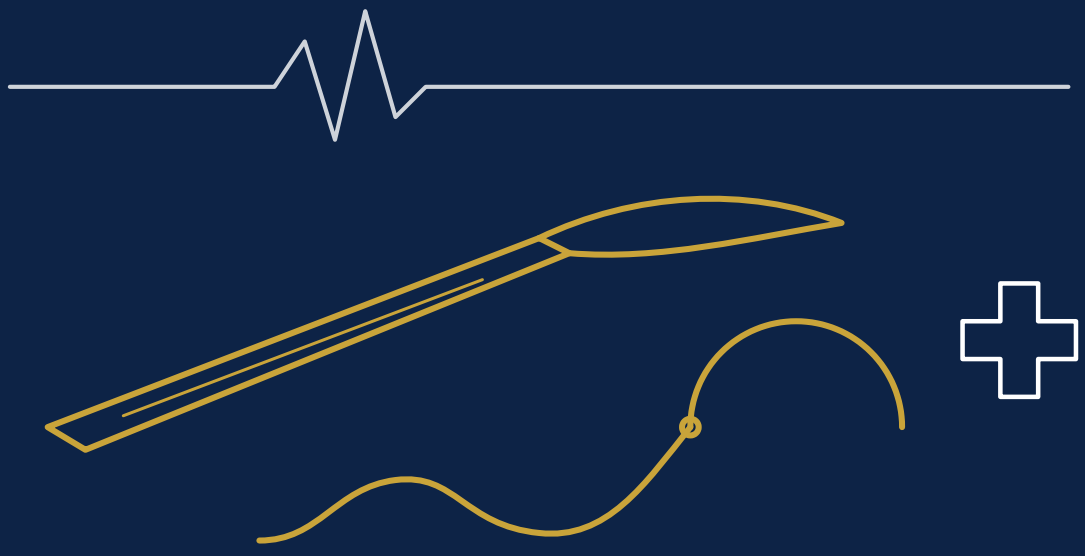
FINAL YEAR MBBS · REVISION MINI-BOOK

Specialty Surgery

Systemic (Regional) Surgery for Rapid Pre-Examination Revision

Based on *Bailey & Love's Short Practice of Surgery*, 28th Edition

Tables · Algorithms · Line Diagrams · 230 Scenario-based One-Best MCQs



Organized by

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Preface

This mini-book has been organized for final year MBBS students who need to revise **specialty (regional) surgery** in the last days before their professional examination. It is the companion to *Surgery in General* and follows the regional chapters of *Bailey & Love's Short Practice of Surgery* (28th Edition): skin, head and neck, endocrine, breast, vascular, gastrointestinal, hepatobiliary, abdominal wall, genitourinary, paediatric, plastic, neurosurgical and cardiothoracic surgery.

The text is written in short, examinable statements. Each chapter contains key-point boxes, comparison tables, management algorithms, simple line diagrams, "exam pearls" and memory aids. Every chapter ends with **10 scenario-based one-best-answer MCQs**, each with five options listed alphabetically, followed by an answer key with a brief explanation.

This book is a revision tool, not a substitute for the parent textbook. Drug doses and protocols should always be checked against current local guidelines before clinical use.

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How to use this book

- **First pass (1 week before):** read each chapter fully, then attempt its MCQs without looking at the key.
- **Second pass (2–3 days before):** read only the boxes, tables, algorithms and exam pearls.
- **Last night:** re-attempt only the MCQs you got wrong and re-read their explanations.

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Reference: O'Connell PR, McCaskie AW, Sayers RD (eds). *Bailey & Love's Short Practice of Surgery*, 28th Edition. CRC Press, 2023.

CHAPTER 1

Skin and Subcutaneous Tissue

Key points

- Describe every lump: **site, size, shape, surface, edge, consistency, fluctuation, transillumination, attachment (skin/deep), temperature, tenderness, regional nodes**.
- The three common skin cancers: **basal cell carcinoma** (commonest, locally invasive), **squamous cell carcinoma** (nodal spread), **melanoma** (most lethal).
- Any changing pigmented lesion needs **excision biopsy with a narrow (2 mm) margin** — never shave or incisional biopsy as routine.

1. Common benign lumps

Lesion	Key clinical features	Management
Epidermoid ("sebaceous") cyst	Intradermal, attached to skin, **central punctum**, smooth, not transilluminant; complications: infection, ulceration (Cock's peculiar tumour), calcification, sebaceous horn	Complete excision with ellipse of skin incl. punctum; drain if infected, excise later
Lipoma	Subcutaneous, soft, lobulated, **slipping edge**, mobile, skin free; may be multiple (Dercum's disease — painful)	Excise if symptomatic; > 5 cm, deep or rapidly growing → MRI to exclude liposarcoma
Dermoid cyst	Congenital: along lines of fusion (**external angular dermoid**); may have bony indentation or intracranial extension	Imaging before excision
Ganglion	Dorsum of wrist; tense, transilluminant, attached to joint/tendon sheath	Reassure, aspirate or excise (recurrence)
Neurofibroma	Soft, mobile across but not along the nerve; multiple in NF1 with café-au-lait spots	Excise if symptomatic
Keratoacanthoma	Rapid growth over weeks, **central keratin crater**, may regress	Excise (mimics SCC)
Pyogenic granuloma	Rapidly growing, bleeding red vascular nodule after trauma	Curettage/excision, histology

2. Skin cancers

Feature	Basal cell carcinoma	Squamous cell carcinoma	Melanoma
Cell	Basal keratinocytes	Keratinocytes	Melanocytes
Risk factors	UV, fair skin, Gorlin syndrome	UV, actinic keratosis, Bowen's disease, chronic ulcer/scar (**Marjolin**), immunosuppression, arsenic	UV (intermittent intense, sunburn), many/atypical naevi, family history, fair skin
Site	Face above line from angle of mouth to ear lobe (inner canthus, nose)	Sun-exposed: lip, ear, back of hands	Back (men), legs (women); acral/subungual in dark skin
Appearance	Pearly nodule, **rolled edge**, telangiectasia, central ulcer ("rodent ulcer")	Keratotic nodule/ulcer with **everted edge**	Pigmented lesion with ABCDE changes
Spread	Local invasion; metastasis **extremely rare**	**Lymph nodes** (2–5%; higher in lip, ear, Marjolin's)	Lymphatic and blood-borne, early
Treatment	Excision 4 mm margin; Mohs surgery for face/recurrent; RT, imiquimod for superficial	Excision 4–6 mm margin; node management	Wide local excision by Breslow; sentinel node biopsy; immunotherapy for advanced

ABCDE of melanoma (+ Glasgow 7-point checklist)
Asymmetry · **B**order irregularity · **C**olour variation · **D**iameter > 6 mm · **E**volution (change), elevation, bleeding, itching.

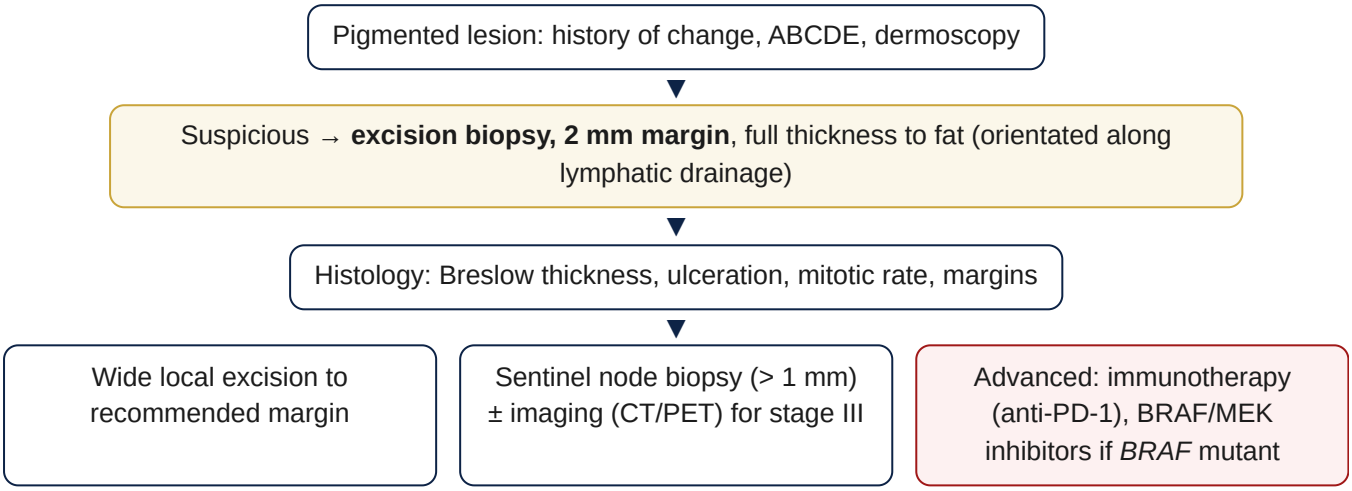
Melanoma: types and prognosis

Type	Features
Superficial spreading	Commonest (~70%); radial growth phase
Nodular	Vertical growth from start; worst prognosis per diameter
Lentigo maligna melanoma	Elderly, sun-damaged face; arises in lentigo maligna (Hutchinson's freckle)
Acral lentiginous	Palms, soles, nail bed; commonest type in dark-skinned people
Amelanotic	Non-pigmented; diagnosed late

Breslow thickness	Recommended excision margin
In situ	5 mm
≤ 1 mm	1 cm
1.01–2 mm	1–2 cm
> 2 mm	2 cm (max 3 cm)

Exam pearl
Breslow thickness (depth in mm from granular layer to deepest tumour cell) is the single most important prognostic factor in localised melanoma. **Sentinel lymph node biopsy** is offered for tumours > 1 mm (pT1b and above) for staging. Subungual melanoma: **Hutchinson's sign** (pigment spreading onto nail fold).

3. Approach to a pigmented lesion



4. Other conditions

Condition	Key facts
Hidradenitis suppurativa	Chronic recurrent abscesses and sinuses of apocrine areas (axilla, groin, perineum); smoking and obesity; antibiotics, biologics, wide excision
Ingrowing toenail	Great toe; wedge excision with **phenolisation** of nail bed
Pilonidal sinus	Natal cleft; hair-containing sinus; abscess drainage; excision, off-midline closure (Karydakis, Bascom), laser options
Haemangioma (infantile)	Appears after birth, grows, then **involutes** by 5–10 years; propranolol for problematic lesions
Port-wine stain	Vascular malformation, present at birth, does not involute; Sturge–Weber if trigeminal

Chapter 1 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

1.1 A 72-year-old farmer has a slowly growing 1 cm lesion near the inner canthus of the eye with a pearly rolled edge, telangiectasia and central ulceration. What is the most likely diagnosis?

A. Basal cell carcinoma
B. Keratoacanthoma
C. Melanoma
D. Seborrhoeic keratosis
E. Squamous cell carcinoma

1.2 A 45-year-old woman has a pigmented lesion on her calf that has enlarged and become irregular over 6 months. What is the most appropriate initial management?

A. Dermoscopy follow-up in 6 months
B. Incisional punch biopsy
C. Narrow-margin (2 mm) excision biopsy
D. Shave biopsy
E. Wide local excision with 2 cm margin

1.3 Histology of an excised melanoma shows a Breslow thickness of 1.6 mm with no ulceration. Clinically the regional nodes are impalpable. What is the recommended further surgical management?

A. Elective lymph node dissection
B. No further surgery
C. Wide local excision with 1 cm margin only
D. Wide local excision with 1–2 cm margin and sentinel lymph node biopsy
E. Wide local excision with 5 cm margin

1.4 A 60-year-old man has a 2 cm ulcer that developed within a 40-year-old burn scar on his leg. The edge is raised and everted, and there is a firm inguinal lymph node. What is the most likely diagnosis?

A. Basal cell carcinoma
B. Malignant melanoma
C. Pyoderma gangrenosum
D. Squamous cell carcinoma
E. Venous ulcer

1.5 A 35-year-old man has a 3 cm smooth, firm, intradermal swelling on his back with a central punctum. It has become red and tender twice. What is the best definitive treatment once inflammation settles?

A. Aspiration
B. Incision and drainage alone
C. Liposuction
D. Long-term antibiotics
E. Total excision of the cyst with the punctum

1.6 A 50-year-old woman has a soft, lobulated, mobile 4 cm lump on the shoulder with an edge that slips under the examining finger. What is the most likely diagnosis?

A. Epidermoid cyst
B. Lipoma
C. Liposarcoma
D. Neurofibroma
E. Sebaceous horn

1.7 A 67-year-old man has a lesion on his lower lip that grew rapidly over 6 weeks into a 1.5 cm dome-shaped nodule with a central keratin-filled crater. What is the most appropriate management?

A. Cryotherapy without histology
B. Excision for histology
C. Observation for spontaneous regression
D. Radiotherapy
E. Topical imiquimod

1.8 A 55-year-old Pakistani man has a pigmented, non-healing lesion under his great toenail, with pigment extending onto the proximal nail fold. What is the most likely type of melanoma?

A. Acral lentiginous melanoma
B. Amelanotic melanoma
C. Lentigo maligna melanoma
D. Nodular melanoma
E. Superficial spreading melanoma

1.9 Which single histological factor is the most important predictor of prognosis in clinically localised cutaneous melanoma?

A. Breslow thickness
B. Clark level
C. Lymphocytic infiltrate
D. Mitotic rate
E. Tumour diameter

1.10 A 6-month-old infant has a raised, bright red, compressible lesion on the scalp that appeared 2 weeks after birth and has grown. It is not ulcerated or near the eye. What is the most appropriate management?

A. Laser ablation urgently
B. Oral prednisolone
C. Propranolol in all cases
D. Reassurance and observation
E. Surgical excision

Answer key with explanations

1.1 — A (Basal cell carcinoma). A pearly nodule with rolled edge, telangiectasia and central ulcer on the upper face is classic BCC (rodent ulcer). SCC has an everted edge and is commoner on the lip, ear and hands.

1.2 — C (Narrow-margin (2 mm) excision biopsy). A suspicious pigmented lesion should be excised completely with a narrow 2 mm margin to allow accurate Breslow measurement; definitive wide excision follows histology. Wide excision before diagnosis disrupts lymphatic mapping for sentinel node biopsy.

1.3 — D (Wide local excision with 1–2 cm margin and sentinel lymph node biopsy). For 1.01–2 mm melanomas a 1–2 cm margin is recommended, and sentinel node biopsy is offered for staging when thickness exceeds 1 mm. Elective dissection of clinically negative nodes is no longer performed.

1.4 — D (Squamous cell carcinoma). Marjolin's ulcer is an SCC arising in a chronic scar or ulcer; it is aggressive and spreads to regional nodes. BCC rarely metastasises.

1.5 — E (Total excision of the cyst with the punctum). An epidermoid (sebaceous) cyst is excised completely with an ellipse of skin including the punctum; leaving the cyst wall causes recurrence. Acutely infected cysts are drained first and excised later.

1.6 — B (Lipoma). A soft, lobulated subcutaneous lump with a slipping edge is a lipoma. Features suggesting liposarcoma — size over 5 cm, deep location, rapid growth, firmness — warrant MRI.

1.7 — B (Excision for histology). Keratoacanthoma may regress, but it is clinically and histologically difficult to distinguish from well-differentiated SCC, especially on the lip; it should be excised for histology.

1.8 — A (Acral lentiginous melanoma). Subungual melanoma with Hutchinson's sign is acral lentiginous melanoma, the commonest type in dark-skinned people. Superficial spreading is commonest overall.

1.9 — A (Breslow thickness). Breslow thickness (measured in mm) is the strongest prognostic factor for localised melanoma and determines excision margins and the T stage. Clark level is an older, less reproducible measure.

1.10 — D (Reassurance and observation). Infantile haemangiomas proliferate then involute spontaneously; uncomplicated lesions are observed. Propranolol is used when they threaten vision, airway or function, or ulcerate.

CHAPTER 2

Neck Swellings, Salivary Glands and Oral Cancer

Key points

- Classify a neck lump by its **position (anatomical triangle)**, **age of patient** and **duration**.
- A persistent lateral neck lump in an adult over 40 is **metastatic squamous carcinoma until proven otherwise** — examine the upper aerodigestive tract; never do an open biopsy first.
- Investigation of choice for most neck lumps: **ultrasound with fine-needle aspiration cytology (US-FNAC)**.
- ~80% of salivary tumours occur in the parotid, and ~80% of those are benign (pleomorphic adenoma).

1. Neck lumps by site

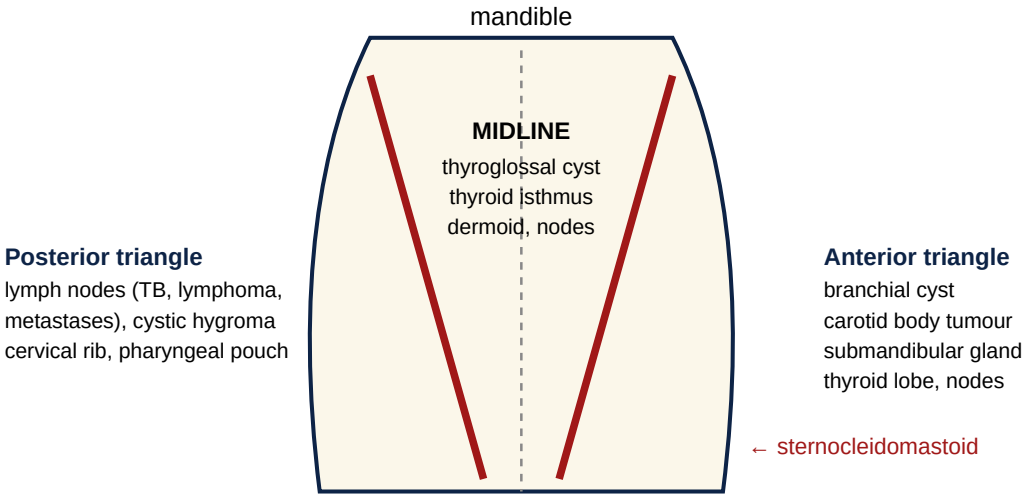
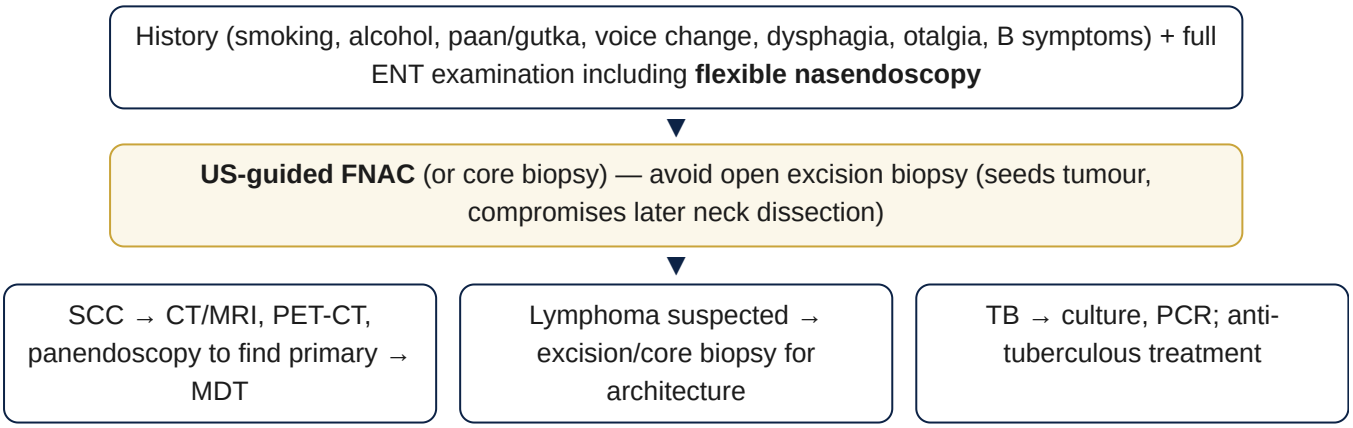


Figure 2.1 — Common neck swellings by anatomical site (schematic, anterior view).

Lesion	Clinical clues	Treatment
Thyroglossal cyst	Midline, child/young adult, **moves up on tongue protrusion** (and swallowing)	**Sistrunk's operation** (excise cyst, tract and middle third of hyoid)
Branchial cyst	Young adult; anterior border of SCM at junction of upper and middle thirds; contains **cholesterol crystals**; may become infected	Excision (beware cystic nodal metastasis in adults > 40)
Cystic hygroma	Infant; posterior triangle; **brilliantly transilluminant** (lymphatic malformation)	Sclerotherapy (OK-432) or excision
Carotid body tumour	Carotid bifurcation; pulsatile; **moves side to side but not up and down**; splaying of carotids ("lyre sign")	Duplex/CTA; **no FNA/biopsy**; excision
Pharyngeal pouch	Elderly; dysphagia, regurgitation, halitosis, gurgling; via **Killian's dehiscence**	Barium swallow; endoscopic stapling
Cervical lymphadenopathy	Reactive, TB (matted, cold abscess, collar-stud), lymphoma (rubbery), metastatic (hard)	US-FNAC; core/excision for lymphoma

Approach to a lateral neck lump in an adult



2. Salivary glands

Feature	Parotid	Submandibular
Commonest problem	**Tumours**	**Stones (sialolithiasis) ~80% of salivary stones**
Why	—	Saliva mucoid and alkaline, rich in calcium; duct runs uphill
Nerve at risk in surgery	**Facial nerve** (passes through gland)	**Marginal mandibular nerve**, lingual and hypoglossal nerves

Tumour	Key features
Pleomorphic adenoma	Commonest; middle-aged; slow, painless, firm; **pseudopod extensions** through capsule → recurrence after enucleation; small risk of malignant change. Treatment: **superficial parotidectomy** (facial nerve preserved)
Warthin's tumour	Older male **smokers**; parotid tail; soft, cystic, may be **bilateral**; hot on technetium scan
Mucoepidermoid carcinoma	Commonest malignant parotid tumour
Adenoid cystic carcinoma	Commonest malignancy in minor and submandibular glands; **perineural spread**

> **Exam pearl — signs of malignancy in a parotid lump**
> Rapid growth, pain, **facial nerve palsy**, fixation to skin or deep tissues, cervical nodes. **Frey's syndrome** (gustatory sweating) after parotidectomy is due to aberrant regeneration of parasympathetic fibres to sweat glands.

Other salivary conditions

- **Acute suppurative parotitis**: elderly, dehydrated post-operative patients, poor oral hygiene; *Staph. aureus*; pus from Stensen's duct → hydration, antibiotics, drainage if abscess.
- **Mumps**: bilateral painful parotid swelling in children.
- **Submandibular stone**: pain and swelling **with meals**; palpable stone in floor of mouth → removal via duct; excise gland if hilar/recurrent.
- **Ranula**: mucous extravasation cyst of sublingual gland in floor of mouth ("frog belly"); plunging ranula extends into neck.
- Sjögren's syndrome: dry eyes/mouth, bilateral gland enlargement; risk of lymphoma.

3. Oral cancer

- > 90% **squamous cell carcinoma**. Very common in South Asia due to **betel quid (paan), areca nut, gutka, naswar**, smoking and alcohol.
- Premalignant lesions: **leukoplakia** (white patch), **erythroplakia** (red patch — highest malignant risk), **oral submucous fibrosis** (areca nut; trismus).
- Sites: lateral border of tongue, floor of mouth, buccal mucosa (paan users), lower lip.
- Features: non-healing ulcer with indurated everted edge, pain, referred otalgia, bleeding, loose teeth, neck nodes.
- Management: biopsy, CT/MRI, staging; **surgical excision with neck dissection** ± reconstruction ± post-operative (chemo)radiotherapy.

Chapter 2 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

2.1 A 9-year-old boy has a 2 cm smooth midline neck swelling just below the hyoid bone that moves upwards when he protrudes his tongue. What is the most appropriate operation?

A. Excision of the cyst alone
B. Hemithyroidectomy
C. Incision and drainage
D. Sclerotherapy
E. Sistrunk's operation

2.2 A 23-year-old man has a 4 cm smooth, fluctuant swelling at the anterior border of the upper third of sternocleidomastoid. Aspiration yields turbid fluid containing cholesterol crystals. What is the diagnosis?

A. Branchial cyst
B. Carotid body tumour
C. Cystic hygroma
D. Dermoid cyst
E. Tuberculous cold abscess

2.3 A 58-year-old smoker and paan chewer has a hard, painless 3 cm lump in the upper deep cervical chain for 2 months. Which is the most appropriate next step?

A. Course of antibiotics and review in 6 weeks
B. Excision biopsy of the node
C. Full ENT examination with nasendoscopy and US-guided FNAC
D. Incision biopsy of the node
E. Radiotherapy to the neck

2.4 A 45-year-old woman has a painless, firm 3 cm lump in the right parotid region for 3 years. Facial nerve function is normal. FNAC suggests pleomorphic adenoma. What is the best treatment?

A. Enucleation of the tumour
B. Observation
C. Radiotherapy
D. Superficial parotidectomy preserving the facial nerve
E. Total parotidectomy with facial nerve sacrifice

2.5 A 65-year-old male smoker has soft, bilateral cystic swellings at the lower poles of both parotid glands. What is the most likely diagnosis?

A. Adenoid cystic carcinoma
B. Mucoepidermoid carcinoma
C. Pleomorphic adenoma
D. Sjögren's syndrome
E. Warthin's tumour

2.6 A 40-year-old man has recurrent painful swelling below the angle of the mandible that occurs during meals and subsides over an hour. Which is the most likely diagnosis?

A. Parotid stone
B. Pleomorphic adenoma of the submandibular gland
C. Ranula
D. Submandibular duct stone
E. Tuberculous lymphadenitis

2.7 A 50-year-old man has a slowly enlarging pulsatile mass at the level of the hyoid. It moves side to side but not vertically. CT angiography shows splaying of the internal and external carotid arteries. What should be avoided?

A. Carotid duplex ultrasound
B. Fine-needle aspiration biopsy
C. Measurement of urinary catecholamines
D. MRI of the neck
E. Referral to a vascular surgeon

2.8 A 60-year-old woman, 6 months after a superficial parotidectomy, complains of sweating and flushing of the cheek on the operated side when she eats. What is the cause?

A. Aberrant regeneration of parasympathetic fibres to sweat glands
B. Facial nerve neuroma
C. Parotid fistula
D. Recurrent tumour
E. Sympathetic denervation of the face

2.9 A 48-year-old man who has chewed gutka for 20 years has a 2 cm non-healing ulcer with an indurated, everted edge on the lateral border of the tongue and pain radiating to the ear. What is the most appropriate initial investigation?

A. Biopsy of the ulcer edge
B. Culture of a swab
C. Fine-needle aspiration of the ulcer
D. Panoramic dental X-ray
E. Trial of topical steroid for 4 weeks

2.10 Which oral premalignant lesion carries the highest risk of malignant transformation?

A. Erythroplakia
B. Frictional keratosis
C. Leukoplakia
D. Lichen planus
E. Oral candidiasis

Answer key with explanations

2.1 — E (Sistrunk's operation). A thyroglossal cyst moves on tongue protrusion because its tract is attached to the foramen caecum via the hyoid. Excision of the cyst, tract and central hyoid (Sistrunk) reduces recurrence; cyst excision alone recurs frequently.

2.2 — A (Branchial cyst). A branchial cyst presents in young adults at the anterior border of SCM at the junction of upper and middle thirds; cholesterol crystals in the aspirate are characteristic. In adults over 40, a cystic nodal SCC metastasis must be excluded.

2.3 — C (Full ENT examination with nasendoscopy and US-guided FNAC). A hard neck node in a high-risk adult suggests metastatic SCC from the upper aerodigestive tract. The primary should be sought and FNAC obtained; open biopsy seeds tumour and compromises later neck dissection.

2.4 — D (Superficial parotidectomy preserving the facial nerve). Pleomorphic adenoma has pseudopod extensions through its capsule; enucleation leaves tumour behind and recurrence is high. Superficial parotidectomy with facial nerve preservation is standard.

2.5 — E (Warthin's tumour). Warthin's tumour (adenolymphoma) occurs in older male smokers, typically in the parotid tail, and may be bilateral. Pleomorphic adenoma is usually unilateral and firm.

2.6 — D (Submandibular duct stone). Meal-time pain and swelling (salivary colic) is due to duct obstruction; about 80% of salivary stones occur in the submandibular gland because its saliva is viscous and calcium-rich and the duct drains uphill.

2.7 — B (Fine-needle aspiration biopsy). A carotid body tumour (paraganglioma) is highly vascular; biopsy risks haemorrhage and is unnecessary because imaging is diagnostic. Catecholamine screening is reasonable as some are functional.

2.8 — A (Aberrant regeneration of parasympathetic fibres to sweat glands). Frey's syndrome (gustatory sweating) results from parasympathetic (auriculotemporal) fibres that supplied the parotid reinnervating the sweat glands of the overlying skin. Treatment includes antiperspirants or botulinum toxin.

2.9 — A (Biopsy of the ulcer edge). This is very likely oral SCC; diagnosis requires an incisional biopsy from the ulcer edge, followed by staging imaging. A trial of topical treatment delays diagnosis.

2.10 — A (Erythroplakia). Erythroplakia (a red velvety patch) has the highest malignant potential, with a large proportion showing dysplasia or carcinoma at biopsy. Leukoplakia is commoner but has lower transformation risk.

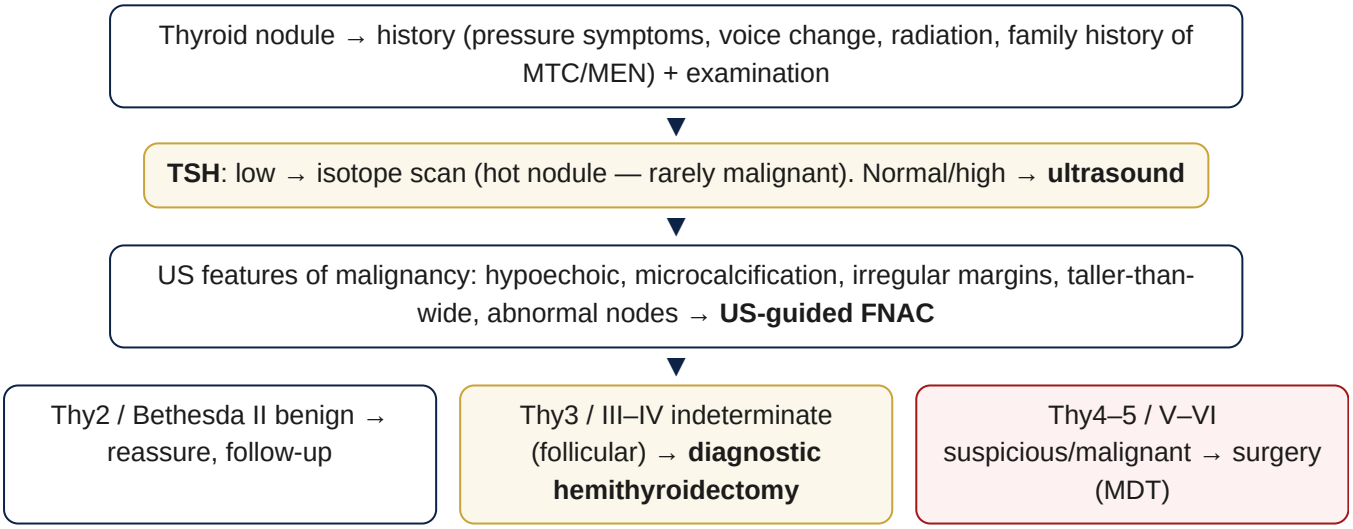
CHAPTER 3

Thyroid, Parathyroid and Adrenal Glands

Key points

- A thyroid swelling **moves with swallowing** (invested in pretracheal fascia).
- Every thyroid nodule needs **TFTs + ultrasound (U-classification) + FNAC (Thy/Bethesda)** as indicated.
- Commonest thyroid cancer: **papillary** (lymphatic spread, excellent prognosis).
- Key complications of thyroidectomy: **haemorrhage (airway), recurrent laryngeal nerve palsy, hypocalcaemia**.

1. Assessment of a thyroid nodule



Why diagnostic hemithyroidectomy for follicular lesions?

FNAC cannot distinguish follicular adenoma from carcinoma — carcinoma is defined by **capsular or vascular invasion**, seen only on histology of the excised nodule.

2. Goitre

Type	Key points
Simple diffuse / multinodular	Iodine deficiency (endemic in northern Pakistan), puberty, pregnancy; euthyroid; surgery for pressure, retrosternal extension, cosmesis or suspicion
Toxic multinodular (Plummer)	Older patients; AF common; no eye signs; radioiodine or surgery
Graves' disease	Autoimmune (TSH-receptor antibodies); diffuse goitre with bruit, **exophthalmos, pretibial myxoedema**; anti-thyroid drugs (carbimazole) 12–18 months → radioiodine or total thyroidectomy
Hashimoto's thyroiditis	Anti-TPO antibodies; firm goitre; hypothyroid; risk of **thyroid lymphoma**
De Quervain's (subacute)	Post-viral, painful tender thyroid, raised ESR, transient hyperthyroidism, low uptake on scan
Retrosternal goitre	Tracheal compression, stridor, **Pemberton's sign** (facial plethora on raising arms); CT; most removed via neck

3. Thyroid cancer

Type	%	Features	Spread	Treatment / marker
Papillary	~75–80	Young women, radiation; **Orphan Annie nuclei, psammoma bodies**; often multifocal	**Lymphatic**	Hemi- or total thyroidectomy ± RAI; thyroglobulin
Follicular	~10–15	Older; capsular/vascular invasion	**Blood** (bone, lung)	Total thyroidectomy + RAI; thyroglobulin
Medullary	~5	Parafollicular **C cells**; sporadic or **MEN 2** (*RET*); amyloid stroma	Nodes, blood	Total thyroidectomy + central neck dissection; **calcitonin, CEA**; exclude phaeochromocytoma first; no RAI
Anaplastic	< 2	Elderly, rapidly growing hard mass, airway compromise	Local + distant	Very poor prognosis; palliation, airway
Lymphoma	< 5	Hashimoto's background; rapid growth	—	Core biopsy; chemo-radiotherapy

4. Thyroidectomy: preparation and complications

- Pre-op: make **euthyroid** (carbimazole ± propranolol; Lugol's iodine 10 days pre-op in Graves' reduces vascularity), **laryngoscopy** to document cord function, calcium.

Complication	Key facts
Reactionary haemorrhage	Within 24 h; tension haematoma → airway obstruction → **open the wound at the bedside**
Recurrent laryngeal nerve palsy	Unilateral → hoarseness; bilateral → **stridor**, may need tracheostomy. Nerve at risk near the **inferior thyroid artery** and Berry's ligament
External branch of superior laryngeal nerve	Runs with superior thyroid artery; loss of high-pitched voice (cricothyroid) — important in singers
Hypocalcaemia	Parathyroid devascularisation/removal; perioral tingling, carpopedal spasm, **Chvostek's and Trousseau's** signs, 24–72 h → IV calcium gluconate
Thyroid storm	Inadequately prepared toxic patient; hyperpyrexia, tachyarrhythmia, confusion → β-blocker, carbimazole/PTU, Lugol's iodine, steroids, cooling
Hypothyroidism	After total thyroidectomy (lifelong levothyroxine)

5. Parathyroid

Type	Biochemistry	Cause
Primary hyperparathyroidism	↑ Ca^{2+}, ↑/inappropriately normal PTH, ↓ PO_4^{3-}	Single **adenoma (~85%)**, hyperplasia, carcinoma (rare); MEN 1/2A
Secondary	↓/N Ca^{2+}, ↑ PTH	Chronic kidney disease, vitamin D deficiency
Tertiary	↑ Ca^{2+}, very ↑ PTH	Autonomous glands after long-standing secondary (post-renal transplant)

Hypercalcaemia: "Stones, bones, abdominal groans and psychic moans"
Renal stones · bone pain/osteoporosis · constipation, peptic ulcer, pancreatitis · depression, confusion · plus polyuria/thirst. Localise with **sestamibi scan + ultrasound** → focused parathyroidectomy.

6. Adrenal (surgical essentials)

Condition	Key facts
Phaeochromocytoma	Episodic headache, sweating, palpitations, hypertension; plasma/urine metanephrines; "rule of 10s" (classic); **α-blockade (phenoxybenzamine) first, then β-blockade** before adrenalectomy
Conn's syndrome	Hypertension + hypokalaemia; raised aldosterone : renin ratio; adenoma → laparoscopic adrenalectomy
Cushing's syndrome	Pituitary (Cushing's disease) commonest endogenous cause; adrenal adenoma → adrenalectomy
Adrenal incidentaloma	Biochemical screen for function; > 4 cm or suspicious imaging → consider resection

Chapter 3 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

3.1 A 35-year-old woman has a 2 cm solitary thyroid nodule. TSH is normal. Ultrasound shows a hypoechoic nodule with microcalcifications. FNAC reports Thy3f (follicular neoplasm). What is the most appropriate next step?

A. Diagnostic hemithyroidectomy
B. Radioactive iodine ablation
C. Repeat FNAC in 6 months
D. Thyroxine suppression therapy
E. Total thyroidectomy with neck dissection

3.2 A 28-year-old woman has a thyroid nodule and a palpable ipsilateral jugular lymph node. FNAC shows cells with 'Orphan Annie eye' nuclei and psammoma bodies. What is the diagnosis?

A. Anaplastic carcinoma
B. Follicular carcinoma
C. Hürthle cell adenoma
D. Medullary carcinoma
E. Papillary carcinoma

3.3 A 32-year-old man has a thyroid nodule. His father had a 'thyroid cancer' and adrenal surgery. Serum calcitonin is markedly raised. Before thyroidectomy, which investigation is essential?

A. Isotope thyroid scan
B. Plasma or urinary metanephrines
C. Serum thyroglobulin
D. Thyroid peroxidase antibodies
E. Whole-body iodine scan

3.4 Thirty-six hours after total thyroidectomy, a 40-year-old woman has tingling around the mouth and fingers. Tapping over the facial nerve causes twitching of the upper lip. What is the most likely cause?

A. Damage to the external laryngeal nerve
B. Hypocalcaemia from parathyroid injury
C. Hypomagnesaemia from diuretics
D. Hysterical hyperventilation
E. Thyroid storm

3.5 After a total thyroidectomy, a patient develops inspiratory stridor and respiratory distress on extubation. The neck is not swollen. Laryngoscopy shows both vocal cords lying near the midline. What is the cause?

A. Bilateral recurrent laryngeal nerve palsy
B. Bilateral superior laryngeal nerve palsy
C. Laryngeal oedema from intubation
D. Tension haematoma
E. Tracheomalacia

3.6 A 30-year-old woman with Graves' disease and a large vascular goitre is scheduled for total thyroidectomy. She is euthyroid on carbimazole. Which additional pre-operative measure reduces gland vascularity?

A. Intravenous hydrocortisone
B. Lugol's iodine for 10 days before surgery
C. Propranolol alone
D. Radioactive iodine 1 week before surgery
E. Stopping carbimazole 2 weeks before surgery

3.7 A 55-year-old woman has renal colic, depression and constipation. Serum calcium 2.9 mmol/L, phosphate low, PTH elevated, renal function normal. What is the most likely cause?

A. Malignancy with PTH-related peptide
B. Parathyroid adenoma
C. Parathyroid carcinoma
D. Secondary hyperparathyroidism
E. Tertiary hyperparathyroidism

3.8 A 70-year-old woman with long-standing Hashimoto's thyroiditis has a rapidly enlarging, firm goitre over 2 months with mild stridor. What is the most likely diagnosis?

A. Anaplastic carcinoma
B. De Quervain's thyroiditis
C. Haemorrhage into a cyst
D. Primary thyroid lymphoma
E. Riedel's thyroiditis

3.9 A 42-year-old man has episodic severe headaches, palpitations, sweating and BP 210/120 mmHg. Plasma metanephrines are raised and CT shows a 4 cm left adrenal mass. Which drug should be started first before surgery?

A. Amlodipine
B. Atenolol
C. Furosemide
D. Phenoxybenzamine
E. Spironolactone

3.10 A 45-year-old woman with a large multinodular goitre extending behind the sternum develops facial congestion and distended neck veins when she raises both arms above her head. What is this sign called?

A. Berry's sign
B. Chvostek's sign
C. Kocher's sign
D. Pemberton's sign
E. Trousseau's sign

Answer key with explanations

3.1 — A (Diagnostic hemithyroidectomy). FNAC cannot distinguish follicular adenoma from carcinoma; capsular or vascular invasion is shown only on histology. Diagnostic hemithyroidectomy is performed, with completion thyroidectomy if carcinoma is confirmed.

3.2 — E (Papillary carcinoma). Papillary carcinoma is the commonest thyroid cancer, typically in young women, with characteristic nuclear features and psammoma bodies; it spreads via lymphatics to cervical nodes. Follicular carcinoma spreads by blood.

3.3 — B (Plasma or urinary metanephrines). Medullary thyroid carcinoma with a family history suggests MEN 2 (RET mutation). A phaeochromocytoma must be excluded and treated first, otherwise induction of anaesthesia may provoke a hypertensive crisis.

3.4 — B (Hypocalcaemia from parathyroid injury). Chvostek's sign with paraesthesia 24–72 h after total thyroidectomy indicates hypocalcaemia due to parathyroid devascularisation; check calcium and give IV calcium gluconate if symptomatic. Hyperventilation can also cause tingling, but not in this setting with a positive Chvostek sign.

3.5 — A (Bilateral recurrent laryngeal nerve palsy). Bilateral RLN palsy leaves both cords in the paramedian position, causing stridor and airway obstruction; reintubation and often tracheostomy are needed. A haematoma would cause neck swelling.

3.6 — B (Lugol's iodine for 10 days before surgery). Potassium iodide (Lugol's iodine) given for about 10 days pre-operatively reduces gland vascularity and hormone release (Wolff–Chaikoff effect). Propranolol controls symptoms but does not reduce vascularity.

3.7 — B (Parathyroid adenoma). Hypercalcaemia with raised PTH and normal renal function is primary hyperparathyroidism, caused in ~85% by a single adenoma. PTHrP-mediated hypercalcaemia suppresses PTH.

3.8 — D (Primary thyroid lymphoma). Hashimoto's thyroiditis is the major risk factor for primary thyroid lymphoma, which presents with rapid enlargement. Anaplastic carcinoma is the close alternative; core biopsy distinguishes them and lymphoma is treated non-surgically.

3.9 — D (Phenoxybenzamine). Phaeochromocytoma requires α-blockade (phenoxybenzamine) first, with fluid loading; β-blockers are added later for tachycardia. Starting with a β-blocker leaves α-stimulation unopposed and can precipitate a hypertensive crisis.

3.10 — D (Pemberton's sign). Pemberton's sign indicates thoracic inlet obstruction by a retrosternal goitre. Chvostek's and Trousseau's signs indicate hypocalcaemia.

CHAPTER 4

The Breast

Key points

- Every breast lump is assessed by **triple assessment**: clinical examination + imaging + needle biopsy (core).
- Commonest lump: **fibroadenoma** (15–30 years); **cysts** (35–50); **carcinoma** (rising after 40).
- Breast cancer management depends on **stage and receptor status (ER, PR, HER2)** and is decided by the MDT.

1. Triple assessment

Breast lump / symptom → **1. Clinical**: history, examination of both breasts and axillae

▼

2. Imaging: < 35–40 years → **ultrasound**; ≥ 40 → **mammography + ultrasound**; MRI for lobular cancer, implants, dense breasts, occult primary

▼

3. Pathology: image-guided **core needle biopsy** (histology + receptors); FNA for cysts/nodes

▼

Results scored (e.g. P/R/B 1–5) → **concordant benign** → reassure · **any suspicious score** → MDT

2. Benign breast disease

Condition	Key features	Management
Fibroadenoma	15–30 years; smooth, firm, highly mobile ("**breast mouse**"), painless	Triple assessment; reassure; excise if > 3–4 cm, growing or patient wishes
Giant/juvenile fibroadenoma	> 5 cm, adolescents	Excision
Phyllodes tumour	Older (40s); rapid growth, large; benign → malignant spectrum	Wide excision (1 cm margin)
Breast cyst	Perimenopausal; smooth, may be tender, sudden onset	Aspirate: if bloodstained or residual mass → cytology/biopsy
Fibrocystic change (ANDI)	Cyclical pain and lumpiness	Reassure, supportive bra
Duct ectasia	Perimenopausal/older; thick cheesy discharge, slit-like nipple retraction	Reassure; total duct excision if troublesome
Intraductal papilloma	Commonest cause of **bloodstained single-duct** discharge	Imaging; microdochectomy
Fat necrosis	History of trauma; hard irregular lump, may mimic cancer	Triple assessment
Lactational abscess	Breastfeeding; *Staph. aureus*	Antibiotics + **US-guided aspiration** (repeated); continue breastfeeding/expressing
Periductal mastitis	Young **smokers**; subareolar abscess, mammary duct fistula	Antibiotics (incl. anaerobic), aspiration; stop smoking; fistula excision

Nipple discharge — red flags
Single duct, **bloodstained**, spontaneous, associated lump, age > 50, male. Bilateral milky multi-duct discharge suggests galactorrhoea (check prolactin, drugs).

3. Breast cancer

Topic	Key facts
Risk factors	Age, female sex, **BRCA1/2**, family history, early menarche, late menopause, nulliparity/late first pregnancy, HRT/OCP, obesity, alcohol, previous chest radiotherapy, atypical hyperplasia
Pathology	Invasive ductal (no special type) ~75%; invasive lobular ~10% (multifocal, bilateral, difficult on mammography); DCIS (non-invasive, microcalcification on mammogram)
Clinical features	Hard, irregular painless lump, skin tethering, **peau d'orange**, nipple retraction, eczema of nipple (**Paget's disease** — underlying cancer), axillary nodes
Spread	Lymphatic (axillary, internal mammary), blood: bone (commonest), lung, liver, brain
Prognosis	**Nottingham Prognostic Index** = 0.2 × size (cm) + grade (1–3) + node stage (1–3); lymph node status is the most important single factor

Management overview

Confirmed cancer → staging (CT/bone scan if locally advanced or symptoms) → MDT

▼

Breast surgery
Wide local excision (breast-conserving) + **radiotherapy**
or mastectomy ± reconstruction

Axilla
Clinically/US negative → **sentinel node biopsy**
Proven node positive → axillary clearance or RT

▼

ER/PR + → **endocrine therapy**: tamoxifen (premenopausal), aromatase inhibitor (postmenopausal), 5–10 yrs

HER2 + → **trastuzumab** + chemotherapy

High risk / triple negative → chemotherapy (often neoadjuvant)

Indications for mastectomy	Complications of axillary surgery
Large tumour relative to breast, multicentric disease, central tumours (relative), patient choice, contraindication to radiotherapy, recurrence after conservation, *BRCA* risk reduction	**Lymphoedema** of arm, seroma, shoulder stiffness, numbness of inner arm (intercostobrachial nerve), injury to long thoracic nerve (**winged scapula**) or thoracodorsal nerve

Tamoxifen side effects
Hot flushes, **endometrial cancer**, **VTE**, cataract. Aromatase inhibitors: arthralgia, **osteoporosis** (monitor bone density).

4. Male breast

- **Gynaecomastia**: puberty, old age, drugs (spironolactone, digoxin, cimetidine, anabolic steroids, cannabis), liver cirrhosis, testicular tumours, hyperthyroidism.
- Male breast cancer: ~1% of breast cancers; *BRCA2*; eccentric hard lump, early nipple involvement.

Chapter 4 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

4.1 A 22-year-old woman has a 2 cm smooth, firm, very mobile, painless lump in the upper outer quadrant of the right breast. Which is the most appropriate imaging investigation?

A. CT of the chest
B. Ductography
C. Mammography alone
D. MRI of both breasts
E. Ultrasound of the breast

4.2 A 46-year-old woman has a smooth, tender 3 cm lump that appeared suddenly. Ultrasound confirms a simple cyst. Aspiration yields 10 mL of green fluid and the lump disappears completely. What is the next step?

A. Cytology of the fluid and mammography in 1 week
B. Excision of the cyst wall
C. Mastectomy
D. Reassure and discharge with breast awareness advice
E. Repeat aspiration weekly

4.3 A 42-year-old woman has spontaneous bloodstained discharge from a single duct of the left nipple. There is no palpable lump; mammography is normal. What is the most likely cause?

A. Breast abscess
B. Duct ectasia
C. Intraductal papilloma
D. Paget's disease of the nipple
E. Prolactinoma

4.4 A 28-year-old breastfeeding woman, 3 weeks post-partum, has a hot, tender, fluctuant 3 cm swelling in the breast with fever. Ultrasound confirms an abscess. What is the most appropriate treatment?

A. Antibiotics alone and stop breastfeeding
B. Antibiotics and ultrasound-guided aspiration, continuing breastfeeding or expressing
C. Bromocriptine to suppress lactation
D. Mastectomy
E. Open incision and drainage with packing as first line

4.5 A 58-year-old woman has a 2 cm invasive ductal carcinoma, ER-positive and HER2-negative. Axillary ultrasound is normal. She wishes to conserve her breast. What is the most appropriate surgical plan?

A. Mastectomy and axillary clearance
B. Neoadjuvant trastuzumab then mastectomy
C. Wide local excision alone
D. Wide local excision and axillary clearance
E. Wide local excision and sentinel lymph node biopsy, followed by radiotherapy

4.6 A 65-year-old postmenopausal woman has completed surgery for an ER-positive, HER2-negative breast cancer. Which adjuvant endocrine therapy is generally preferred?

A. Anastrozole (aromatase inhibitor)
B. Goserelin
C. Megestrol acetate
D. Tamoxifen
E. Trastuzumab

4.7 A 50-year-old woman has an eczematous, crusting lesion of the right nipple for 4 months that has not responded to topical steroids. There is no palpable lump. What is the most appropriate investigation?

A. Bacterial swab
B. Full-thickness punch biopsy of the nipple and mammography
C. Patch testing for contact dermatitis
D. Serum prolactin
E. Trial of topical antifungal

4.8 After a mastectomy and axillary clearance, a patient notices that her right scapula protrudes when she pushes against a wall. Which nerve has been injured?

A. Intercostobrachial nerve
B. Long thoracic nerve
C. Medial pectoral nerve
D. Suprascapular nerve
E. Thoracodorsal nerve

4.9 A 34-year-old woman who smokes 20 cigarettes a day has had three episodes of a painful subareolar abscess and now has a discharging opening at the areolar margin. What is the most likely diagnosis?

A. Duct ectasia
B. Inflammatory breast cancer
C. Lactational mastitis
D. Mammary duct fistula from periductal mastitis
E. Tuberculosis of the breast

4.10 A 55-year-old woman's breast cancer is 3 cm (size), grade 3, with 4 involved axillary nodes (node score 3). What is her Nottingham Prognostic Index?

A. 5.4
B. 6.0
C. 6.6
D. 7.2
E. 9.0

Answer key with explanations

4.1 — E (Ultrasound of the breast). In women under 35–40, dense breast tissue limits mammography; ultrasound is the imaging of choice within triple assessment, followed by core biopsy if indicated. The lesion is likely a fibroadenoma.

4.2 — D (Reassure and discharge with breast awareness advice). A simple cyst that yields non-bloodstained fluid and resolves completely after aspiration needs no further investigation. Bloodstained fluid, a residual mass or rapid recurrence requires cytology and biopsy.

4.3 — C (Intraductal papilloma). Intraductal papilloma is the commonest cause of single-duct bloodstained discharge in a woman with a normal mammogram; microdochectomy provides diagnosis and treatment. Duct ectasia usually gives thick, multi-duct discharge.

4.4 — B (Antibiotics and ultrasound-guided aspiration, continuing breastfeeding or expressing). Breast abscesses are treated with antibiotics (flucloxacillin) and repeated needle aspiration; incision is reserved for failure or skin necrosis. Continued emptying of the breast helps resolution.

4.5 — E (Wide local excision and sentinel lymph node biopsy, followed by radiotherapy). For a small tumour with a clinically and radiologically negative axilla, breast-conserving surgery plus sentinel node biopsy is standard; whole-breast radiotherapy must follow conservation. Axillary clearance is for proven node-positive disease.

4.6 — A (Anastrozole (aromatase inhibitor)). In postmenopausal women, oestrogen comes from peripheral aromatisation, so aromatase inhibitors are preferred and slightly more effective than tamoxifen. Tamoxifen is first line in premenopausal women; trastuzumab is for HER2-positive disease.

4.7 — B (Full-thickness punch biopsy of the nipple and mammography). Persistent unilateral nipple eczema involving the nipple itself is Paget's disease until proven otherwise, associated with underlying DCIS or invasive cancer. Biopsy and mammography are required; true eczema usually affects the areola and is often bilateral.

4.8 — B (Long thoracic nerve). The long thoracic nerve supplies serratus anterior; injury causes winging of the scapula. The thoracodorsal nerve (latissimus dorsi) is the close distractor; intercostobrachial nerve injury causes numbness of the inner arm.

4.9 — D (Mammary duct fistula from periductal mastitis). Periductal mastitis, strongly associated with smoking, causes recurrent subareolar abscesses and mammary duct fistula. Treatment involves stopping smoking and excision of the fistula and affected duct.

4.10 — C (6.6). NPI = 0.2 × size (cm) + grade + node score = 0.6 + 3 + 3 = 6.6, which falls in the poor prognostic group (> 5.4).

CHAPTER 5

Arterial Disorders

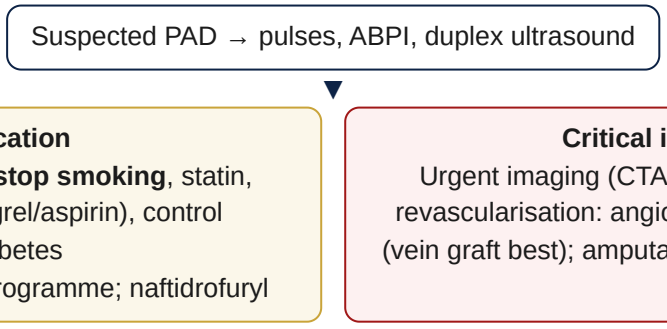
Key points

- Atherosclerosis is the main cause of peripheral arterial disease (PAD), aneurysms and carotid disease; risk factors: **smoking, diabetes, hypertension, hyperlipidaemia**, age, male sex.
- **Ankle–brachial pressure index (ABPI)**: normal 0.9–1.2; claudication ~0.5–0.9; critical ischaemia < 0.5 (falsely high in diabetics with calcified vessels).
- **Acute limb ischaemia** is a surgical emergency: the "6 Ps".
- Abdominal aortic aneurysm ≥ **5.5 cm** in men → consider repair.

1. Chronic lower limb ischaemia

Fontaine stage	Clinical
I	Asymptomatic
II	**Intermittent claudication** (calf pain on walking relieved by rest — superficial femoral artery disease commonest)
III	**Rest pain** (night pain in foot, relieved by hanging leg down)
IV	Ulceration / gangrene

Chronic limb-threatening ischaemia = rest pain > 2 weeks or tissue loss. **Buerger's test**: pallor on elevation, reactive rubor on dependency. **Leriche syndrome**: aorto-iliac occlusion → buttock claudication, impotence, absent femoral pulses.



2. Acute limb ischaemia

The 6 Ps
Pain · **P**allor · **P**ulselessness · **P**erishingly cold · **P**araesthesia · **P**aralysis (paraesthesia and paralysis = threatened limb; fixed mottling = irreversible)

Feature	Embolus	Thrombosis in situ
Source	Heart (**AF**, post-MI mural thrombus), aneurysm	Pre-existing atheroma
Onset	Sudden, severe	Less abrupt
History of claudication	No	Yes
Contralateral pulses	Normal	Often absent
Treatment	IV heparin → **embolectomy (Fogarty catheter)**	Heparin, angiography → thrombolysis/angioplasty/bypass

After revascularisation watch for **reperfusion injury, compartment syndrome** (fasciotomy), hyperkalaemia, myoglobinuria.

3. Abdominal aortic aneurysm (AAA)

Topic	Key facts
Definition	Infrarenal aorta ≥ 3 cm (or > 1.5 × normal)
Risk factors	Male, > 65, **smoking**, family history, hypertension
Screening	Single ultrasound for men at 65 (UK)
Surveillance	3.0–4.4 cm yearly US; 4.5–5.4 cm 3-monthly
Repair indication	≥ 5.5 cm (men; ~5.0 cm women), growth > 1 cm/year, or symptomatic (tender)
Repair options	**EVAR** (endovascular — lower early mortality, needs lifelong surveillance, endoleak) or open repair
Rupture	Abdominal/back pain, collapse, pulsatile mass → **permissive hypotension**, straight to theatre (CT only if stable); mortality ~80% overall

4. Carotid disease and stroke prevention

- Symptoms: **TIA**, amaurosis fugax (transient monocular blindness), stroke in carotid territory.
- Duplex ultrasound grades stenosis.
- **Symptomatic stenosis 50–99% → carotid endarterectomy within 2 weeks** of symptoms + best medical therapy.
- Complications of CEA: stroke, MI, haematoma, cranial nerve injury (**hypoglossal** — tongue deviates to side of injury), hyperperfusion.

5. Other conditions

Condition	Key facts
Diabetic foot	Neuropathy + ischaemia + infection; check pulses/ABPI (may mislead); X-ray for osteomyelitis/gas; urgent debridement of wet gangrene/abscess; offloading; MDT foot care
Thromboangiitis obliterans (Buerger's)	Young male **smokers**, distal small vessels, digital ulcers, migratory thrombophlebitis; stopping smoking essential
Raynaud's phenomenon	White → blue → red colour change; primary (young women) or secondary (scleroderma)
Thoracic outlet syndrome	Cervical rib; neurological, venous or arterial symptoms in arm
Amputation levels	Below-knee preferred where healing possible (better prosthetic function); above-knee if knee contractures or poor perfusion

Chapter 5 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

5.1 A 64-year-old smoker has right calf pain after walking 200 metres, relieved within minutes by rest. Right ABPI is 0.7. Foot pulses are absent. What is the most appropriate initial management?

A. Below-knee amputation
B. Femoro-popliteal bypass
C. Percutaneous angioplasty
D. Smoking cessation, statin, antiplatelet and supervised exercise
E. Sympathectomy

5.2 A 75-year-old woman with atrial fibrillation not on anticoagulation develops sudden severe pain in the left leg 3 hours ago. The leg is cold, white and pulseless below the femoral; sensation and movement are intact. Right leg pulses are normal. What is the most appropriate treatment after IV heparin?

A. Amputation
B. Catheter-directed thrombolysis over 48 hours
C. Conservative management with warfarin
D. Femoro-distal bypass
E. Fogarty balloon embolectomy

5.3 After successful embolectomy for a 6-hour acute ischaemic leg, the patient develops severe calf pain on passive dorsiflexion of the toes and a tense swollen calf. Foot pulses are palpable. What is the next step?

A. Elevate the leg and give analgesia
B. Four-compartment fasciotomy
C. Repeat embolectomy
D. Start thrombolysis
E. Ultrasound to exclude DVT

5.4 A 70-year-old man has an asymptomatic abdominal aortic aneurysm measured at 4.8 cm on ultrasound. What is the most appropriate management?

A. CT angiography and EVAR now
B. Discharge with reassurance
C. Elective open repair
D. Repeat ultrasound every 3 months
E. Repeat ultrasound in 2 years

5.5 A 72-year-old man collapses with severe back pain. He is pale, BP 80/50 mmHg, and has a tender pulsatile epigastric mass. Which is the most appropriate management?

A. CT angiography before any decision
B. Rapid infusion of 4 L of crystalloid to normalise blood pressure
C. Thrombolysis
D. Transfer immediately to theatre with permissive hypotension
E. Ultrasound to measure the aneurysm

5.6 A 67-year-old man had transient loss of vision in his left eye 'like a curtain coming down' lasting 5 minutes, 1 week ago. Duplex shows 80% stenosis of the left internal carotid artery. What is the most appropriate management?

A. Aspirin alone and review in 6 months
B. Carotid endarterectomy in 6 months
C. Carotid endarterectomy within 2 weeks plus best medical therapy
D. Observation only
E. Right carotid endarterectomy

5.7 After a left carotid endarterectomy, a patient's tongue deviates to the left on protrusion. Which nerve has been injured?

A. Glossopharyngeal
B. Hypoglossal
C. Lingual
D. Marginal mandibular
E. Vagus

5.8 A 58-year-old diabetic man has a foot ulcer. Foot pulses are not palpable, but his ABPI is 1.4. What is the most likely explanation for this ABPI?

A. Arteriovenous fistula
B. Calcified, incompressible tibial arteries
C. Excellent peripheral perfusion
D. High cardiac output
E. Measurement in the wrong position

5.9 A 32-year-old man who smokes 30 cigarettes daily has painful ulcers on the tips of his fingers and toes and episodes of superficial thrombophlebitis. What is the most important treatment?

A. Anticoagulation with warfarin
B. Calcium channel blockers
C. Complete cessation of smoking
D. Digital sympathectomy
E. Steroids

5.10 A 60-year-old man has buttock and thigh claudication, erectile dysfunction and absent femoral pulses bilaterally. Where is the most likely site of occlusion?

A. Aorto-iliac segment
B. Common femoral artery
C. Popliteal artery
D. Superficial femoral artery
E. Tibial arteries

Answer key with explanations

5.1 — D (Smoking cessation, statin, antiplatelet and supervised exercise). Intermittent claudication is managed first with best medical therapy and supervised exercise; most patients improve and few progress to limb loss. Intervention is considered for lifestyle-limiting symptoms after this.

5.2 — E (Fogarty balloon embolectomy). Sudden onset in AF with normal contralateral pulses indicates embolism; treatment is heparin and urgent embolectomy. Thrombolysis is better suited to in-situ thrombosis or graft occlusion.

5.3 — B (Four-compartment fasciotomy). Reperfusion causes oedema and compartment syndrome; pain on passive stretch and a tense compartment require urgent fasciotomy. Palpable pulses do not exclude compartment syndrome.

5.4 — D (Repeat ultrasound every 3 months). Aneurysms of 4.5–5.4 cm are kept under 3-monthly ultrasound surveillance; repair is advised at ≥ 5.5 cm, rapid growth (> 1 cm/year) or symptoms.

5.5 — D (Transfer immediately to theatre with permissive hypotension). Suspected ruptured AAA in an unstable patient requires immediate surgery (or EVAR if the patient is stable enough for CT). Permissive hypotension limits further bleeding; aggressive fluids worsen haemorrhage.

5.6 — C (Carotid endarterectomy within 2 weeks plus best medical therapy). Amaurosis fugax is a TIA of the retinal circulation. Symptomatic ipsilateral stenosis of 50–99% benefits most from endarterectomy performed within 2 weeks of symptoms.

5.7 — B (Hypoglossal). The hypoglossal nerve crosses the carotid bifurcation; injury causes ipsilateral tongue weakness, so the tongue deviates towards the side of injury. Marginal mandibular injury affects the corner of the mouth.

5.8 — B (Calcified, incompressible tibial arteries). Medial arterial calcification in diabetes and renal failure makes vessels incompressible, giving a falsely high ABPI. Toe pressures or duplex give a better assessment.

5.9 — C (Complete cessation of smoking). Thromboangiitis obliterans (Buerger's disease) affects young male smokers; complete abstinence from tobacco is the only treatment that halts progression.

5.10 — A (Aorto-iliac segment). Leriche syndrome — aorto-iliac occlusive disease — causes buttock/thigh claudication, impotence and absent femoral pulses. SFA disease, the commonest site, causes calf claudication with palpable femorals.

CHAPTER 6

Venous and Lymphatic Disorders

Key points

- Varicose veins result from **valvular incompetence**, usually at the saphenofemoral (SFJ) or saphenopopliteal junction (SPJ).
- Investigation of choice: **duplex ultrasound** (reflux > 0.5 s).
- Venous ulcers need **compression** — only after confirming ABPI > 0.8.
- Endovenous ablation is first-line treatment for truncal reflux.

1. Venous anatomy of the lower limb

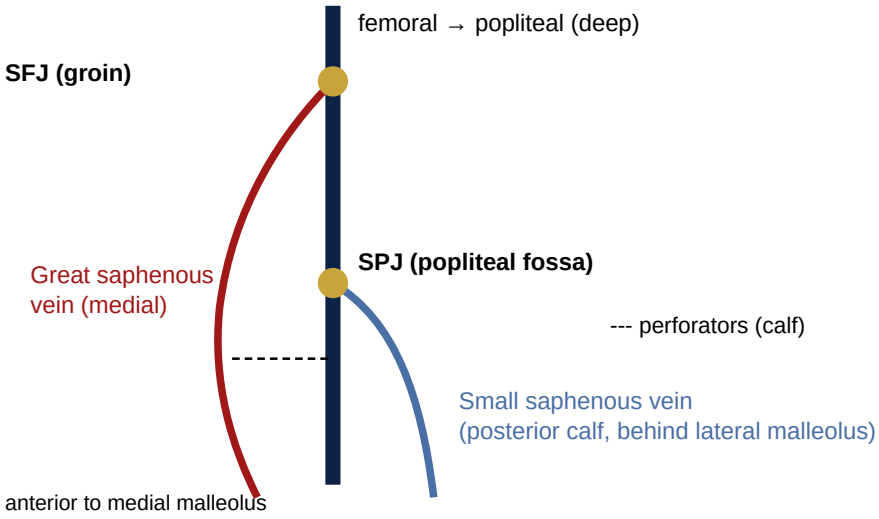


Figure 6.1 — Superficial and deep venous systems of the leg (schematic).

2. Varicose veins

Topic	Key facts
Primary	Valve failure; female, pregnancy, family history, prolonged standing, obesity
Secondary	Previous DVT (post-thrombotic), pelvic mass, AV fistula, Klippel–Trénaunay
Symptoms	Aching, heaviness, itching, ankle swelling worse at end of day
Complications	Haemorrhage, superficial thrombophlebitis, **skin changes** (eczema, haemosiderin pigmentation, **lipodermatosclerosis**, atrophie blanche), **venous ulcer**
Classification	**CEAP**: C0 none · C1 telangiectasia · C2 varicose veins · C3 oedema · C4 skin changes · C5 healed ulcer · C6 active ulcer
Clinical tests	Trendelenburg and tourniquet tests (historical) → replaced by **duplex**; cough impulse/saphena varix at SFJ

Treatment options

Option	Notes
Conservative	Graduated compression stockings, weight loss, leg elevation, exercise
Endothermal ablation (radiofrequency/laser)	First line for truncal reflux; day case, local anaesthetic; risk of nerve injury, DVT (EHIT)
Foam sclerotherapy	Smaller veins, recurrences; risk of visual disturbance, thrombophlebitis
Open surgery	SFJ ligation (Trendelenburg), stripping to knee (avoid below knee — **saphenous nerve**), avulsions; SPJ surgery risks **sural and common peroneal** nerves

> **Exam pearl — saphena varix**
> Soft groin swelling below and lateral to the pubic tubercle, disappears on lying, cough impulse and **fluid thrill** on tapping the vein below; may mimic a femoral hernia.

3. Venous ulcer versus arterial ulcer

Feature	Venous	Arterial
Site	**Gaiter area**, above medial malleolus	Toes, heel, pressure points
Pain	Mild, relieved by elevation	Severe, worse on elevation, night pain
Edge / base	Shallow, sloping edge, granulating base	Punched out, deep, pale base
Surrounding skin	Pigmentation, lipodermatosclerosis, eczema	Cold, shiny, hairless, pulses absent
Treatment	**Multilayer compression** (if ABPI > 0.8) + treat superficial reflux	Revascularisation; compression contraindicated

Any non-healing ulcer → **biopsy** to exclude SCC (Marjolin's).

4. Superficial thrombophlebitis and DVT

- Superficial thrombophlebitis: tender red cord; duplex to exclude extension to deep system (within 3 cm of SFJ → anticoagulate); **migratory thrombophlebitis** → consider occult malignancy (Trousseau's sign — pancreas).
- DVT and PE are covered in *Surgery in General* (post-operative complications).
- Post-thrombotic syndrome: chronic pain, swelling, skin changes and ulceration after DVT.

5. Lymphoedema

Type	Causes
Primary	Congenital (**Milroy's disease** — at birth), praecox (puberty — commonest), tarda (> 35 years)
Secondary	**Filariasis** (*Wuchereria bancrofti*) — commonest worldwide; axillary/inguinal surgery and radiotherapy, malignancy, recurrent cellulitis

Features: non-pitting (late) swelling, involves dorsum of foot, **Stemmer's sign** (cannot pinch skin at base of second toe), hyperkeratosis. Investigation: lymphoscintigraphy. Treatment: **decongestive therapy** (massage, multilayer bandaging, compression garments, skin care, exercise); surgery (lymphovenous anastomosis, debulking) for selected cases.

Chapter 6 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

6.1 A 42-year-old woman has varicose veins on the medial aspect of the thigh and calf with aching at the end of the day. Which is the investigation of choice before treatment?

A. Ascending venography
B. CT venography
C. Duplex ultrasound
D. Handheld Doppler alone
E. Trendelenburg tourniquet test

6.2 A 50-year-old woman has a shallow, painless ulcer above the medial malleolus with surrounding brown pigmentation and induration. Before applying multilayer compression bandaging, which investigation is essential?

A. Ankle–brachial pressure index
B. Blood glucose
C. Erythrocyte sedimentation rate
D. Swab for culture
E. Venography

6.3 A 48-year-old man has a soft swelling in the right groin below and lateral to the pubic tubercle that disappears on lying down, has a cough impulse, and transmits a fluid thrill when the varicose veins below are tapped. What is the diagnosis?

A. Femoral artery aneurysm
B. Femoral hernia
C. Inguinal hernia
D. Psoas abscess
E. Saphena varix

6.4 After open stripping of the great saphenous vein down to the ankle, a patient has numbness along the medial side of the leg and foot. Which nerve has been injured?

A. Common peroneal nerve
B. Saphenous nerve
C. Superficial peroneal nerve
D. Sural nerve
E. Tibial nerve

6.5 A 55-year-old man has symptomatic varicose veins with great saphenous vein reflux on duplex and no deep venous disease. What is the recommended first-line intervention?

A. Compression stockings for life
B. Foam sclerotherapy
C. Open high ligation and stripping
D. Radiofrequency or laser (endothermal) ablation
E. Subfascial endoscopic perforator surgery

6.6 A 60-year-old man has migratory superficial thrombophlebitis affecting different veins over several weeks, weight loss and new-onset diabetes. What should be suspected?

A. Buerger's disease
B. Carcinoma of the pancreas
C. Polycythaemia vera
D. Protein C deficiency
E. Varicose veins

6.7 A 16-year-old girl has gradually progressive painless swelling of the left foot and leg since puberty. The swelling involves the dorsum of the foot, and the skin at the base of the second toe cannot be pinched. What is the most likely diagnosis?

A. Deep vein thrombosis
B. Lipoedema
C. Lymphoedema praecox
D. Milroy's disease
E. Venous insufficiency

6.8 Which is the commonest cause of secondary lymphoedema worldwide?

A. Axillary node dissection
B. Filariasis
C. Malignant infiltration of nodes
D. Radiotherapy
E. Recurrent cellulitis

6.9 A 45-year-old woman has a tender, red, cord-like swelling along the great saphenous vein in the upper thigh. Duplex shows thrombus extending to 2 cm from the saphenofemoral junction. What is the most appropriate management?

A. Antibiotics
B. Compression and NSAIDs only
C. Incision and drainage
D. Reassure and no treatment
E. Therapeutic anticoagulation

6.10 A patient has varicose veins with lipodermatosclerosis and pigmentation but no ulcer, either active or healed. What is the CEAP clinical class?

A. C2
B. C3
C. C4
D. C5
E. C6

Answer key with explanations

6.1 — C (Duplex ultrasound). Duplex ultrasound maps reflux (> 0.5 s) at the junctions and in truncal veins and assesses the deep system; it is required before any intervention. Clinical tourniquet tests are inaccurate.

6.2 — A (Ankle–brachial pressure index). Compression can cause pressure necrosis in an ischaemic limb; ABPI must be > 0.8 before full compression. Swabs are rarely helpful as ulcers are colonised.

6.3 — E (Saphena varix). A saphena varix is a dilatation of the great saphenous vein at the SFJ; the fluid thrill on tapping distally distinguishes it from a femoral hernia, which also has a cough impulse.

6.4 — B (Saphenous nerve). The saphenous nerve accompanies the great saphenous vein below the knee; stripping only to the knee reduces this risk. The sural nerve accompanies the small saphenous vein.

6.5 — D (Radiofrequency or laser (endothermal) ablation). Endothermal (radiofrequency or laser) ablation is first-line for truncal reflux; foam sclerotherapy is the next option and open surgery is used when endovenous techniques are unsuitable.

6.6 — B (Carcinoma of the pancreas). Migratory thrombophlebitis (Trousseau's sign of malignancy) is classically associated with pancreatic carcinoma; new diabetes and weight loss support this.

6.7 — C (Lymphoedema praecox). Primary lymphoedema appearing at puberty is lymphoedema praecox (the commonest primary form). Stemmer's sign and foot involvement distinguish it from lipoedema, which spares the feet. Milroy's disease is present at birth.

6.8 — B (Filariasis). Lymphatic filariasis (Wuchereria bancrofti) is the commonest cause of lymphoedema worldwide; in developed countries cancer treatment is the commonest cause.

6.9 — E (Therapeutic anticoagulation). Superficial thrombophlebitis within 3 cm of the SFJ risks propagation into the deep system and PE; therapeutic anticoagulation (or SFJ ligation) is indicated. Distal thrombophlebitis is managed with NSAIDs and compression.

6.10 — C (C4). C4 denotes skin changes (pigmentation, eczema, lipodermatosclerosis); C5 is a healed ulcer and C6 an active ulcer.

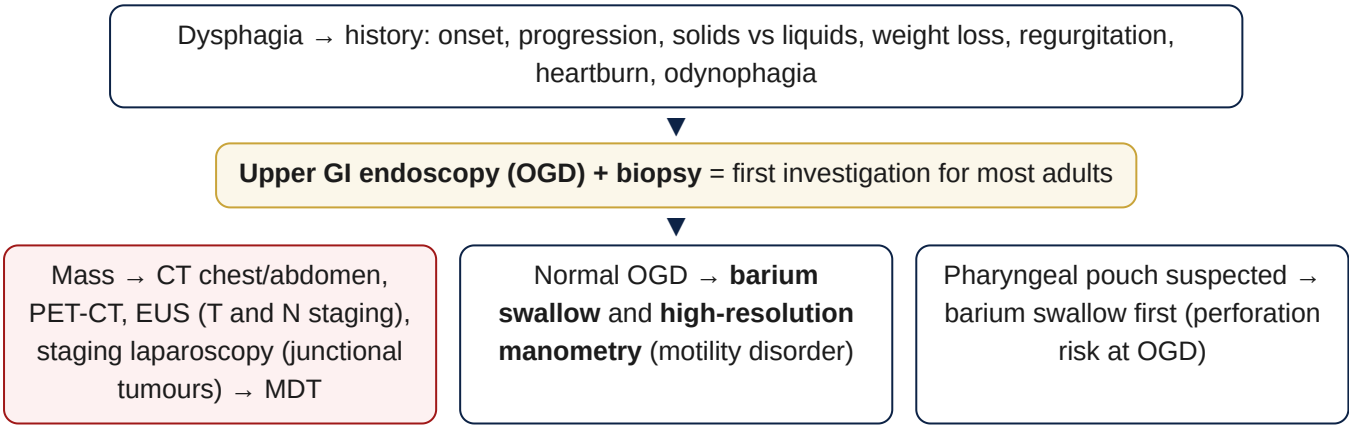
CHAPTER 7

The Oesophagus

Key points

- **Progressive dysphagia** (solids → liquids) with weight loss in an adult = carcinoma until proven otherwise → **urgent upper GI endoscopy with biopsy**.
- Dysphagia to **liquids and solids from the outset** suggests a motility disorder (achalasia).
- GORD → Barrett's oesophagus → dysplasia → **adenocarcinoma** (lower third). Squamous carcinoma: upper/middle third (smoking, alcohol, hot beverages).
- Oesophageal perforation (Boerhaave's) is a surgical emergency with high mortality.

1. Approach to dysphagia



Cause of dysphagia	Clue
Carcinoma	Progressive, solids first, elderly, weight loss
Peptic stricture	Long history of heartburn
Achalasia	Liquids and solids, regurgitation of undigested food, chest pain, young–middle age
Pharyngeal pouch	Elderly, gurgling neck swelling, halitosis, regurgitation
Plummer–Vinson syndrome	Middle-aged women, iron-deficiency anaemia, post-cricoid web (post-cricoid carcinoma risk)
Eosinophilic oesophagitis	Young atopic men, food bolus impaction, rings on OGD
Extrinsic	Mediastinal nodes, lung cancer, aortic aneurysm

2. Gastro-oesophageal reflux disease and hiatus hernia

Topic	Key facts
Mechanism	Incompetent lower oesophageal sphincter, hiatus hernia, delayed gastric emptying, obesity
Hiatus hernia	**Sliding (type I, ~90%)** — GOJ moves into chest, causes reflux; **rolling/para-oesophageal (type II)** — fundus beside the oesophagus, risk of **volvulus, strangulation** → repair even if asymptomatic in fit patients
Investigation	OGD (oesophagitis, Barrett's); **24-h pH/impedance monitoring** and manometry before anti-reflux surgery
Treatment	Lifestyle (weight loss, smoking, late meals, elevate bed head), **PPI**; **laparoscopic Nissen fundoplication** (360° wrap) for refractory symptoms, volume reflux or PPI intolerance
Complications of fundoplication	Dysphagia, gas-bloat syndrome, inability to belch/vomit, wrap slippage

Barrett's oesophagus
Replacement of squamous by **columnar epithelium with intestinal metaplasia** (goblet cells). Surveillance endoscopy; high-grade dysplasia → **endoscopic mucosal resection + radiofrequency ablation**. Risk of adenocarcinoma ~0.3–0.5% per year.

3. Achalasia

- Loss of ganglion cells in the myenteric (Auerbach's) plexus → **failure of LOS relaxation** and aperistalsis.
- Barium swallow: dilated oesophagus with smooth tapering "**bird's beak**"; absent gastric air bubble on CXR.
- **Manometry** (gold standard): high LOS pressure, incomplete relaxation, aperistalsis.
- OGD to exclude **pseudo-achalasia** (carcinoma at cardia).
- Treatment: pneumatic dilatation, **laparoscopic Heller's cardiomyotomy + partial fundoplication**, **POEM**; botulinum toxin for frail patients.
- Chagas' disease (*Trypanosoma cruzi*) produces a similar picture; long-standing achalasia → squamous carcinoma risk.

4. Carcinoma of the oesophagus

Feature	Squamous cell carcinoma	Adenocarcinoma
Site	Upper and middle third	**Lower third / GOJ**
Risk factors	Smoking, alcohol, hot drinks, nitrosamines, achalasia, Plummer–Vinson, caustic stricture, tylosis	**GORD, Barrett's**, obesity, male
Geography	Asia, Africa ("oesophageal cancer belt")	Western countries — rising

Treatment: resectable → **neoadjuvant chemotherapy or chemoradiotherapy** → oesophagectomy (Ivor Lewis: laparotomy + right thoracotomy; McKeown three-stage; transhiatal). Early (T1a) → endoscopic resection. **Palliation**: self-expanding metal stent, radiotherapy/brachytherapy, chemotherapy, nutritional support.

Main complications of oesophagectomy: **anastomotic leak**, pneumonia, chylothorax, recurrent laryngeal nerve palsy, conduit necrosis.

5. Oesophageal perforation

Cause	Features
Iatrogenic (commonest — endoscopy, dilatation)	Pain, fever, surgical emphysema after procedure
Boerhaave's syndrome (spontaneous, forceful vomiting)	Severe chest/epigastric pain after vomiting (often after alcohol), **surgical emphysema** (Mackler's triad: vomiting, chest pain, subcutaneous emphysema); left lower posterior oesophagus; mimics MI/pancreatitis

Investigation: CXR (pneumomediastinum, left effusion), **CT with oral water-soluble contrast**. Treatment: nil by mouth, broad-spectrum antibiotics + antifungal, PPI, nutrition; early surgical repair/drainage or endoscopic stent/clip depending on size, timing and contamination.

Mallory–Weiss tear: mucosal tear at GOJ after retching → haematemesis; usually settles conservatively.

Chapter 7 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

7.1 A 67-year-old man has 3 months of progressive difficulty swallowing solid food, now also soft food, with 8 kg weight loss. He has had heartburn for 20 years. What is the most appropriate first investigation?

A. Barium swallow
B. CT of the chest
C. Oesophageal manometry
D. PET-CT
E. Upper GI endoscopy with biopsy

7.2 A 35-year-old woman has 2 years of dysphagia to both liquids and solids from the start, regurgitation of undigested food at night and weight loss. Barium swallow shows a dilated oesophagus with a smooth 'bird's beak' narrowing. Which investigation confirms the diagnosis?

A. 24-hour pH monitoring
B. CT of the thorax
C. Endoscopic ultrasound
D. High-resolution oesophageal manometry
E. Serum anti-endomysial antibodies

7.3 A 40-year-old man vomits violently after heavy drinking, then develops severe lower chest pain. He is tachycardic, and crepitus is felt in the neck. Chest X-ray shows pneumomediastinum and a left pleural effusion. What is the most likely diagnosis?

A. Acute pancreatitis
B. Boerhaave's syndrome
C. Mallory–Weiss tear
D. Myocardial infarction
E. Perforated peptic ulcer

7.4 A 52-year-old man undergoes surveillance OGD for Barrett's oesophagus. Biopsies from a flat area show high-grade dysplasia, confirmed by two pathologists. There is no visible lesion. What is the preferred treatment?

A. Endoscopic ablation (e.g. radiofrequency ablation)
B. High-dose PPI and repeat endoscopy in 2 years
C. Laparoscopic Nissen fundoplication
D. Observation with annual endoscopy
E. Oesophagectomy

7.5 A 70-year-old woman has epigastric fullness and occasional chest pain after meals. CXR shows a retrocardiac gas bubble; barium study shows the gastric fundus herniated alongside a normally placed gastro-oesophageal junction. What is the main reason to recommend surgical repair?

A. Risk of Barrett's oesophagus
B. Risk of carcinoma
C. Risk of gastric volvulus and strangulation
D. Severe acid reflux
E. To prevent achalasia

7.6 A 45-year-old man has typical reflux symptoms controlled only on high-dose PPI; he wishes to stop medication. OGD shows grade B oesophagitis and a small sliding hiatus hernia. Which investigation is essential before considering fundoplication?

A. Barium meal and follow-through
B. CT of the abdomen
C. Gastric emptying study
D. Oesophageal manometry and 24-hour pH/impedance monitoring
E. Serum gastrin

7.7 A 72-year-old man with oesophageal carcinoma has liver metastases and cannot swallow his saliva. Performance status is 3. What is the most appropriate management of his dysphagia?

A. Feeding jejunostomy alone
B. Ivor Lewis oesophagectomy
C. Neoadjuvant chemoradiotherapy
D. Self-expanding metal stent
E. Total parenteral nutrition

7.8 A 48-year-old woman has iron-deficiency anaemia, glossitis, koilonychia and dysphagia to solids. Barium swallow shows a thin web in the upper oesophagus. Which malignancy is she at increased risk of?

A. Adenocarcinoma of the lower oesophagus
B. Gastric lymphoma
C. Gastrointestinal stromal tumour
D. Post-cricoid squamous cell carcinoma
E. Thyroid carcinoma

7.9 On day 6 after an Ivor Lewis oesophagectomy, a patient becomes febrile and tachycardic, and the right chest drain output becomes cloudy and turbid. What is the most likely complication?

A. Anastomotic leak
B. Chylothorax
C. Empyema from pneumonia only
D. Pulmonary embolism
E. Recurrent laryngeal nerve palsy

7.10 A 26-year-old man with asthma and eczema presents with a piece of meat stuck in his oesophagus, his third such episode. OGD shows concentric rings and furrows. What is the most likely diagnosis?

A. Achalasia
B. Candida oesophagitis
C. Eosinophilic oesophagitis
D. Peptic stricture
E. Schatzki ring only

Answer key with explanations

7.1 — E (Upper GI endoscopy with biopsy). Progressive dysphagia with weight loss is an alarm feature; OGD with biopsy gives a tissue diagnosis. Long-standing reflux suggests Barrett's-related adenocarcinoma of the lower third. CT and PET are staging investigations.

7.2 — D (High-resolution oesophageal manometry). Manometry is the gold standard for achalasia, showing failure of LOS relaxation and aperistalsis. OGD is still needed to exclude pseudo-achalasia due to a cardia tumour.

7.3 — B (Boerhaave's syndrome). Spontaneous full-thickness rupture of the lower oesophagus after forceful vomiting presents with chest pain and surgical emphysema (Mackler's triad). A Mallory–Weiss tear is mucosal and presents with haematemesis without emphysema.

7.4 — A (Endoscopic ablation (e.g. radiofrequency ablation)). High-grade dysplasia in Barrett's is treated endoscopically (resection of visible lesions, radiofrequency ablation of flat dysplasia). Oesophagectomy carries significant morbidity and is reserved for invasive cancer; fundoplication does not reverse dysplasia.

7.5 — C (Risk of gastric volvulus and strangulation). This is a para-oesophageal (rolling) hiatus hernia with a normally positioned GOJ. The main risk is volvulus, obstruction and strangulation, so repair is advised in fit patients. Sliding hernias cause reflux.

7.6 — D (Oesophageal manometry and 24-hour pH/impedance monitoring). pH/impedance confirms reflux and manometry excludes achalasia or severe dysmotility, which would make a full fundoplication cause severe dysphagia.

7.7 — D (Self-expanding metal stent). Metastatic disease with poor performance status calls for palliation; a self-expanding metal stent relieves dysphagia rapidly. Brachytherapy is an alternative with slower onset but more durable relief.

7.8 — D (Post-cricoid squamous cell carcinoma). Plummer–Vinson (Paterson–Kelly) syndrome — anaemia, dysphagia and an oesophageal web — predisposes to post-cricoid squamous carcinoma. Adenocarcinoma is associated with Barrett's.

7.9 — A (Anastomotic leak). Sepsis around days 5–7 with turbid drain fluid after oesophagectomy indicates an anastomotic leak; confirm with CT and contrast or endoscopy. Chylothorax produces milky fluid rich in triglycerides, typically when feeding restarts.

7.10 — C (Eosinophilic oesophagitis). Young atopic men with recurrent food bolus impaction and trachealisation (rings) on endoscopy have eosinophilic oesophagitis; biopsies show > 15 eosinophils/hpf. Treatment includes PPI, topical steroids and dietary therapy.

CHAPTER 8

Stomach and Duodenum

Key points

- Peptic ulcer disease is caused mainly by ***Helicobacter pylori*** and **NSAIDs**; elective ulcer surgery is now rare.
- Surgical emergencies: **perforation, bleeding, gastric outlet obstruction**.
- Upper GI bleeding: resuscitate → risk score → **endoscopy within 24 h** (sooner if unstable).
- Gastric cancer presents late; alarm features demand urgent endoscopy.

1. Peptic ulcer disease

Feature	Duodenal ulcer	Gastric ulcer
Frequency	Commoner (~4:1)	Less common
H. pylori	~90% (less now; NSAIDs ↑)	~70%
Pain	Epigastric, relieved by food, **night pain**	Worse with food, weight loss
Malignancy	Never malignant	Can be malignant → **biopsy all and re-scope to confirm healing**
Typical bleed source	Posterior DU → **gastroduodenal artery**	Lesser curve → **left gastric artery**

Treatment: *H. pylori* **eradication** (PPI + two antibiotics, e.g. amoxicillin + clarithromycin, 7–14 days; confirm with urea breath/stool antigen test), stop NSAIDs, PPI. **Zollinger–Ellison syndrome** (gastrinoma; MEN 1) → multiple/distal ulcers, diarrhoea, very high gastrin.

2. Perforated peptic ulcer

Sudden severe epigastric pain → generalised peritonitis, **board-like rigidity**, shoulder-tip pain; history of NSAIDs/ulcer

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Erect CXR: free air under diaphragm (~75%) → **CT** if doubt; serum amylase to exclude pancreatitis

▼

Resuscitate: IV fluids, analgesia, NG tube, catheter, IV antibiotics, IV PPI

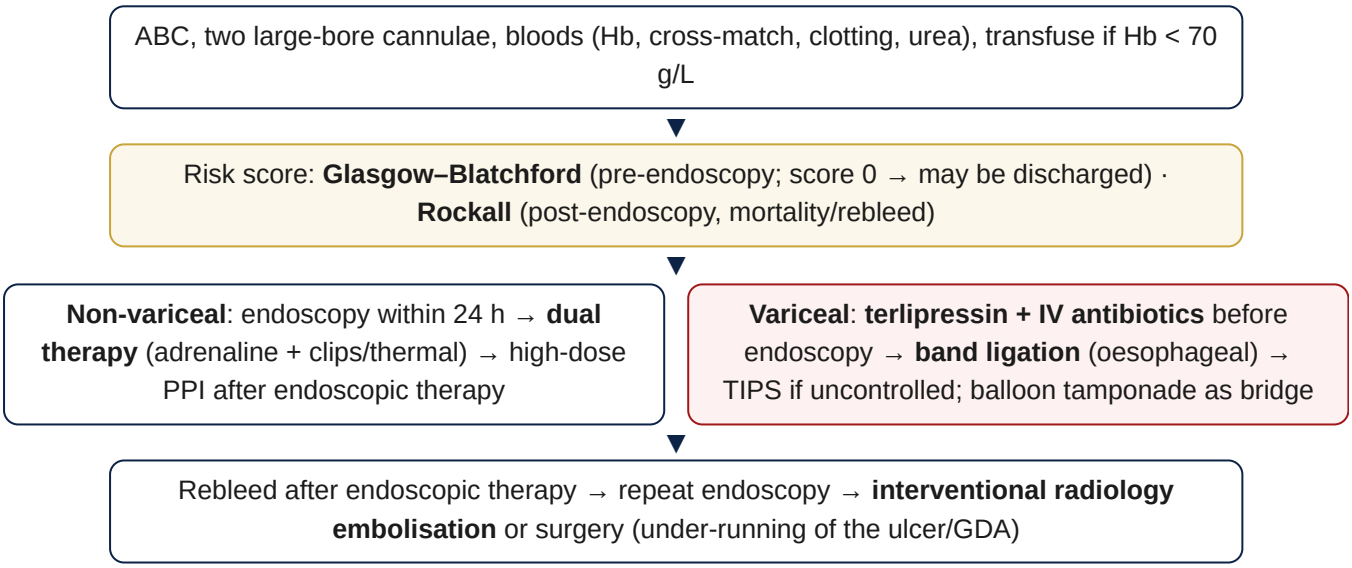
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Laparotomy/laparoscopy: omental patch repair (Graham patch) + peritoneal lavage; biopsy gastric ulcers → post-op *H. pylori* eradication

Conservative (Taylor) management only in selected stable patients with a sealed perforation on contrast study.

3. Upper gastrointestinal bleeding

Cause	Clue
Peptic ulcer (commonest)	NSAIDs, dyspepsia
Oesophageal/gastric varices	Chronic liver disease, portal hypertension stigmata
Mallory–Weiss tear	Haematemesis after retching
Erosive gastritis/oesophagitis	NSAIDs, alcohol, critical illness
Malignancy	Weight loss, anaemia
Dieulafoy lesion	Large tortuous submucosal artery; massive bleed, small mucosal defect



4. Gastric outlet obstruction

- Causes: chronic duodenal/pyloric ulcer scarring, **carcinoma of the antrum** (commonest now in adults), pancreatic cancer; infantile hypertrophic pyloric stenosis in babies.
- Features: projectile vomiting of undigested food **without bile**, visible gastric peristalsis, **succussion splash**, weight loss.
- Metabolic: **hypochloraemic, hypokalaemic metabolic alkalosis with paradoxical aciduria** → correct with 0.9% saline + KCl.
- Investigation: NG decompression, OGD + biopsy, CT. Treatment: benign → endoscopic balloon dilatation; malignant → resection, gastrojejunostomy or duodenal stent.

5. Gastric carcinoma

Topic	Key facts
Risk factors	*H. pylori*, smoked/salted foods, nitrosamines, atrophic gastritis, pernicious anaemia, previous partial gastrectomy, blood group A, *CDH1* (diffuse hereditary)
Pathology	Adenocarcinoma. **Lauren**: intestinal type (older, distal) vs diffuse type (younger, signet-ring cells, **linitis plastica**)
Signs of spread	**Virchow's node** (left supraclavicular, Troisier's sign), **Sister Mary Joseph nodule** (umbilicus), **Krukenberg tumour** (ovaries), ascites, hepatomegaly, Blumer's shelf on PR
Staging	CT, EUS, **staging laparoscopy** with peritoneal washings
Treatment	**Perioperative chemotherapy** (e.g. FLOT) + gastrectomy (subtotal for distal, total for proximal) with **D2 lymphadenectomy**; early gastric cancer → endoscopic submucosal dissection; HER2+ → trastuzumab

Other gastric tumours

GIST — from interstitial cells of Cajal, *KIT*/CD117 positive, imatinib. **MALT lymphoma** — *H. pylori*; low-grade lesions regress after eradication.

6. Complications after gastric surgery

Complication	Key features
Early dumping	10–30 min after meals; osmotic fluid shift → palpitations, sweating, abdominal cramps
Late dumping	2–3 h after meals; reactive **hypoglycaemia**
Nutritional	**B12 deficiency** (loss of intrinsic factor — lifelong injections after total gastrectomy), iron deficiency, osteoporosis
Others	Duodenal stump leak, afferent loop syndrome, bile reflux gastritis, small-stomach syndrome

7. Bariatric surgery (in brief)

Indicated for BMI ≥ 40, or ≥ 35 with comorbidity (lower thresholds in South Asians). Commonest operations: **sleeve gastrectomy** and **Roux-en-Y gastric bypass**. Benefits include remission of type 2 diabetes.

Chapter 8 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

8.1 A 45-year-old man taking ibuprofen for back pain develops sudden severe epigastric pain spreading over the whole abdomen. He has board-like rigidity. Erect chest X-ray shows free gas under the right hemidiaphragm. After resuscitation, what is the standard operative treatment?

A. Highly selective vagotomy
B. Omental patch repair with peritoneal lavage
C. Partial gastrectomy (Billroth I)
D. Total gastrectomy
E. Truncal vagotomy and pyloroplasty

8.2 A 60-year-old man has haematemesis. Endoscopy shows a posterior duodenal ulcer with a visible vessel that rebleeds despite two endoscopic attempts. He remains unstable after transfusion. Which artery is most likely bleeding?

A. Gastroduodenal artery
B. Left gastric artery
C. Right gastroepiploic artery
D. Short gastric artery
E. Superior mesenteric artery

8.3 A 55-year-old man with alcoholic cirrhosis presents with large haematemesis, BP 90/60 mmHg. After resuscitation, which drug treatment should be started before endoscopy?

A. Intravenous omeprazole alone
B. Octreotide alone
C. Oral propranolol
D. Terlipressin and intravenous antibiotics
E. Tranexamic acid

8.4 A 65-year-old man has 3 weeks of projectile, non-bilious vomiting of food eaten the previous day. A succussion splash is present. Which set of blood results is most likely?

A. Hyperchloraemic acidosis with hyperkalaemia
B. Hypochloraemic alkalosis with hyperkalaemia
C. Hypochloraemic alkalosis with hypokalaemia
D. Hyponatraemic acidosis
E. Normal electrolytes

8.5 A 62-year-old man with weight loss and early satiety has a hard, non-tender left supraclavicular lymph node. What is this sign called, and what does it suggest?

A. Blumer's shelf — pelvic metastasis
B. Krukenberg tumour — ovarian metastasis
C. Sister Mary Joseph nodule — umbilical metastasis
D. Troisier's sign — metastatic gastric carcinoma
E. Virchow's triad — venous thrombosis

8.6 A 70-year-old woman has a 3 cm gastric ulcer on the lesser curve on endoscopy. Biopsies are benign. After 8 weeks of PPI treatment and H. pylori eradication, what is the next step?

A. Barium meal
B. Discharge
C. Partial gastrectomy
D. Repeat endoscopy with biopsy to confirm healing
E. Serum gastrin

8.7 Twenty minutes after meals, a patient who had a partial gastrectomy experiences palpitations, sweating, flushing and abdominal cramps with diarrhoea. What is the mechanism?

A. Bacterial overgrowth in an afferent loop
B. Bile reflux into the gastric remnant
C. Rapid osmotic fluid shift into the small bowel
D. Reactive hypoglycaemia due to insulin surge
E. Vitamin B12 deficiency

8.8 A 58-year-old man has a 4 cm submucosal mass in the gastric body found at endoscopy. EUS-guided biopsy shows spindle cells that are strongly CD117 positive. What is the diagnosis?

A. Gastric adenocarcinoma
B. Gastrointestinal stromal tumour
C. Leiomyoma
D. MALT lymphoma
E. Neuroendocrine tumour

8.9 A 50-year-old man with recurrent duodenal and jejunal ulcers despite PPI therapy has chronic watery diarrhoea and a fasting serum gastrin 10 times normal. He also has hypercalcaemia. What is the most likely diagnosis?

A. Carcinoid syndrome
B. H. pylori resistant to treatment
C. NSAID-induced ulcers
D. VIPoma
E. Zollinger–Ellison syndrome with MEN 1

8.10 A 72-year-old man has a melaena with Hb 108 g/L, urea 6 mmol/L, pulse 82/min and BP 140/80 mmHg. His Glasgow–Blatchford score is calculated before endoscopy. What is the principal use of this score?

A. To decide the dose of PPI
B. To determine the need for surgery after endoscopy
C. To grade the ulcer appearance
D. To identify patients who need intervention or can be managed as outpatients
E. To predict mortality after endoscopic therapy

Answer key with explanations

8.1 — B (Omental patch repair with peritoneal lavage). Perforated peptic ulcer is treated by omental patch (Graham) repair and lavage, open or laparoscopic, followed by PPI and H. pylori eradication. Definitive acid-reducing surgery is no longer needed.

8.2 — A (Gastroduodenal artery). The gastroduodenal artery runs behind the first part of the duodenum and is eroded by posterior duodenal ulcers. Treatment options are angiographic embolisation or surgical under-running. Lesser-curve gastric ulcers bleed from the left gastric artery.

8.3 — D (Terlipressin and intravenous antibiotics). Suspected variceal bleeding is treated with a vasoactive drug (terlipressin) and prophylactic antibiotics, which reduce rebleeding and mortality, followed by endoscopic band ligation. Propranolol is for secondary prevention.

8.4 — C (Hypochloraemic alkalosis with hypokalaemia). Gastric outlet obstruction causes loss of HCl, leading to hypochloraemic, hypokalaemic metabolic alkalosis with paradoxical aciduria. The commonest cause in adults today is antral carcinoma, so OGD and biopsy are essential.

8.5 — D (Troisier's sign — metastatic gastric carcinoma). An enlarged left supraclavicular (Virchow's) node in a patient with abdominal malignancy is Troisier's sign; it indicates spread via the thoracic duct, classically from gastric cancer.

8.6 — D (Repeat endoscopy with biopsy to confirm healing). Gastric ulcers may be malignant despite initially benign biopsies, so repeat OGD with biopsy after treatment confirms healing. Duodenal ulcers do not require routine re-scoping.

8.7 — C (Rapid osmotic fluid shift into the small bowel). Early dumping (10–30 min) is caused by hyperosmolar chyme drawing fluid into the jejunum with release of vasoactive peptides. Late dumping (2–3 h) is due to reactive hypoglycaemia.

8.8 — B (Gastrointestinal stromal tumour). GISTs arise from the interstitial cells of Cajal and express CD117 (KIT); they are treated by resection with clear margins and imatinib for high-risk or advanced disease. Leiomyomas are desmin-positive and CD117-negative.

8.9 — E (Zollinger–Ellison syndrome with MEN 1). A gastrinoma causes multiple ulcers in unusual sites, diarrhoea and very high gastrin; associated hypercalcaemia (parathyroid hyperplasia) indicates MEN 1. VIPoma causes watery diarrhoea but not ulcers.

8.10 — D (To identify patients who need intervention or can be managed as outpatients). The Glasgow–Blatchford score uses clinical and laboratory data before endoscopy to predict the need for intervention; a score of 0 identifies low-risk patients who may be managed as outpatients. The full Rockall score uses endoscopic findings to predict mortality and rebleeding.

CHAPTER 9

Liver and Spleen

Key points

- Jaundice is classified as **pre-hepatic, hepatic or post-hepatic (obstructive)**; ultrasound is the first test to look for **dilated bile ducts**.
- Commonest malignant liver tumour: **metastasis** (colorectal); commonest primary: **hepatocellular carcinoma** (on cirrhosis — HBV, HCV).
- Liver abscess: **amoebic** (endemic areas, single, right lobe) vs **pyogenic** (biliary sepsis).
- Hydatid cyst: never aspirate blindly (anaphylaxis, spillage).
- Post-splenectomy patients need **vaccination and antibiotic prophylaxis** against encapsulated organisms.

1. Jaundice

Feature	Pre-hepatic (haemolytic)	Hepatic	Post-hepatic (obstructive)
Bilirubin	Unconjugated	Mixed	**Conjugated**
Urine	Normal colour (acholuric)	Dark	**Dark**, bilirubin +
Stools	Normal/dark	Normal/pale	**Pale**
Itch	No	±	Yes
Enzymes	Normal	↑↑ ALT/AST	↑↑ **ALP, GGT**

Obstructive jaundice → **ultrasound** (dilated ducts? gallstones? level of obstruction)

▼

Stones in CBD → **MRCP** → ERCP and stone extraction

Mass / painless jaundice → **CT pancreas protocol** ± EUS biopsy → MDT

Courvoisier's law

"In the presence of jaundice, a **palpable non-tender gallbladder** is unlikely to be due to stones" — suggests carcinoma of the pancreatic head or distal bile duct (chronically scarred stone-filled gallbladders do not distend).

2. Liver abscess and cysts

Feature	Amoebic abscess	Pyogenic abscess	Hydatid cyst
Cause	*Entamoeba histolytica*	Biliary sepsis (commonest), portal pyaemia (appendicitis, diverticulitis), *Klebsiella*, *E. coli*	*Echinococcus granulosus* (dogs, sheep)
Patient	Young male, endemic area	Older, diabetic, biliary disease	Rural, sheep-rearing
Features	Fever, RUQ pain, tender hepatomegaly; single right-lobe; "**anchovy-sauce**" pus	Toxic, rigors, multiple	Often asymptomatic, slowly enlarging; rupture → anaphylaxis
Diagnosis	US/CT + **amoebic serology**	US/CT, blood cultures	US/CT (**daughter cysts**, wall calcification), serology
Treatment	**Metronidazole** (+ luminal agent); aspirate only if large/impending rupture/no response	Antibiotics + **percutaneous drainage**; treat source	**Albendazole** + PAIR or surgery (cystectomy) with scolicidal agent

3. Liver tumours

Tumour	Key facts
Haemangioma	Commonest benign; leave alone
Focal nodular hyperplasia	Young women; **central stellate scar**; no malignant potential
Hepatic adenoma	Young women on **OCP**, anabolic steroids; risk of **haemorrhage** and malignancy → stop OCP; resect if > 5 cm
Hepatocellular carcinoma	Cirrhosis (HBV, HCV, alcohol, NAFLD), aflatoxin; **AFP**; arterial enhancement with washout on CT/MRI (often diagnostic without biopsy); surveillance 6-monthly US ± AFP in cirrhosis; treatment: resection, transplantation (Milan criteria), ablation, TACE, systemic therapy
Colorectal liver metastases	Resection offers chance of cure (5-year survival ~40%) if adequate future liver remnant

4. Portal hypertension (surgical essentials)

- Causes: cirrhosis (commonest), portal vein thrombosis, schistosomiasis, Budd–Chiari syndrome.
- Portosystemic collaterals: **oesophageal varices**, caput medusae, rectal varices.
- Severity of liver disease: **Child–Pugh** (bilirubin, albumin, INR, ascites, encephalopathy) and **MELD** — predict surgical risk.
- Treatment of bleeding varices: see Chapter 8; **TIPS** for refractory bleeding/ascites.

5. Liver trauma

Most blunt liver injuries in haemodynamically stable patients are managed **non-operatively** (CT grading, observation, angioembolisation). Unstable patients → laparotomy: **Pringle manoeuvre** (clamping the hepatoduodenal ligament — portal triad) and **perihepatic packing** (damage control).

6. The spleen

Topic	Key facts
Splenomegaly — causes	Infection (malaria, typhoid, kala-azar, EBV), portal hypertension, haematological (CML, myelofibrosis — massive), haemolytic anaemias, storage diseases
Signs of a spleen	Notch, moves with respiration towards RIF, **cannot get above it**, dull to percussion
Indications for splenectomy	Trauma (unsalvageable), ITP (refractory), hereditary spherocytosis, hypersplenism, splenic tumours/abscess/cysts
Splenic trauma	Left upper quadrant pain, **Kehr's sign** (left shoulder-tip pain); stable → non-operative/embolisation; unstable → splenectomy or splenorrhaphy
Post-splenectomy complications	Left basal atelectasis, pancreatic tail injury/fistula, gastric dilatation, thrombocytosis, **OPSI**

Overwhelming post-splenectomy infection (OPSI)
Due to encapsulated organisms: ***Streptococcus pneumoniae*** (commonest), *Haemophilus influenzae* type b, *Neisseria meningitidis*. Prevention: vaccines (ideally **2 weeks before elective splenectomy**, or 2 weeks after emergency surgery), annual influenza vaccine, long-term penicillin prophylaxis, patient alert card. Children are at highest risk.

Chapter 9 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

9.1 A 68-year-old man presents with painless progressive jaundice, dark urine, pale stools, itching and weight loss. A non-tender, distended gallbladder is palpable. What is the most likely diagnosis?

A. Acute cholecystitis
B. Carcinoma of the head of the pancreas
C. Choledocholithiasis
D. Hepatitis A
E. Mirizzi syndrome

9.2 A 30-year-old man from rural Sindh has fever and right upper quadrant pain for 2 weeks. Ultrasound shows a single 7 cm hypoechoic lesion in the right lobe of the liver. Amoebic serology is positive. What is the first-line treatment?

A. Albendazole
B. Ceftriaxone alone
C. Metronidazole
D. Open surgical drainage
E. Percutaneous drainage in all cases

9.3 A 40-year-old shepherd has a 10 cm cyst in the right lobe of the liver with internal daughter cysts and a calcified wall on CT. What should be avoided?

A. Albendazole therapy
B. Blind diagnostic aspiration without precautions
C. Hydatid serology
D. Surgical excision with scolicidal agents
E. Ultrasound follow-up

9.4 A 65-year-old man with hepatitis C cirrhosis on surveillance has a 3 cm liver lesion that shows arterial-phase enhancement with portal venous washout on multiphase CT. AFP is raised. What is the most likely diagnosis?

A. Cholangiocarcinoma
B. Focal nodular hyperplasia
C. Haemangioma
D. Hepatocellular carcinoma
E. Metastasis from colorectal cancer

9.5 A 28-year-old woman on the oral contraceptive pill for 10 years has a 6 cm liver lesion. She had an episode of severe RUQ pain with a small subcapsular haemorrhage. MRI suggests hepatic adenoma. What is the most appropriate management?

A. AFP measurement only
B. Continue OCP and observe
C. Liver transplantation
D. Radiofrequency ablation only
E. Stop the OCP and plan resection

9.6 During a laparotomy for blunt trauma, there is massive bleeding from a deep laceration of the right lobe of the liver. Which manoeuvre temporarily controls inflow to the liver?

A. Cattell–Braasch manoeuvre
B. Kocher manoeuvre
C. Mattox manoeuvre
D. Pringle manoeuvre
E. Valsalva manoeuvre

9.7 A 25-year-old motorcyclist has left upper quadrant pain and pain at the tip of the left shoulder. He is haemodynamically stable. CT shows a grade II splenic laceration with no active extravasation. What is the most appropriate management?

A. Emergency splenectomy
B. Laparoscopic splenorrhaphy
C. Non-operative management with close observation
D. Partial splenectomy
E. Prophylactic angioembolisation in all cases

9.8 A 10-year-old boy who underwent splenectomy for trauma 2 years ago develops fever, hypotension and purpuric rash within hours. Which organism is most commonly responsible for this condition?

A. Escherichia coli
B. Haemophilus influenzae type b
C. Neisseria meningitidis
D. Staphylococcus aureus
E. Streptococcus pneumoniae

9.9 A 35-year-old woman with refractory immune thrombocytopenic purpura is scheduled for elective laparoscopic splenectomy. When should pneumococcal, Hib and meningococcal vaccines ideally be given?

A. 6 months after surgery
B. At least 2 weeks before surgery
C. Immediately after surgery
D. On the day of surgery
E. Only if she develops an infection

9.10 A 60-year-old man had a colorectal cancer resected 1 year ago. Surveillance CT shows two metastases confined to the right lobe of the liver with no extrahepatic disease. He is fit. What is the best treatment with curative intent?

A. Best supportive care
B. Liver transplantation
C. Palliative chemotherapy only
D. Partial hepatectomy with perioperative chemotherapy
E. Whole-liver radiotherapy

Answer key with explanations

9.1 — B (Carcinoma of the head of the pancreas). Courvoisier's law: a palpable gallbladder with jaundice is unlikely to be due to stones and suggests malignant distal obstruction (pancreatic head, distal cholangiocarcinoma). Stone disease causes a fibrotic, non-distensible gallbladder.

9.2 — C (Metronidazole). Most amoebic liver abscesses respond to metronidazole followed by a luminal agent (e.g. diloxanide). Aspiration is reserved for large abscesses at risk of rupture, left-lobe abscesses or failure to respond.

9.3 — B (Blind diagnostic aspiration without precautions). Hydatid cyst fluid is highly antigenic; uncontrolled puncture can cause anaphylaxis and peritoneal seeding. Treatment is albendazole with PAIR (under cover and with scolicidal agents) or surgery.

9.4 — D (Hepatocellular carcinoma). In cirrhosis, a lesion with arterial hyperenhancement and washout is diagnostic of HCC without biopsy. Haemangiomas show peripheral nodular enhancement with centripetal fill-in.

9.5 — E (Stop the OCP and plan resection). Hepatic adenomas are associated with the OCP and carry risks of haemorrhage and malignant change; adenomas > 5 cm or those that have bled should be resected, and the OCP stopped.

9.6 — D (Pringle manoeuvre). The Pringle manoeuvre clamps the hepatoduodenal ligament (hepatic artery, portal vein, CBD) to reduce hepatic inflow. Persistent bleeding despite it suggests hepatic vein or retrohepatic IVC injury.

9.7 — C (Non-operative management with close observation). Haemodynamically stable patients with low-grade splenic injuries are managed non-operatively in a monitored setting, preserving splenic function. Angioembolisation is for contrast blush or higher grades; splenectomy is for instability.

9.8 — E (Streptococcus pneumoniae). Overwhelming post-splenectomy infection is caused by encapsulated organisms, most commonly Streptococcus pneumoniae. Meningococcus can also cause purpura and is the close distractor.

9.9 — B (At least 2 weeks before surgery). Vaccination at least 2 weeks before elective splenectomy allows an optimal antibody response; after emergency splenectomy, vaccines are given about 2 weeks post-operatively.

9.10 — D (Partial hepatectomy with perioperative chemotherapy). Resectable colorectal liver metastases with an adequate future liver remnant should be resected; 5-year survival is about 40%. Transplantation is not standard for colorectal metastases.

CHAPTER 10

Gallbladder and Bile Ducts

Key points

- Gallstones: ~80% are **cholesterol/mixed**; pigment stones in haemolysis. Most are asymptomatic and need no treatment.
- **Ultrasound** is the first-line investigation for gallstone disease.
- Symptomatic gallstones → **laparoscopic cholecystectomy**; acute cholecystitis → early (index-admission) cholecystectomy.
- Most feared complication of cholecystectomy: **bile duct injury** — prevented by achieving the **critical view of safety**.

1. Biliary anatomy and Calot's triangle

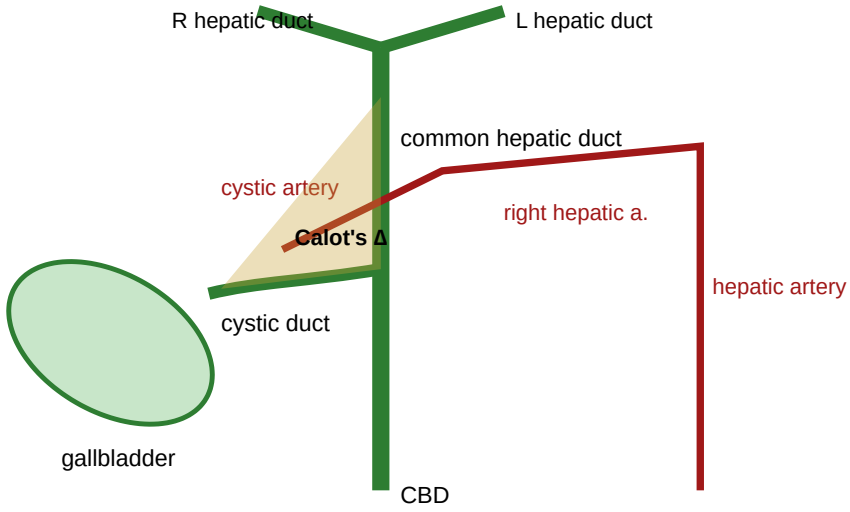


Figure 10.1 — Calot's triangle (hepatocystic triangle): cystic duct, common hepatic duct and inferior surface of the liver; contains the cystic artery.

Critical view of safety (Strasberg)

1. Hepatocystic triangle cleared of fat and fibrous tissue · 2. Lower third of gallbladder separated from the liver bed · 3. **Only two structures** (cystic duct and artery) seen entering the gallbladder. If this cannot be achieved → subtotal cholecystectomy or conversion.

2. Spectrum of gallstone disease

Condition	Features	Management
Biliary colic	RUQ/epigastric pain, constant (not colicky), lasts hours, after fatty meals; no fever; normal bloods	Analgesia; elective laparoscopic cholecystectomy
Acute cholecystitis	Persistent RUQ pain, fever, **Murphy's sign**, ↑ WCC; US: thick wall, pericholecystic fluid, stones	IV fluids, antibiotics; **early cholecystectomy within 1 week**; percutaneous cholecystostomy if unfit
Empyema / gangrene	Swinging fever, toxic, mass	Urgent surgery or drainage
Mucocele	Stone impacted in Hartmann's pouch; tense non-tender gallbladder, no jaundice	Cholecystectomy
Choledocholithiasis	Obstructive jaundice, fluctuating, pain	MRCP → **ERCP + sphincterotomy** → cholecystectomy (or lap CBD exploration)
Acute cholangitis	**Charcot's triad**: fever + rigors, jaundice, RUQ pain (+ hypotension, confusion = **Reynolds' pentad**)	Antibiotics, resuscitation, **urgent biliary decompression by ERCP**
Gallstone pancreatitis	See Chapter 11	Cholecystectomy on same admission (mild)
Gallstone ileus	Elderly woman; cholecysto-duodenal fistula; stone impacts at **terminal ileum**; **Rigler's triad**: SBO, pneumobilia, ectopic gallstone	Enterotomy and stone removal
Mirizzi syndrome	Stone in Hartmann's pouch compresses common hepatic duct → jaundice	Careful surgery (often subtotal)

Risk factors — "Fat, Female, Fertile, Forty, Fair"
Plus rapid weight loss, pregnancy, OCP, ileal resection/Crohn's (bile salt loss), haemolysis (pigment stones), diabetes, TPN.

3. Complications of cholecystectomy

Complication	Key points
Bile duct injury (~0.3%)	Misidentification of CBD as cystic duct ("classical injury"); presents with bile leak, peritonitis or jaundice; MRCP/ERCP → hepaticojejunostomy at specialist centre
Bile leak	Cystic stump or duct of Luschka; drain + ERCP stent
Retained CBD stones	Post-op jaundice → ERCP
Haemorrhage	Cystic or right hepatic artery
Post-cholecystectomy syndrome	Persistent dyspepsia/pain

4. Other biliary conditions

Condition	Key facts
Acalculous cholecystitis	Critically ill (ICU, burns, sepsis, TPN); high mortality; percutaneous cholecystostomy
Gallbladder polyps	> 10 mm (or growing, or with PSC) → cholecystectomy (malignancy risk)
Carcinoma of the gallbladder	Gallstones, **porcelain gallbladder**, polyps; very common in northern India/Pakistan; presents late; often incidental after cholecystectomy
Cholangiocarcinoma	PSC, choledochal cyst, liver flukes; hilar (**Klatskin**) tumour → painless jaundice with non-palpable gallbladder
Choledochal cyst	Congenital dilatation; triad of pain, jaundice, mass; excision + hepaticojejunostomy (malignancy risk)
Primary sclerosing cholangitis	Associated with **ulcerative colitis**; "beading" on MRCP; cholangiocarcinoma risk
Biliary atresia	Neonates: persistent conjugated jaundice, pale stools → **Kasai portoenterostomy** before 60 days

Chapter 10 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

10.1 A 42-year-old woman has had RUQ pain for 18 hours with fever 38.4 °C. She catches her breath when the gallbladder area is palpated during deep inspiration. WCC 15 × 10^9/L, bilirubin normal. Ultrasound shows gallstones and a thick-walled gallbladder. What is the best management?

A. Antibiotics and cholecystectomy in 3 months
B. ERCP
C. Intravenous antibiotics and early laparoscopic cholecystectomy during the same admission
D. Percutaneous cholecystostomy
E. Ursodeoxycholic acid

10.2 A 70-year-old man has fever with rigors, jaundice and RUQ pain. BP 85/50 mmHg and he is confused. Ultrasound shows a dilated CBD with stones. After resuscitation and IV antibiotics, what is the most important next step?

A. Emergency open cholecystectomy
B. Laparoscopic cholecystectomy within 6 weeks
C. MRCP in 48 hours
D. Oral antibiotics and discharge
E. Urgent biliary decompression by ERCP

10.3 During a laparoscopic cholecystectomy, which finding constitutes the third element of the 'critical view of safety'?

A. A clear view of the common bile duct along its length
B. Identification of the right hepatic artery
C. Intra-operative cholangiogram showing contrast in the duodenum
D. Only two structures are seen entering the gallbladder
E. Visualisation of the portal vein

10.4 An 80-year-old woman has colicky abdominal pain, vomiting and distension for 3 days. Abdominal X-ray shows dilated small-bowel loops, gas in the biliary tree and a calcified opacity in the right iliac fossa. What is the diagnosis?

A. Adhesive obstruction
B. Caecal volvulus
C. Emphysematous cholecystitis
D. Gallstone ileus
E. Mesenteric ischaemia

10.5 Four days after a laparoscopic cholecystectomy, a 45-year-old woman develops progressive jaundice and abdominal discomfort. Bilirubin 120 µmol/L, ALP raised. Ultrasound shows dilated intrahepatic ducts. What is the most appropriate next investigation?

A. CT colonography
B. HIDA scan alone
C. Liver biopsy
D. MRCP
E. Repeat ultrasound in 2 weeks

10.6 A 55-year-old woman has an incidental 'porcelain gallbladder' (calcified wall) on CT. She is asymptomatic and fit. What is the main reason to recommend cholecystectomy?

A. Prevention of acute pancreatitis
B. Prevention of biliary colic
C. Prevention of gallstone ileus
D. Risk of gallbladder carcinoma
E. Risk of mucocele

10.7 A 6-week-old baby has persistent jaundice since birth, pale stools and dark urine. Conjugated bilirubin is raised. Ultrasound shows an absent gallbladder. Which operation is indicated?

A. Choledochal cyst excision
B. Kasai portoenterostomy
C. Laparoscopic cholecystectomy
D. Liver transplant immediately
E. Ramstedt's pyloromyotomy

10.8 A 38-year-old man with ulcerative colitis has raised ALP and pruritus. MRCP shows multifocal strictures and dilatations of intra- and extrahepatic ducts ('beading'). Which malignancy is he at greatest risk of?

A. Cholangiocarcinoma
B. Gallbladder carcinoma only
C. Hepatoblastoma
D. Pancreatic carcinoma
E. Small bowel lymphoma

10.9 A 50-year-old woman has typical biliary colic. Ultrasound shows gallstones and a CBD of 10 mm, with mildly raised bilirubin and ALP. MRCP confirms a 7 mm CBD stone. What is the most common management sequence?

A. Cholecystectomy only
B. ERCP with stone extraction, then laparoscopic cholecystectomy
C. Extracorporeal shock wave lithotripsy
D. Open CBD exploration with T-tube in all cases
E. Ursodeoxycholic acid to dissolve stones

10.10 A 72-year-old ICU patient with 40% burns develops fever, RUQ tenderness and a distended, thick-walled gallbladder without stones on ultrasound. He is too unwell for surgery. What is the most appropriate treatment?

A. ERCP and sphincterotomy
B. Laparoscopic cholecystectomy
C. Observation
D. Percutaneous cholecystostomy with antibiotics
E. Ursodeoxycholic acid

Answer key with explanations

10.1 — C (Intravenous antibiotics and early laparoscopic cholecystectomy during the same admission). Acute cholecystitis is best treated with early laparoscopic cholecystectomy (within 1 week of onset), which reduces readmissions and total stay compared with delayed surgery. Cholecystostomy is reserved for patients unfit for surgery.

10.2 — E (Urgent biliary decompression by ERCP). Reynolds' pentad indicates severe (suppurative) cholangitis; urgent biliary drainage by ERCP (or PTC if ERCP fails) is life-saving. Cholecystectomy is deferred until the patient recovers.

10.3 — D (Only two structures are seen entering the gallbladder). The critical view of safety requires a cleared hepatocystic triangle, separation of the lower gallbladder from the liver bed, and only two structures (cystic duct and artery) entering the gallbladder. Dissecting the CBD itself is not required and increases risk.

10.4 — D (Gallstone ileus). Rigler's triad — small-bowel obstruction, pneumobilia and an ectopic gallstone — indicates gallstone ileus via a cholecystoenteric fistula; the stone usually impacts at the terminal ileum. Treatment is enterotomy and stone extraction.

10.5 — D (MRCP). Post-cholecystectomy obstructive jaundice may be due to a retained stone or bile duct injury (clip/stricture); MRCP defines the anatomy, followed by ERCP or surgical repair as needed.

10.6 — D (Risk of gallbladder carcinoma). Porcelain gallbladder has historically been associated with gallbladder carcinoma; prophylactic cholecystectomy is generally offered in fit patients. Gallbladder cancer is particularly common in South Asia.

10.7 — B (Kasai portoenterostomy). Biliary atresia presents with persistent conjugated jaundice and pale stools; Kasai portoenterostomy has the best outcome when done before about 60 days of age. Transplantation is required if it fails.

10.8 — A (Cholangiocarcinoma). Primary sclerosing cholangitis, strongly associated with ulcerative colitis, carries a high lifetime risk of cholangiocarcinoma (and colorectal cancer).

10.9 — B (ERCP with stone extraction, then laparoscopic cholecystectomy). CBD stones are cleared by ERCP and sphincterotomy, followed by cholecystectomy to prevent recurrence; single-stage laparoscopic CBD exploration is an equally valid alternative where expertise exists.

10.10 — D (Percutaneous cholecystostomy with antibiotics). Acalculous cholecystitis occurs in critically ill patients and carries high mortality; percutaneous cholecystostomy plus antibiotics is the treatment of choice when the patient is too unwell for surgery.

CHAPTER 11

The Pancreas

Key points

- Acute pancreatitis: commonest causes are **gallstones and alcohol**. Diagnosis needs 2 of 3: typical pain, **amylase/lipase > 3 × upper limit**, imaging features.
- Severity is defined by **organ failure** (Revised Atlanta): persistent (> 48 h) organ failure = severe.
- Management is supportive: **fluids, analgesia, early enteral nutrition**; no routine prophylactic antibiotics.
- Pancreatic cancer: painless jaundice, weight loss; only ~15–20% are resectable.

1. Acute pancreatitis

Causes — "I GET SMASHED"
Idiopathic · **G**allstones · **E**thanol · **T**rauma · **S**teroids · **M**umps/viruses · **A**utoimmune · **S**corpion sting · **H**ypertriglyceridaemia, **H**ypercalcaemia · **E**RCP · **D**rugs (azathioprine, valproate, thiazides)

Topic	Key facts
Clinical	Severe epigastric pain radiating to back, vomiting, tachycardia; **Grey Turner's** (flank) and **Cullen's** (periumbilical) bruising in severe haemorrhagic cases
Diagnosis	Amylase or **lipase** (more specific, stays raised longer) > 3× normal; **ultrasound** for gallstones in all; **CT** only if diagnosis uncertain or for complications after **72 h**
Severity scores	**Glasgow (Imrie)** ≥ 3 within 48 h = severe; APACHE II ≥ 8; CRP > 150 mg/L at 48 h; Revised Atlanta: mild (no organ failure), moderately severe (transient organ failure < 48 h or local complications), severe (persistent organ failure)

Glasgow score — "PANCREAS" (1 point each, within 48 h)
PaO_2 < 8 kPa · **A**ge > 55 · **N**eutrophils (WCC) > 15 × 10^9/L · **C**alcium < 2 mmol/L · **R**enal: urea > 16 mmol/L · **E**nzymes: LDH > 600 IU/L or AST > 200 · **A**lbumin < 32 g/L · **S**ugar (glucose) > 10 mmol/L

Management

Resuscitation: IV crystalloid (goal-directed, avoid overload), O_2, analgesia, urinary catheter, monitor in HDU/ICU if severe

▼

Nutrition: **early enteral feeding** (oral or nasogastric/nasojejunal) — better than TPN

▼

Gallstone pancreatitis + **cholangitis** or persistent obstruction → **urgent ERCP**

Mild gallstone pancreatitis → **cholecystectomy during same admission**

▼

Infected necrosis (gas on CT, sepsis) → antibiotics (carbapenem) → **step-up approach**: percutaneous/endoscopic drainage → minimally invasive necrosectomy (delay to ~4 weeks when walled off)

Local complication	Timing / features
Acute peripancreatic fluid collection	< 4 weeks, no wall; most resolve
Pseudocyst	> 4 weeks, fibrous wall, no necrosis; drain (endoscopic cystgastrostomy) if symptomatic, enlarging or infected — not merely because of size
Acute necrotic collection → walled-off necrosis	Necrosis; infection risk
Others	Splenic/portal vein thrombosis, pseudoaneurysm (haemorrhage), ascites, ARDS, hypocalcaemia, hyperglycaemia

2. Chronic pancreatitis

- Causes: **alcohol** (commonest), tropical (calcific) pancreatitis (South Asia, young), hereditary, autoimmune, obstruction.
- Features: chronic epigastric pain radiating to back, **steatorrhoea** (exocrine failure), **diabetes** (endocrine failure), weight loss.
- Investigation: CT (**calcification**, ductal dilatation), MRCP, faecal elastase (low).
- Treatment: stop alcohol and smoking, analgesia, **pancreatic enzyme replacement**, insulin; endoscopic stone/stricture therapy; surgery (Frey, Puestow drainage, resection) for intractable pain.

3. Carcinoma of the pancreas

Topic	Key facts
Risk factors	**Smoking** (strongest modifiable), chronic pancreatitis, diabetes, obesity, family history, *BRCA2*, Lynch, Peutz–Jeghers
Pathology	~90% ductal adenocarcinoma; ~70% in the **head**
Head tumours	**Painless progressive obstructive jaundice**, weight loss, **Courvoisier's** gallbladder, new-onset diabetes
Body/tail tumours	Present late with back pain and weight loss
Other signs	Migratory thrombophlebitis (Trousseau), Virchow's node, ascites
Investigation	**Pancreatic-protocol CT** (staging, vascular involvement); EUS ± biopsy; **CA 19-9** (monitoring; falsely ↑ in jaundice)
Resectability	No distant metastases and no major arterial encasement (SMA, coeliac, common hepatic) — "borderline" cases get neoadjuvant chemotherapy
Surgery	**Pancreaticoduodenectomy (Whipple)** for head; distal pancreatectomy + splenectomy for tail; adjuvant chemotherapy (mFOLFIRINOX)
Palliation	Biliary **metal stent** (ERCP), duodenal stent or gastrojejunostomy, coeliac plexus block, chemotherapy

Whipple complications
Pancreatic fistula (commonest serious), delayed gastric emptying, post-pancreatectomy haemorrhage (sentinel bleed from pseudoaneurysm), bile leak, diabetes, exocrine insufficiency. Should pre-operative biliary drainage be done routinely? **No** — only if cholangitis, very high bilirubin or delayed surgery (neoadjuvant therapy).

4. Other pancreatic lesions

Lesion	Key facts
Insulinoma	Commonest functional neuroendocrine tumour; **Whipple's triad** (hypoglycaemic symptoms, glucose < 2.8 mmol/L, relief with glucose); usually benign, solitary → enucleation
Gastrinoma	Zollinger–Ellison (Chapter 8); "gastrinoma triangle"
IPMN	Cystic, mucin-producing, communicates with duct; main-duct type has high malignant risk
Serous cystadenoma	Microcystic, "honeycomb" with central scar; benign
Annular pancreas	Congenital; duodenal obstruction (Down's syndrome association)

Chapter 11 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

11.1 A 45-year-old woman has severe epigastric pain radiating to the back with vomiting. Serum lipase is 9 times the upper limit of normal. She is haemodynamically stable. Which imaging investigation should be performed in all such patients on admission?

A. Contrast-enhanced CT abdomen
B. Endoscopic ultrasound
C. ERCP
D. MRCP
E. Ultrasound of the abdomen

11.2 A 60-year-old man with gallstone pancreatitis develops fever 39 °C, rigors, rising bilirubin (95 µmol/L) and a dilated CBD on day 2. What is the most appropriate intervention?

A. Emergency cholecystectomy
B. Interval cholecystectomy only
C. Necrosectomy
D. Prophylactic antibiotics alone
E. Urgent ERCP with sphincterotomy

11.3 A 50-year-old man with mild gallstone pancreatitis recovers fully within 4 days. When should cholecystectomy ideally be performed?

A. After 6 months
B. After 6 weeks
C. During the same admission
D. Not required if ERCP has been done
E. Only if a second attack occurs

11.4 In the Glasgow (Imrie) score for acute pancreatitis, which variable is included?

A. Serum amylase level
B. Serum calcium < 2 mmol/L
C. Serum lipase level
D. Serum potassium
E. Temperature > 38 °C

11.5 Six weeks after severe alcoholic pancreatitis, a 40-year-old man has early satiety and a 7 cm round collection with a thick enhancing wall and no solid debris behind the stomach on CT. He is otherwise well and the collection is shrinking. What is the best management?

A. Endoscopic cystgastrostomy now
B. External percutaneous drainage
C. Observation with interval imaging
D. Open cyst excision
E. Surgical necrosectomy

11.6 On day 12 of severe pancreatitis, a patient deteriorates with fever and rising CRP. CT shows gas bubbles within an area of pancreatic necrosis. After starting antibiotics, what is the preferred next intervention if he fails to improve?

A. Immediate open necrosectomy
B. Percutaneous or endoscopic drainage (step-up approach)
C. Total pancreatectomy
D. TPN and observe
E. Whipple's operation

11.7 A 55-year-old woman has chronic alcoholic pancreatitis with pale, bulky, offensive stools that float. Faecal elastase is low. What is the most appropriate treatment for this symptom?

A. Cholestyramine
B. Loperamide
C. Metronidazole
D. Octreotide
E. Pancreatic enzyme replacement with meals

11.8 A 66-year-old man with painless jaundice has a 2.5 cm mass in the pancreatic head on CT, abutting but not encasing the superior mesenteric vein, with no metastases. He is fit. What is the most appropriate treatment with curative intent?

A. Biliary stenting alone
B. Distal pancreatectomy
C. Palliative chemotherapy only
D. Pancreaticoduodenectomy (Whipple's operation)
E. Total gastrectomy

11.9 On day 5 after a Whipple's operation, the drain output becomes cloudy with an amylase level more than 3 times the serum level, and the patient has a low-grade fever. What is the most likely complication?

A. Bile leak
B. Chyle leak
C. Delayed gastric emptying
D. Duodenal stump blow-out
E. Pancreatic fistula

11.10 A 35-year-old woman has episodes of confusion and sweating before breakfast that resolve after eating. During an episode her blood glucose is 2.1 mmol/L, with inappropriately high insulin and C-peptide. What is the most likely diagnosis?

A. Gastrinoma
B. Glucagonoma
C. Insulinoma
D. Self-administration of insulin
E. VIPoma

Answer key with explanations

11.1 — E (Ultrasound of the abdomen). Abdominal ultrasound is done early in all patients with acute pancreatitis to detect gallstones, which changes management (cholecystectomy). CT is used only when the diagnosis is uncertain or to assess complications after 72 hours.

11.2 — E (Urgent ERCP with sphincterotomy). Gallstone pancreatitis complicated by cholangitis requires urgent ERCP to drain the bile duct. Routine early ERCP without cholangitis or obstruction does not improve outcome.

11.3 — C (During the same admission). For mild gallstone pancreatitis, cholecystectomy during the index admission (or within 2 weeks) prevents recurrent attacks, which are common while waiting. Severe pancreatitis with collections is an exception, where surgery is deferred.

11.4 — B (Serum calcium < 2 mmol/L). The Glasgow score uses PaO_2, age, WCC, calcium, urea, LDH/AST, albumin and glucose. Amylase and lipase levels confirm the diagnosis but do not correlate with severity.

11.5 — C (Observation with interval imaging). Many pseudocysts resolve; drainage is indicated for persistent symptoms, enlargement, infection or complications, not size alone. As this one is shrinking and symptoms are mild, observation is appropriate.

11.6 — B (Percutaneous or endoscopic drainage (step-up approach)). Infected necrosis is managed with antibiotics and a step-up approach — drainage first, then minimally invasive necrosectomy if required, ideally delayed until necrosis is walled off. Early open necrosectomy carries high mortality.

11.7 — E (Pancreatic enzyme replacement with meals). Steatorrhoea reflects exocrine insufficiency; pancreatic enzyme supplements taken with meals (with a PPI if needed) improve fat absorption.

11.8 — D (Pancreaticoduodenectomy (Whipple's operation)). A resectable pancreatic head adenocarcinoma is treated by pancreaticoduodenectomy followed by adjuvant chemotherapy. Distal pancreatectomy is for body/tail tumours.

11.9 — E (Pancreatic fistula). Drain amylase more than 3 times serum amylase after day 3 defines a post-operative pancreatic fistula — the commonest serious complication after pancreaticoduodenectomy; it can lead to abscess and pseudoaneurysm bleeding.

11.10 — C (Insulinoma). Whipple's triad with raised insulin and C-peptide suggests endogenous hyperinsulinism from an insulinoma. Exogenous insulin causes high insulin but suppressed C-peptide.

CHAPTER 12

Intestinal Obstruction and the Small Intestine

Key points

- Four cardinal features of obstruction: **colicky pain, vomiting, distension, absolute constipation**.
- Commonest causes: small bowel — **adhesions**, hernias (commonest in patients without previous surgery); large bowel — **carcinoma**, volvulus, diverticular stricture.
- The key decision is whether there is **strangulation** (ischaemia), which demands urgent surgery.
- **CT** is the investigation of choice: confirms obstruction, level, cause and ischaemia.

1. Classification

Feature	Small bowel obstruction	Large bowel obstruction
Vomiting	**Early**, bilious	Late, may be faeculent
Distension	Less, central	**Marked**, peripheral
Constipation	Later	**Early**
Pain	Colicky, central, frequent	Colicky, lower, less frequent
X-ray	Central loops, **valvulae conniventes** (cross whole width), > 3 cm	Peripheral, **haustra** (partial), > 6 cm (caecum > 9 cm)

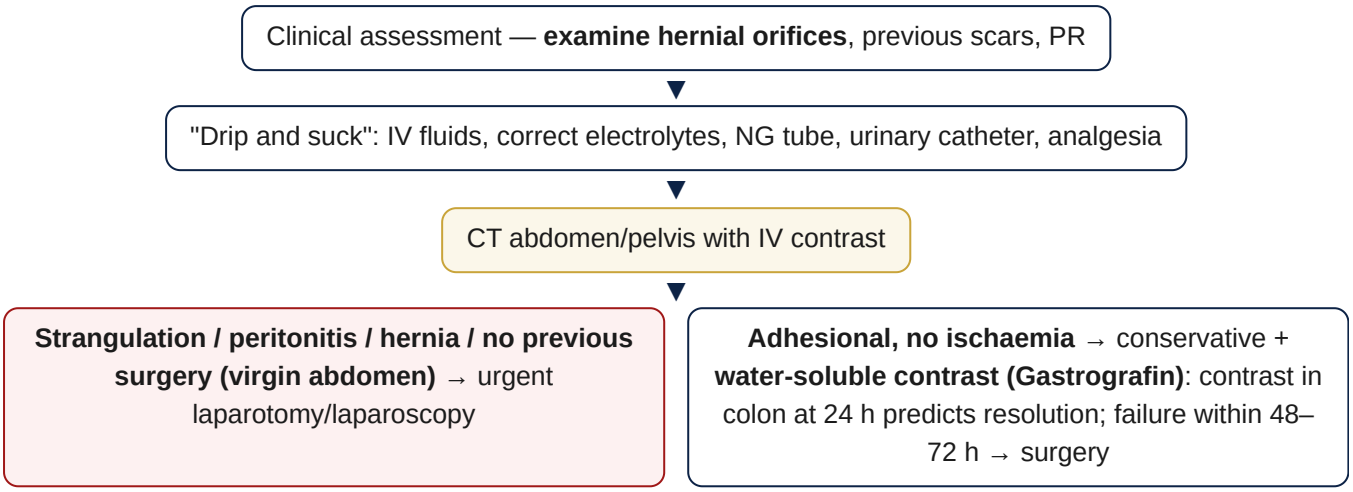
Size rule "3 – 6 – 9"
Upper limit of normal diameter: small bowel 3 cm · colon 6 cm · caecum 9 cm.

Closed-loop obstruction (e.g. volvulus, colonic obstruction with competent ileocaecal valve) → high risk of perforation; caecum perforates first (Laplace's law).

2. Strangulation — recognise early

Features suggesting strangulation
Continuous (not colicky) pain, **tachycardia, fever**, localised tenderness/peritonism, tender irreducible hernia, raised WCC, **rising lactate**, metabolic acidosis; CT: reduced bowel-wall enhancement, mesenteric oedema, free fluid, pneumatosis.

3. Management of small bowel obstruction



Viability of bowel at surgery: colour, peristalsis, mesenteric pulsation, sheen; doubtful bowel → warm packs for 5–10 min, re-assess, or second-look.

4. Specific causes

Cause	Key facts
Sigmoid volvulus	Elderly, constipated, institutionalised, neuro-psychiatric; huge distension; AXR "**coffee-bean**" sign → **endoscopic (flexible sigmoidoscopic) decompression + flatus tube** → elective sigmoid colectomy; gangrene/peritonitis → Hartmann's procedure
Caecal volvulus	Younger; mobile caecum; usually needs **right hemicolectomy**
Intussusception	Infants 6–18 months: colicky pain with drawing up legs, **red-currant jelly** stool, **sausage-shaped mass**; US "target sign"; **air enema reduction**; surgery if failed/peritonitis. Adults: usually a lead point (tumour) → resection
Pseudo-obstruction (Ogilvie's)	Colonic dilatation without mechanical cause; elderly, post-operative, electrolyte disturbance; CT excludes mechanical cause → correct cause, **neostigmine**, colonoscopic decompression
Obstructing colorectal cancer	Right side → right hemicolectomy + primary anastomosis; left side → Hartmann's or resection with anastomosis ± defunctioning stoma; stent as bridge/palliation
Gallstone ileus	See Chapter 10

5. Acute mesenteric ischaemia

Topic	Key facts
Causes	**SMA embolism** (AF — commonest), SMA thrombosis (atherosclerosis), non-occlusive (low-flow states), mesenteric venous thrombosis
Hallmark	**Severe pain out of proportion to clinical signs**; later peritonitis, bloody diarrhoea
Investigations	Raised lactate, metabolic acidosis, leucocytosis; **CT mesenteric angiography** (investigation of choice)
Treatment	Resuscitation, heparin, laparotomy: revascularisation (embolectomy/bypass/stent), resect non-viable bowel, **second-look laparotomy** at 24–48 h
Chronic mesenteric ischaemia	"**Intestinal angina**": post-prandial pain, food fear, weight loss
Ischaemic colitis	Watershed areas (splenic flexure); left-sided pain and bloody diarrhoea; usually conservative

6. Other small-bowel conditions

Condition	Key facts
Meckel's diverticulum	"Rule of 2s": 2% of people, 2 feet (60 cm) from ileocaecal valve, 2 inches long, 2 types of ectopic tissue (gastric, pancreatic), symptomatic by age 2; painless rectal bleeding (**technetium-99m pertechnetate scan**), diverticulitis, intussusception, obstruction
Crohn's disease (small bowel)	Terminal ileum; strictures, fistulae, abscesses; surgery: **conservative resection or stricturoplasty** (preserve length)
Abdominal tuberculosis	Common in Pakistan; ileocaecal region; "doughy" abdomen, ascites, strictures, obstruction; CT, laparoscopy and biopsy; anti-TB therapy, surgery for obstruction/perforation
Typhoid perforation	Terminal ileum, 2nd–3rd week of fever; simple closure or resection
Small bowel tumours	Neuroendocrine (carcinoid — **carcinoid syndrome** only with liver metastases; urinary 5-HIAA), lymphoma, adenocarcinoma, GIST
Short bowel syndrome	< 200 cm remaining; diarrhoea, malabsorption → nutritional support, PN

Chapter 12 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

12.1 A 55-year-old woman who had a hysterectomy 10 years ago has colicky central abdominal pain, bilious vomiting and distension for 24 hours. She is afebrile, pulse 88/min, abdomen non-tender between colic. CT shows small-bowel obstruction with a transition point and no signs of ischaemia. What is the most appropriate management?

A. Colonoscopy
B. Immediate laparotomy
C. IV fluids, nasogastric decompression and water-soluble contrast study
D. Laparoscopic adhesiolysis today
E. Oral laxatives

12.2 A 70-year-old woman with no previous abdominal surgery has small bowel obstruction. She has a tender, irreducible lump below and lateral to the pubic tubercle. What is the most likely cause?

A. Adhesions
B. Femoral hernia
C. Gallstone ileus
D. Inguinal hernia
E. Obturator hernia

12.3 An 82-year-old nursing-home resident with Parkinson's disease has massive abdominal distension and absolute constipation for 2 days. He is not peritonitic. AXR shows a large inverted U-shaped loop of bowel arising from the pelvis. What is the most appropriate initial management?

A. Barium enema
B. Colonoscopic decompression and insertion of a flatus tube
C. Emergency Hartmann's procedure
D. Neostigmine infusion
E. Right hemicolectomy

12.4 A 9-month-old boy has episodes of screaming with drawing up of his legs, vomiting and a stool resembling red-currant jelly. A sausage-shaped mass is felt in the right upper abdomen. He is stable with no peritonitis. What is the first-line treatment?

A. Emergency laparotomy
B. Ileocolic resection
C. Intravenous antibiotics only
D. Observation
E. Radiologically guided air (pneumatic) enema reduction

12.5 A 74-year-old man with atrial fibrillation has sudden severe central abdominal pain for 6 hours. He is in agony, but the abdomen is soft with minimal tenderness. Lactate is 6 mmol/L. What is the most appropriate investigation?

A. Abdominal ultrasound
B. Erect chest X-ray
C. Serum amylase
D. Upper GI endoscopy
E. Urgent CT mesenteric angiography

12.6 A 4-year-old boy has painless passage of a large amount of dark red blood per rectum. He is haemodynamically stable. Colonoscopy is unhelpful. Which investigation is most likely to identify the cause?

A. Barium enema
B. CT colonography
C. Meckel's (technetium-99m pertechnetate) scan
D. Small bowel follow-through
E. Upper GI endoscopy

12.7 A 78-year-old man, 5 days after hip replacement, develops marked abdominal distension without pain or peritonism. CT shows dilated colon to the rectum with no mechanical obstruction; caecum 11 cm. Electrolytes are being corrected. What is the next step if conservative treatment fails?

A. Emergency right hemicolectomy
B. Intravenous neostigmine with cardiac monitoring
C. Loperamide
D. Oral Gastrografin
E. Total colectomy

12.8 At laparotomy for strangulated small bowel, a 20 cm segment looks dusky after the constriction is released. Which feature best indicates that the bowel is viable?

A. Absence of mesenteric pulsation
B. Black discoloration
C. Loss of the serosal sheen
D. Presence of peristalsis and return of pink colour after warm packs
E. Thin, flaccid wall

12.9 A 28-year-old man from rural Punjab has 3 months of fever, weight loss, night sweats, colicky abdominal pain and a vague mass in the right iliac fossa. CT shows thickening of the ileocaecal region with necrotic mesenteric nodes. Which is the most likely diagnosis?

A. Abdominal tuberculosis
B. Appendix mass
C. Caecal carcinoma
D. Carcinoid tumour
E. Crohn's disease

12.10 A 60-year-old woman has flushing, diarrhoea and wheeze. CT shows a small ileal mass and multiple liver lesions. Which urinary test supports the diagnosis?

A. 5-hydroxyindoleacetic acid (5-HIAA)
B. Free cortisol
C. Metanephrines
D. Porphobilinogen
E. Vanillylmandelic acid

Answer key with explanations

12.1 — C (IV fluids, nasogastric decompression and water-soluble contrast study). Uncomplicated adhesional SBO is managed conservatively; Gastrografin is both diagnostic (contrast in colon by 24 h predicts resolution) and possibly therapeutic. Surgery is indicated for ischaemia or failure to resolve.

12.2 — B (Femoral hernia). A lump below and lateral to the pubic tubercle is femoral; femoral hernias are common in elderly women and have a high strangulation risk. Always examine hernial orifices in SBO, especially with a 'virgin' abdomen.

12.3 — B (Colonoscopic decompression and insertion of a flatus tube). Uncomplicated sigmoid volvulus (coffee-bean sign) is decompressed endoscopically with a flatus tube; because recurrence is common, elective sigmoid colectomy is considered. Gangrene or peritonitis requires emergency resection.

12.4 — E (Radiologically guided air (pneumatic) enema reduction). Ileocolic intussusception in an infant without peritonitis is reduced by air enema under radiological guidance (successful in most cases). Surgery is required for failure, perforation or peritonitis.

12.5 — E (Urgent CT mesenteric angiography). Pain out of proportion to signs in a patient with AF and raised lactate suggests acute mesenteric ischaemia from SMA embolism; CT angiography confirms the diagnosis rapidly. Delay leads to bowel infarction.

12.6 — C (Meckel's (technetium-99m pertechnetate) scan). Painless rectal bleeding in a child suggests a Meckel's diverticulum containing ectopic gastric mucosa, which ulcerates adjacent ileum; pertechnetate is taken up by gastric mucosa.

12.7 — B (Intravenous neostigmine with cardiac monitoring). Acute colonic pseudo-obstruction (Ogilvie's syndrome) is treated by correcting causes, then IV neostigmine (with atropine available for bradycardia), and colonoscopic decompression if it fails. Surgery is for perforation or ischaemia.

12.8 — D (Presence of peristalsis and return of pink colour after warm packs). Return of colour, visible peristalsis and mesenteric arterial pulsation after warm packs indicate viability; black colour, loss of sheen and absent pulsation indicate non-viable bowel requiring resection.

12.9 — A (Abdominal tuberculosis). Constitutional symptoms with ileocaecal thickening and necrotic (caseating) nodes in an endemic area strongly suggest abdominal TB. Crohn's disease is the close differential; biopsy, culture and PCR distinguish them.

12.10 — A (5-hydroxyindoleacetic acid (5-HIAA)). Carcinoid syndrome occurs when a small-bowel neuroendocrine tumour metastasises to the liver, allowing serotonin to bypass hepatic metabolism; urinary 5-HIAA (a serotonin metabolite) is raised.

CHAPTER 13

The Vermiform Appendix

Key points

- Acute appendicitis is the commonest surgical emergency; peak age 10–30 years.
- Typical history: **periumbilical pain migrating to the right iliac fossa (RIF)**, anorexia, nausea, low-grade fever.
- Diagnosis is clinical, supported by scoring (**Alvarado, AIR**), ultrasound (children, pregnancy, young women) or CT (adults).
- Treatment: **appendicectomy** (laparoscopic preferred); antibiotics-first in selected uncomplicated cases; appendix mass → conservative.

1. Anatomy and pathogenesis

- Base at confluence of the three taeniae coli on the caecum; tip position variable: **retrocaecal (~65–75%)**, pelvic (~20–30%), subcaecal, pre/post-ileal.
- **McBurney's point**: junction of lateral and middle thirds of the line from the anterior superior iliac spine to the umbilicus.
- Obstruction of lumen (lymphoid hyperplasia in young, **faecolith** in adults, rarely tumour/worms) → distension, ischaemia, bacterial invasion → gangrene → perforation.

2. Clinical features

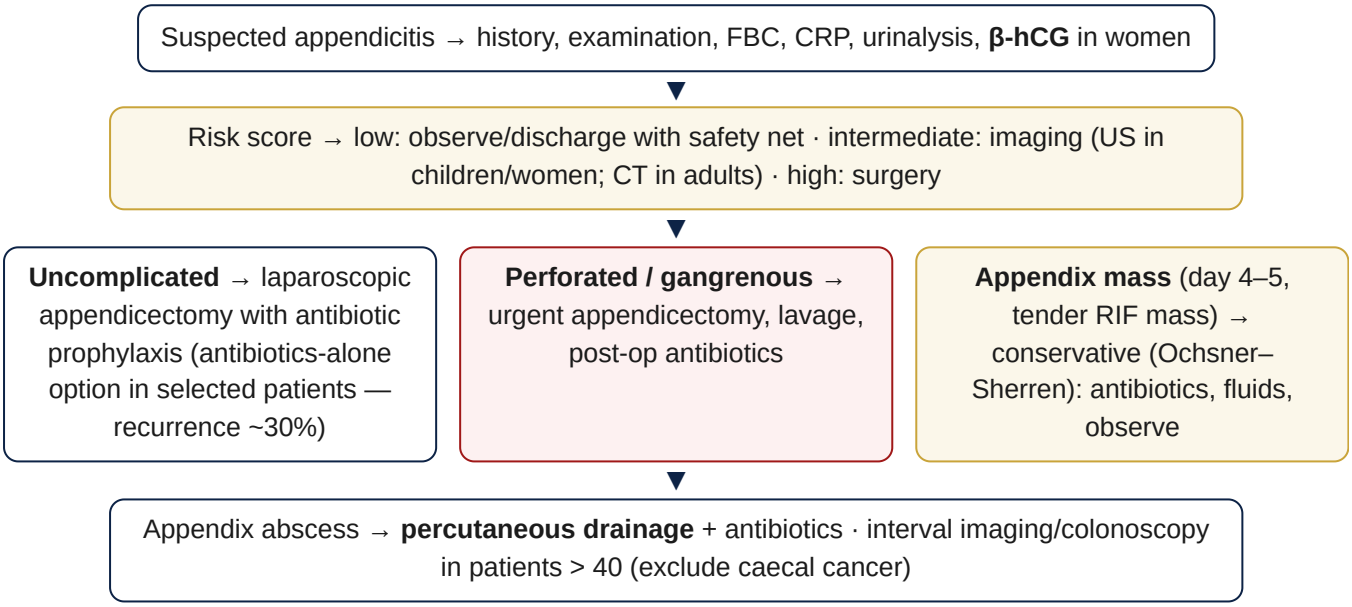
Sign	Description
Tenderness and guarding at McBurney's point	Most consistent sign
Rebound / percussion tenderness	Peritoneal irritation
Rovsing's sign	Pressure in LIF causes pain in RIF
Psoas sign	Pain on hip extension — retrocaecal appendix
Obturator sign	Pain on internal rotation of flexed hip — pelvic appendix
Pelvic appendix	Few abdominal signs; diarrhoea, frequency, tenderness on **PR**

Alvarado score — "MANTRELS" (max 10)
Migration of pain (1) · **A**norexia (1) · **N**ausea/vomiting (1) · **T**enderness RIF (2) · **R**ebound (1) · **E**levated temperature > 37.3 °C (1) · **L**eucocytosis (2) · **S**hift to left (1). Score ≥ 7 → appendicitis likely.

3. Differential diagnosis of RIF pain

Children	Women of child-bearing age	Adults / elderly
Mesenteric adenitis (recent URTI, high fever, shifting tenderness), gastroenteritis, Meckel's diverticulitis, intussusception, UTI, lower-lobe pneumonia	**Ectopic pregnancy** (always do **pregnancy test**), ovarian cyst rupture/torsion, PID, mittelschmerz, endometriosis	Ureteric colic, Crohn's disease, caecal carcinoma, diverticulitis (right-sided/sigmoid), perforated DU, cholecystitis

4. Management algorithm



5. Special groups

- **Children < 5 and elderly**: atypical presentation, higher perforation rates.
- **Pregnancy**: commonest non-obstetric surgical emergency; appendix displaced upward by uterus (pain higher); US then MRI; laparoscopic appendicectomy is safe; perforation → fetal loss.
- Immunocompromised: minimal signs.

6. Complications of appendicectomy

Complication	Notes
Wound infection	Commonest; higher with perforation
Pelvic / intra-abdominal abscess	Day 5–7, swinging fever, tenesmus, diarrhoea; CT and drainage
Ileus, adhesions	—
Stump appendicitis	Long residual stump
Faecal fistula	Rare; caecal base necrosis or Crohn's
Port-site hernia, right inguinal hernia (ilioinguinal nerve injury)	—

7. Appendiceal tumours

- **Neuroendocrine tumour (carcinoid)**: commonest appendiceal tumour, usually at the tip, incidental. < 2 cm at tip → appendicectomy sufficient; > 2 cm, base involvement, mesoappendiceal invasion → right hemicolectomy.
- **Mucinous neoplasm** → mucocele; rupture may cause **pseudomyxoma peritonei** (cytoreduction + HIPEC).

Chapter 13 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

13.1 A 19-year-old man has 18 hours of abdominal pain that began around the umbilicus and moved to the right iliac fossa, with anorexia and one episode of vomiting. Temperature 37.8 °C; tenderness and guarding at McBurney's point; WCC 14 × 10^9/L. What is the most appropriate management?

A. Colonoscopy
B. CT scan before any decision
C. Discharge with analgesia
D. Laparoscopic appendicectomy
E. Oral antibiotics and outpatient review

13.2 A 24-year-old woman presents with RIF pain and tenderness for 12 hours. Her last menstrual period was 7 weeks ago. Which investigation must be done first?

A. Abdominal X-ray
B. CT abdomen
C. Pregnancy test (β-hCG)
D. Serum amylase
E. Urine culture

13.3 A 25-year-old man presents with 5 days of RIF pain. He is now better than 2 days ago, with temperature 37.9 °C and a tender 6 cm mass in the RIF. CT shows an inflammatory phlegmon without a drainable abscess. What is the most appropriate management?

A. Barium enema
B. Conservative treatment with IV antibiotics and observation
C. Immediate open appendicectomy
D. Percutaneous drainage
E. Right hemicolectomy

13.4 A 10-year-old girl has RIF pain for 2 days following a sore throat. Temperature is 39 °C; tenderness is mild and shifts when she turns onto her left side. Ultrasound shows enlarged mesenteric lymph nodes and a normal appendix. What is the most likely diagnosis?

A. Acute appendicitis
B. Intussusception
C. Meckel's diverticulitis
D. Mesenteric adenitis
E. Ovarian torsion

13.5 Pressure in the left iliac fossa of a patient with suspected appendicitis causes pain in the right iliac fossa. What is this sign called?

A. Blumberg's sign
B. Murphy's sign
C. Obturator sign
D. Psoas sign
E. Rovsing's sign

13.6 A patient with suspected appendicitis has pain in the RIF when the right hip is passively extended while lying on the left side. Where is the appendix most likely to lie?

A. Paracaecal
B. Pelvic
C. Pre-ileal
D. Retrocaecal
E. Subhepatic

13.7 Histology after appendicectomy in a 30-year-old woman shows a 1.2 cm well-differentiated neuroendocrine tumour at the tip of the appendix with clear margins and no mesoappendiceal invasion. What further treatment is required?

A. Chemotherapy
B. No further surgery; follow-up
C. Octreotide therapy
D. Radiotherapy
E. Right hemicolectomy

13.8 On day 6 after appendicectomy for a perforated appendix, a 22-year-old man has swinging pyrexia, diarrhoea with mucus and rectal discomfort. What is the most likely diagnosis?

A. Clostridioides difficile colitis
B. Pelvic abscess
C. Stump appendicitis
D. Subphrenic abscess
E. Wound infection

13.9 A 26-year-old woman who is 24 weeks pregnant has right-sided abdominal pain, higher than expected for appendicitis, with fever and leucocytosis. Ultrasound is inconclusive. What is the most appropriate next imaging?

A. Abdominal X-ray
B. CT with IV contrast
C. Diagnostic laparoscopy without imaging
D. HIDA scan
E. MRI of the abdomen

13.10 A 60-year-old man is treated for an appendix abscess with percutaneous drainage and antibiotics. He recovers fully. What should be arranged before discharge from follow-up?

A. Colonoscopy or CT colonography to exclude caecal carcinoma
B. Lifelong antibiotics
C. Repeat drainage at 6 weeks
D. Upper GI endoscopy
E. Urgent interval appendicectomy within 1 week

Answer key with explanations

13.1 — D (Laparoscopic appendicectomy). A classic presentation with a high Alvarado score in a young man warrants appendicectomy (laparoscopic preferred) without the need for routine CT.

13.2 — C (Pregnancy test (β-hCG)). Every woman of child-bearing age with abdominal pain needs a pregnancy test to exclude ectopic pregnancy, a life-threatening differential of appendicitis; it also affects choice of imaging.

13.3 — B (Conservative treatment with IV antibiotics and observation). An appendix mass (phlegmon) is managed conservatively (Ochsner–Sherren regimen) because early surgery risks damage to inflamed adherent bowel. An abscess is drained percutaneously; interval appendicectomy is optional.

13.4 — D (Mesenteric adenitis). Mesenteric adenitis follows a viral illness, with high fever, shifting tenderness and enlarged mesenteric nodes on ultrasound; it is self-limiting. Appendicitis usually has localised fixed tenderness and lower-grade fever.

13.5 — E (Rovsing's sign). Rovsing's sign is RIF pain on LIF pressure, due to displacement of gas and peritoneal irritation. Blumberg's sign is rebound tenderness.

13.6 — D (Retrocaecal). The psoas sign indicates an inflamed appendix lying on the psoas muscle in the retrocaecal position. The obturator sign (pain on internal rotation of the flexed hip) suggests a pelvic appendix.

13.7 — B (No further surgery; follow-up). Appendiceal NETs smaller than 2 cm at the tip without adverse features are cured by appendicectomy. Right hemicolectomy is considered for tumours over 2 cm, base involvement or mesoappendiceal invasion.

13.8 — B (Pelvic abscess). Swinging pyrexia with rectal symptoms after perforated appendicitis suggests pelvic abscess; confirm with CT or PR, and drain percutaneously or transrectally.

13.9 — E (MRI of the abdomen). In pregnancy, MRI without gadolinium is preferred after an inconclusive ultrasound, avoiding ionising radiation. The appendix is displaced upwards by the gravid uterus.

13.10 — A (Colonoscopy or CT colonography to exclude caecal carcinoma). In patients over 40 with an appendix mass or abscess, an underlying caecal carcinoma or appendiceal neoplasm must be excluded with colonoscopy or CT colonography.

CHAPTER 14

Colon and Rectum

Key points

- **Colorectal cancer** arises mostly through the **adenoma–carcinoma sequence**; screening and polypectomy prevent it.
- Red flags: change in bowel habit, rectal bleeding, iron-deficiency anaemia, weight loss, mass → **colonoscopy**.
- **Diverticular disease** is mainly sigmoid; complications are graded by **Hinchey**.
- Ulcerative colitis is **cured by proctocolectomy**; Crohn's disease is not cured by surgery.

1. Colorectal polyps and the adenoma–carcinoma sequence

Normal mucosa	↓ *APC* loss → early adenoma	↓ *KRAS* → intermediate adenoma	↓ *TP53* loss → carcinoma

Malignant risk of adenoma ↑ with **size > 1 cm, villous histology, high-grade dysplasia**. Hyperplastic polyps — no risk; sessile serrated lesions — risk (right colon).

2. Colorectal carcinoma

Topic	Key facts
Risk factors	Age, family history, FAP, Lynch, IBD (UC > Crohn's), red/processed meat, low fibre, obesity, smoking
Right-sided	**Iron-deficiency anaemia**, weight loss, RIF mass; obstruction late
Left-sided / rectal	Change in bowel habit, **rectal bleeding**, tenesmus, **obstruction** (annular "apple-core" lesion)
Investigation	**Colonoscopy + biopsy** (or CT colonography); staging **CT chest/abdomen/pelvis**; **MRI pelvis** for rectal cancer (CRM, T, N); CEA baseline
Staging	TNM; historical **Dukes**: A (bowel wall), B (through wall, nodes −), C (nodes +), D (distant metastases)

Operations for colorectal cancer

Tumour site	Operation
Caecum, ascending colon, hepatic flexure	**Right hemicolectomy** (ileocolic, right colic, right branch of middle colic)
Transverse colon	Extended right hemicolectomy
Descending colon	Left hemicolectomy
Sigmoid	Sigmoid colectomy / high anterior resection
Upper and mid rectum	**Anterior resection with total mesorectal excision (TME)** ± defunctioning ileostomy
Low rectum involving sphincters	**Abdominoperineal excision (APER)** → permanent end colostomy
Emergency obstruction/perforation (left)	**Hartmann's procedure** (resection, end colostomy, closed rectal stump) or resection + anastomosis ± stoma; stent as bridge

Rectal cancer pearls

Total mesorectal excision reduces local recurrence. A threatened **circumferential resection margin** on MRI or locally advanced disease → **neoadjuvant (chemo)radiotherapy**. Adjuvant chemotherapy for node-positive colon cancer (stage III).

3. Diverticular disease

Topic	Key facts
Pathology	Pulsion **false diverticula** (mucosa through muscle) at points where vessels penetrate; **sigmoid**; low-fibre diet, high intraluminal pressure
Acute diverticulitis	LIF pain, fever, tenderness ("left-sided appendicitis"); **CT** confirms; uncomplicated → oral/IV antibiotics (or none in selected), fluids
Complications	Abscess (drain percutaneously), perforation, fistula (**colovesical** — pneumaturia, faecaluria), stricture/obstruction, **bleeding** (painless, often right-sided diverticula)
Follow-up	Colonoscopy/CT colonography after complicated episode to exclude cancer

Hinchey stage	Finding	Usual management
I	Pericolic abscess	Antibiotics
II	Pelvic/distant abscess	Percutaneous drainage + antibiotics
III	**Purulent** peritonitis	Laparoscopic lavage or resection (Hartmann's/primary anastomosis)
IV	**Faecal** peritonitis	**Hartmann's procedure**

4. Inflammatory bowel disease

Feature	Ulcerative colitis	Crohn's disease
Distribution	Rectum always, continuous proximal spread	Mouth to anus; **skip lesions**; terminal ileum commonest
Depth	Mucosal	**Transmural** → fistulae, strictures
Histology	Crypt abscesses, goblet cell depletion	**Non-caseating granulomas**
Endoscopy	Continuous inflammation, pseudopolyps	Aphthous ulcers, **cobblestoning**, fissures
Smoking	Protective	Worsens
Perianal disease	Uncommon	Common (fistulae, abscesses, skin tags)
Surgery	**Curative**: proctocolectomy with ileal pouch–anal anastomosis or end ileostomy	Not curative; limited resection, stricturoplasty

Acute severe colitis (Truelove and Witts)
≥ 6 bloody stools/day + systemic toxicity (fever, tachycardia, anaemia, raised ESR/CRP) → admit, IV steroids, VTE prophylaxis, daily AXR. **Toxic megacolon** (transverse colon > 6 cm) or no response to steroids/rescue therapy by day 3–7 → **emergency subtotal colectomy with end ileostomy**.

5. Other conditions

Condition	Key facts
Lower GI bleeding	Causes: diverticular, angiodysplasia (right colon, elderly), cancer, colitis, haemorrhoids. Unstable → **CT angiography** → embolisation; colonoscopy when stable; exclude upper GI source (OGD) if urea raised
Rectal prolapse	Full-thickness: elderly women, concentric folds; perineal (Delorme's, Altemeier's) or abdominal rectopexy
Hirschsprung's disease	Neonate, delayed passage of meconium (> 48 h), absent ganglion cells in distal bowel; rectal suction biopsy; pull-through operation
Stomas	**Ileostomy**: right iliac fossa, **spouted**, liquid output (dehydration). **Colostomy**: left iliac fossa, **flush**, formed stool. Complications: retraction, necrosis, prolapse, parastomal hernia, stenosis, high output

Chapter 14 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

14.1 A 68-year-old man has fatigue and iron-deficiency anaemia (Hb 85 g/L, low ferritin) with no GI symptoms. Upper GI endoscopy is normal. What is the most likely site of the underlying lesion?

A. Caecum or ascending colon
B. Rectum
C. Sigmoid colon
D. Small bowel
E. Stomach

14.2 A 62-year-old woman has a biopsy-proven adenocarcinoma 9 cm from the anal verge. MRI shows the tumour 0.5 mm from the mesorectal fascia (threatened circumferential resection margin). CT shows no metastases. What is the most appropriate next step?

A. Abdominoperineal excision immediately
B. Anterior resection with TME immediately
C. Endoscopic mucosal resection
D. Neoadjuvant chemoradiotherapy, then reassessment for TME surgery
E. Palliative colostomy

14.3 A 75-year-old woman has generalised peritonitis. At laparotomy there is faecal contamination from a perforated sigmoid diverticulum. She is septic and on vasopressors. Which operation is most appropriate?

A. Defunctioning loop ileostomy only
B. Hartmann's procedure
C. Laparoscopic lavage alone
D. Right hemicolectomy
E. Total colectomy with ileorectal anastomosis

14.4 A 60-year-old man with known diverticular disease has recurrent urinary tract infections and passes air in his urine. What is the most likely diagnosis?

A. Bladder carcinoma
B. Colovaginal fistula
C. Colovesical fistula
D. Emphysematous cystitis
E. Ureteric stone

14.5 A 30-year-old man with ulcerative colitis has 10 bloody stools per day, pulse 112/min, temperature 38.2 °C and CRP 160 mg/L. AXR shows a transverse colon of 7.5 cm. Despite 72 hours of IV hydrocortisone he is worsening. What is the most appropriate management?

A. Colonoscopy and biopsy
B. Continue steroids for 2 more weeks
C. Emergency subtotal colectomy with end ileostomy
D. Panproctocolectomy with ileal pouch–anal anastomosis
E. Rectal mesalazine

14.6 Which histological feature favours Crohn's disease over ulcerative colitis?

A. Continuous mucosal involvement from the rectum
B. Crypt abscesses
C. Goblet cell depletion
D. Inflammation confined to the mucosa
E. Non-caseating granulomas and transmural inflammation

14.7 A 70-year-old man with a low rectal cancer 3 cm from the anal verge involving the external sphincter is fit for surgery. Which operation is most appropriate?

A. Abdominoperineal excision of the rectum
B. Anterior resection with coloanal anastomosis
C. Hartmann's procedure
D. Sigmoid colectomy
E. Transanal local excision

14.8 An 80-year-old woman has painless, profuse fresh rectal bleeding. Pulse 118/min, BP 88/55 mmHg despite 2 units of blood. Upper GI source has been excluded. What is the most appropriate next investigation?

A. Barium enema
B. Colonoscopy after full bowel preparation
C. CT angiography
D. Flexible sigmoidoscopy
E. Technetium-labelled red-cell scan

14.9 A 72-year-old man had an emergency Hartmann's procedure for perforated diverticulitis. Which statement correctly describes his stoma?

A. Caecostomy
B. End colostomy in the left iliac fossa, flush with the skin
C. Loop ileostomy in the right iliac fossa
D. Mucous fistula in the right upper quadrant
E. Spouted end ileostomy in the right iliac fossa

14.10 A 3-day-old neonate has not passed meconium, with abdominal distension and bilious vomiting. Rectal examination produces an explosive release of gas and stool. Which investigation confirms the diagnosis?

A. Abdominal ultrasound
B. Barium meal
C. Rectal suction biopsy
D. Sweat chloride test
E. Upper GI contrast study

Answer key with explanations

14.1 — A (Caecum or ascending colon). Right-sided colon cancers commonly present with occult bleeding and iron-deficiency anaemia rather than obstruction or visible blood; colonoscopy is required.

14.2 — D (Neoadjuvant chemoradiotherapy, then reassessment for TME surgery). A threatened CRM predicts local recurrence; neoadjuvant chemoradiotherapy downstages the tumour before total mesorectal excision. Upfront surgery risks a positive margin.

14.3 — B (Hartmann's procedure). Hinchey IV (faecal peritonitis) in an unstable patient is treated with sigmoid resection, end colostomy and closure of the rectal stump. Laparoscopic lavage is an option only for purulent (Hinchey III) peritonitis.

14.4 — C (Colovesical fistula). Pneumaturia and recurrent UTIs (often polymicrobial, faecaluria) in diverticular disease indicate a colovesical fistula, the commonest diverticular fistula; CT shows air in the bladder. Treatment is sigmoid resection with bladder repair.

14.5 — C (Emergency subtotal colectomy with end ileostomy). Toxic megacolon with failure of medical therapy needs emergency subtotal colectomy and end ileostomy, leaving the rectum for later pouch surgery. A pouch is never constructed in the acute setting; colonoscopy risks perforation.

14.6 — E (Non-caseating granulomas and transmural inflammation). Crohn's disease is transmural with non-caseating granulomas, skip lesions and fistulae; ulcerative colitis is continuous mucosal inflammation from the rectum, with crypt abscesses and goblet cell depletion.

14.7 — A (Abdominoperineal excision of the rectum). Low rectal cancers involving the sphincter complex require APER with a permanent end colostomy. Sphincter-preserving anterior resection requires a clear distal margin without sphincter involvement.

14.8 — C (CT angiography). In haemodynamically unstable lower GI bleeding, CT angiography localises active bleeding (> 0.5 mL/min) rapidly and guides catheter embolisation. Colonoscopy is used once stable.

14.9 — B (End colostomy in the left iliac fossa, flush with the skin). Hartmann's procedure creates an end colostomy (usually in the left iliac fossa, flush with skin) and closes the rectal stump. Ileostomies are spouted to protect the skin from enzyme-rich effluent.

14.10 — C (Rectal suction biopsy). Hirschsprung's disease (absent ganglion cells) is confirmed by rectal suction biopsy showing aganglionosis and increased acetylcholinesterase-positive nerve fibres. A sweat test is used for meconium ileus in cystic fibrosis.

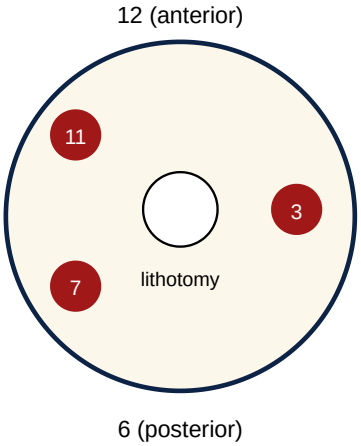
CHAPTER 15

The Anus and Anal Canal

Key points

- The **dentate line** divides the anal canal: above — visceral (painless), columnar; below — somatic (painful), squamous.
- Perianal pain + bleeding on defaecation = **fissure**; painless bright red bleeding = **haemorrhoids**.
- Perianal abscess → drain promptly; recurrent abscess suggests **fistula-in-ano**.
- Always perform PR and proctoscopy, and exclude colorectal cancer when indicated.

1. Anatomy



(viewed from the perineum, patient in lithotomy)

Haemorrhoids — 3, 7, 11 o'clock
(lithotomy position: left lateral, right posterior, right anterior — branches of superior rectal artery)

Fissure — 6 o'clock (posterior midline) ~90%
anterior midline in women post-partum

Goodsall's rule (fistula)
external opening anterior to transverse anal line → straight tract posterior → curved tract to posterior midline (6 o'clock)

Figure 15.1 — Clock-face of the anus in lithotomy position.

Feature	Above dentate line	Below dentate line
Epithelium	Columnar	Squamous (anoderm)
Nerve supply	Autonomic — painless	Somatic (inferior rectal/pudendal) — painful
Lymphatics	Internal iliac / mesorectal	**Inguinal nodes**
Venous drainage	Portal (superior rectal)	Systemic

2. Haemorrhoids

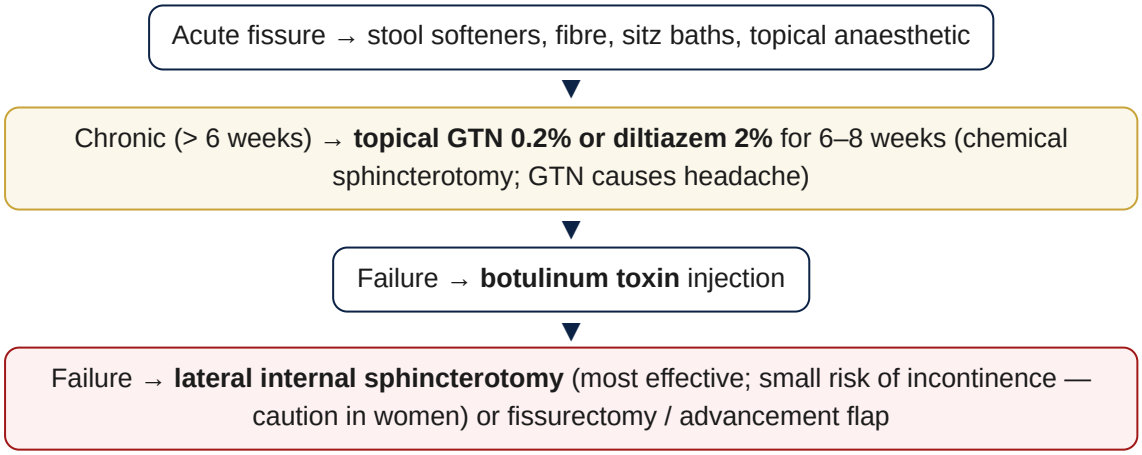
Grade	Description	Treatment
I	Bleed, do not prolapse	High-fibre diet, fluids, avoid straining; **injection sclerotherapy**
II	Prolapse, reduce spontaneously	**Rubber band ligation** (most effective office treatment)
III	Prolapse, need manual reduction	Band ligation, HAL/THD (Doppler-guided ligation), **laser haemorrhoidoplasty**, stapled haemorrhoidopexy
IV	Permanently prolapsed	**Excisional haemorrhoidectomy** (Milligan–Morgan)

Complications: thrombosis/strangulation (acute painful prolapse — usually conservative), anaemia. Post-haemorrhoidectomy: pain, **urinary retention**, bleeding (reactionary, secondary at day 7–10), anal stenosis, incontinence. Bands must be placed above the dentate line (painless).

Perianal haematoma ("thrombosed external pile"): acutely painful blue lump at anal verge; within 48–72 h → evacuate under LA; later → conservative.

3. Anal fissure

- Longitudinal tear in anoderm, **posterior midline**; caused by hard stool; **internal sphincter spasm** perpetuates ischaemia.
- Severe tearing pain during and after defaecation, fresh blood on paper. Chronic: sentinel tag, hypertrophied papilla, exposed internal sphincter fibres.
- Atypical site (lateral)/multiple/painless → consider **Crohn's, TB, HIV, syphilis, carcinoma**.



4. Anorectal abscess and fistula-in-ano

Topic	Key facts
Origin	**Cryptoglandular** infection of anal glands in the intersphincteric plane
Abscess types	Perianal (commonest), ischiorectal, intersphincteric, supralevator; horseshoe
Abscess treatment	**Prompt incision and drainage** — antibiotics alone are inadequate
Fistula	Chronic tract between anal canal and perianal skin; intermittent discharge
Parks' classification	Intersphincteric (commonest), trans-sphincteric, suprasphincteric, extrasphincteric
Investigation	Examination under anaesthesia, **MRI pelvis** (complex/recurrent), endoanal US
Treatment	Low/simple → **fistulotomy**. High/complex (risk of incontinence) → **seton** (draining/cutting), LIFT, advancement flap, **FiLaC (laser)**, VAAFT, fibrin glue

5. Other conditions

Condition	Key facts
Pilonidal sinus	Natal cleft; hairy young men; abscess → drainage; chronic → excision and off-midline closure (Karydakis, Bascom cleft lift, Limberg flap), laser ablation; hair removal
Pruritus ani	Hygiene, haemorrhoids, fissure, threadworms, fungal, dermatological, diabetes
Anal carcinoma	Squamous cell; **HPV**, HIV, immunosuppression; inguinal nodes; treatment is **chemoradiotherapy (Nigro protocol)** — not primary surgery; APER for failure/recurrence
Faecal incontinence	Obstetric sphincter injury commonest in women; endoanal US; biofeedback, sphincter repair, sacral nerve stimulation
Proctalgia fugax	Sudden severe fleeting rectal pain, no pathology

Chapter 15 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

15.1 A 28-year-old woman has severe tearing anal pain during and for an hour after each bowel movement, with streaks of fresh blood on the paper for 3 months. Gentle parting of the buttocks shows a posterior midline tear with a sentinel tag. What is the first-line treatment?

A. Anal dilatation under anaesthesia
B. Fistulotomy
C. Haemorrhoidectomy
D. Lateral internal sphincterotomy
E. Topical diltiazem or GTN with stool softeners

15.2 A 45-year-old man has painless bright red rectal bleeding on the paper and in the pan, with lumps that prolapse at defaecation and return spontaneously. What grade of haemorrhoids does he have, and what is the usual treatment?

A. Grade I — sclerotherapy
B. Grade II — rubber band ligation
C. Grade III — excisional haemorrhoidectomy
D. Grade IV — Milligan–Morgan haemorrhoidectomy
E. Thrombosed external haemorrhoid — evacuation

15.3 A 32-year-old man has a 2-day history of throbbing perianal pain and fever. There is a tender, fluctuant, red swelling 2 cm from the anal verge. What is the most appropriate management?

A. Fistulotomy
B. Oral antibiotics and review in 1 week
C. Seton insertion at first presentation in all cases
D. Surgical incision and drainage under anaesthesia
E. Topical GTN

15.4 A patient has a fistula-in-ano with its external opening at 5 o'clock, 3 cm from the anal verge (lithotomy). According to Goodsall's rule, where is the internal opening most likely to be?

A. 12 o'clock anterior midline
B. 3 o'clock
C. 5 o'clock directly opposite
D. 6 o'clock posterior midline
E. 9 o'clock

15.5 MRI of a recurrent fistula-in-ano shows a high trans-sphincteric tract crossing the upper third of the external sphincter. Why is a primary fistulotomy avoided?

A. It causes anal stenosis only
B. It does not heal
C. Risk of faecal incontinence
D. Risk of malignant transformation
E. Risk of urinary retention

15.6 A 55-year-old HIV-positive man has a painful, indurated ulcer at the anal margin with a hard inguinal lymph node. Biopsy confirms squamous cell carcinoma. What is the primary treatment?

A. Abdominoperineal excision
B. Local excision
C. Palliative colostomy
D. Primary chemoradiotherapy
E. Topical imiquimod

15.7 A 30-year-old man has sudden-onset, exquisitely painful bluish lump at the anal margin that appeared 24 hours ago after straining. What is the most appropriate treatment?

A. Haemorrhoidectomy
B. Lateral sphincterotomy
C. Rubber band ligation
D. Sclerotherapy
E. Simple evacuation of the clot under local anaesthesia

15.8 A 26-year-old woman, 8 weeks post-partum, has painful defaecation. Examination shows a fissure in the anterior midline. A second patient, a 35-year-old man, has multiple painless fissures in lateral positions with perianal skin tags. What should be suspected in the second patient?

A. Constipation alone
B. Crohn's disease
C. Haemorrhoids
D. Irritable bowel syndrome
E. Pilonidal disease

15.9 A 22-year-old hairy man has had three episodes of a painful abscess in the natal cleft. Examination shows midline pits with protruding hairs. What is the most appropriate definitive treatment?

A. Antibiotics only
B. Excision with off-midline closure (e.g. Karydakis or Bascom cleft lift)
C. Fistulotomy
D. Lateral sphincterotomy
E. Radiotherapy

15.10 Which feature makes rubber band ligation of internal haemorrhoids relatively painless?

A. Bands are applied above the dentate line, where innervation is autonomic
B. Bands are applied below the dentate line
C. Haemorrhoids have no blood supply
D. Local anaesthetic is always injected first
E. The procedure is performed under general anaesthesia

Answer key with explanations

15.1 — E (Topical diltiazem or GTN with stool softeners). A chronic anal fissure is first treated medically with topical calcium channel blockers or GTN (chemical sphincterotomy) and stool softeners. Sphincterotomy is reserved for failure; anal dilatation causes incontinence and is abandoned.

15.2 — B (Grade II — rubber band ligation). Haemorrhoids that prolapse and reduce spontaneously are grade II; rubber band ligation is the most effective outpatient treatment. Grade III need manual reduction.

15.3 — D (Surgical incision and drainage under anaesthesia). A perianal abscess needs prompt surgical drainage; antibiotics alone are inadequate. Searching aggressively for a fistula during acute sepsis risks creating false tracts.

15.4 — D (6 o'clock posterior midline). Goodsall's rule: external openings posterior to the transverse anal line usually follow a curved tract to the posterior midline (6 o'clock); anterior openings usually track radially in a straight line.

15.5 — C (Risk of faecal incontinence). Laying open a high fistula divides a substantial portion of the sphincter, causing incontinence. Sphincter-preserving options include seton, LIFT, advancement flap and laser closure.

15.6 — D (Primary chemoradiotherapy). Anal squamous cell carcinoma is treated primarily with chemoradiotherapy (5-FU/capecitabine and mitomycin with radiotherapy), which preserves the sphincter in most patients; APER is salvage surgery.

15.7 — E (Simple evacuation of the clot under local anaesthesia). A perianal haematoma presenting within 48–72 h is relieved by incision and evacuation under LA; after this it is managed conservatively. Banding the lesion below the dentate line would be extremely painful.

15.8 — B (Crohn's disease). Fissures in atypical (lateral) positions, multiple or relatively painless, raise suspicion of Crohn's disease, TB, HIV, syphilis or malignancy, and warrant examination under anaesthesia and biopsy. Anterior fissures in post-partum women are typical.

15.9 — B (Excision with off-midline closure (e.g. Karydakis or Bascom cleft lift)). Chronic pilonidal sinus is treated by excision with off-midline closure, which has lower recurrence than midline closure; minimally invasive options include laser ablation and pit-picking. Hair removal reduces recurrence.

15.10 — A (Bands are applied above the dentate line, where innervation is autonomic). The mucosa above the dentate line has visceral innervation and is insensitive to pain; bands placed too low (on somatically innervated anoderm) cause severe pain.

CHAPTER 16

Hernias, Umbilicus and Abdominal Wall

Key points

- A hernia is the protrusion of a viscus through an abnormal opening in the wall of its containing cavity.
- **Inguinal hernia** is commonest overall in both sexes; **femoral hernia** is more common in women than men and has the **highest strangulation risk**.
- Inguinal hernias lie **above and medial** to the pubic tubercle; femoral hernias **below and lateral**.
- Standard adult repair is **tension-free mesh** (open Lichtenstein or laparoscopic TEP/TAPP).

1. The inguinal canal

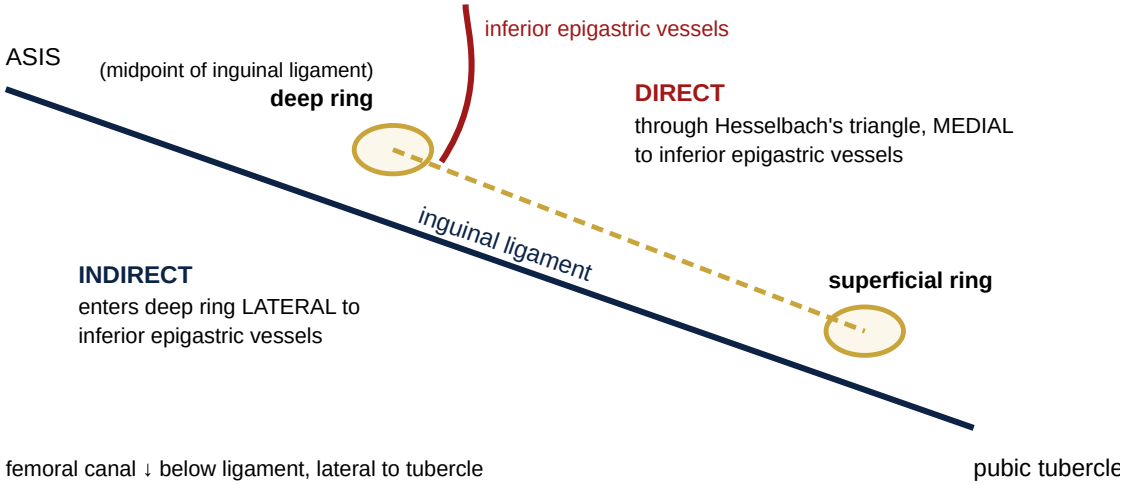


Figure 16.1 — Inguinal canal and relations of direct and indirect hernias (schematic, right side).

Wall	Formed by
Anterior	External oblique aponeurosis (+ internal oblique laterally)
Posterior	Transversalis fascia (+ conjoint tendon medially)
Roof	Arching fibres of internal oblique and transversus abdominis
Floor	Inguinal ligament (lacunar ligament medially)

Contents: **spermatic cord** (male) or **round ligament** (female), and the **ilioinguinal nerve**.
Hesselbach's triangle: inferior epigastric vessels (lateral), rectus sheath (medial), inguinal ligament (inferior).

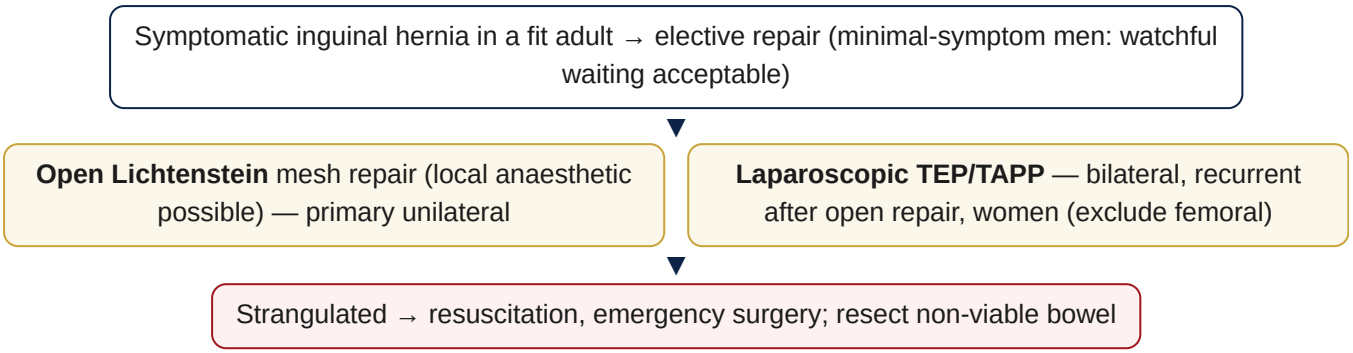
2. Indirect versus direct inguinal hernia

Feature	Indirect	Direct
Origin	Patent **processus vaginalis** — congenital	Weakness of posterior wall — acquired
Age	Any; all paediatric hernias	Older men
Into scrotum	Often	Rarely
Deep ring occlusion test	**Controlled** by pressure over deep ring	Not controlled
Shape / reduction	Elliptical, reduces up and laterally	Round, reduces straight back
Strangulation	More likely (narrow neck)	Rare (wide neck)
Relation to inferior epigastric vessels (at surgery)	**Lateral**	**Medial**

3. Complications and terminology

Term	Meaning
Irreducible (incarcerated)	Cannot be reduced; adhesions or narrow neck
Obstructed	Contains bowel with obstruction, blood supply intact
Strangulated	Blood supply compromised — tense, tender, red, no cough impulse, systemic upset → **emergency surgery**
Richter's hernia	Only part of the bowel wall circumference trapped — may strangulate **without obstruction** (femoral commonest)
Littre's hernia	Contains Meckel's diverticulum
Amyand's / de Garengeot's	Appendix in inguinal / femoral hernia
Maydl's hernia	W-shaped loop; strangulated loop inside abdomen
Sliding hernia	Viscus (caecum, sigmoid, bladder) forms part of the sac wall
Pantaloon hernia	Combined direct and indirect, straddling the inferior epigastric vessels

4. Management of inguinal hernia



Children: herniotomy (ligation of sac, no mesh) — **urgently** in infants (high incarceration risk).
Complications of repair: haematoma, infection, recurrence, chronic groin pain (ilioinguinal, iliohypogastric, genital branch of genitofemoral nerves), testicular ischaemia, urinary retention.

5. Femoral hernia

- Through femoral canal: boundaries — **inguinal ligament** (anterior), **pectineal ligament** (posterior), **lacunar ligament** (medial), **femoral vein** (lateral).
- Elderly women, small, often irreducible; high strangulation risk → **repair all femoral hernias promptly** (low, high/McEvedy or laparoscopic approach).
- Differential diagnosis of a groin lump: inguinal hernia, saphena varix, lymph node, femoral aneurysm, psoas abscess, ectopic testis, lipoma of cord, hydrocele of the canal of Nuck.

6. Other abdominal wall hernias

Hernia	Key facts
Umbilical (infant)	Common, especially in Black infants; most close by **age 2–4** → observe; repair if persists
Paraumbilical (adult)	Defect beside umbilicus; obese, multiparous women; narrow neck → obstruction; mesh repair
Epigastric	Linea alba between xiphoid and umbilicus; extraperitoneal fat
Incisional	10–20% of laparotomies; risk factors: **wound infection**, obesity, smoking, steroids, poor closure technique; prevention: small-bite closure (suture length : wound length ≥ 4 : 1)
Spigelian	Lateral border of rectus at arcuate line; interparietal; US/CT diagnosis
Obturator	Thin elderly women; SBO + **Howship–Romberg sign** (pain down medial thigh)
Lumbar	Petit's (inferior) or Grynfeltt's (superior) triangles
Divarication of recti	Not a true hernia; midline bulge on straining; no strangulation risk

Chapter 16 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

16.1 A 72-year-old woman has a small, tense, tender, irreducible lump in the right groin below and lateral to the pubic tubercle, with vomiting and abdominal distension for 24 hours. What is the most likely diagnosis?

A. Direct inguinal hernia
B. Obstructed femoral hernia
C. Psoas abscess
D. Saphena varix
E. Strangulated indirect inguinal hernia

16.2 At laparoscopic repair, a hernia sac is seen passing through the abdominal wall medial to the inferior epigastric vessels. What type of hernia is this?

A. Direct inguinal hernia
B. Femoral hernia
C. Indirect inguinal hernia
D. Obturator hernia
E. Spigelian hernia

16.3 A 6-week-old boy, born at 34 weeks, has an intermittent reducible swelling in the right groin extending into the scrotum. What is the most appropriate management?

A. Laparoscopic mesh repair at 5 years
B. Observation until age 2
C. Truss
D. Urgent (early elective) herniotomy
E. Watchful waiting until it becomes irreducible

16.4 A 2-year-old child has a soft, reducible umbilical hernia with a 1 cm defect. The parents are anxious. What is the most appropriate advice?

A. Apply a coin and strapping
B. Immediate mesh repair
C. Observe; most close spontaneously by 4 years
D. Repair before age 3 to prevent strangulation in all cases
E. Ultrasound every 3 months

16.5 During an emergency femoral hernia repair, the sac contains a knuckle of small bowel with only part of its antimesenteric wall trapped and gangrenous. The patient had no features of obstruction. What is this called?

A. Amyand's hernia
B. Littre's hernia
C. Maydl's hernia
D. Pantaloon hernia
E. Richter's hernia

16.6 A thin 80-year-old woman has small bowel obstruction with no visible hernia and pain radiating down the medial side of the right thigh to the knee. What is the most likely diagnosis?

A. Femoral hernia
B. Lumbar hernia
C. Obturator hernia
D. Sciatic hernia
E. Spigelian hernia

16.7 Three months after an open Lichtenstein repair, a 40-year-old man has burning pain and numbness over the root of the penis, upper scrotum and medial upper thigh. Which nerve is most likely involved?

A. Femoral nerve
B. Genitofemoral (femoral branch only)
C. Iliohypogastric nerve
D. Ilioinguinal nerve
E. Lateral cutaneous nerve of thigh

16.8 A 55-year-old man has a large incisional hernia 2 years after an emergency laparotomy complicated by wound infection. Which single factor is the strongest risk factor for incisional hernia?

A. Absorbable suture use
B. Age over 50
C. Midline incision length
D. Post-operative wound infection
E. Use of drains

16.9 A 52-year-old man has bilateral symptomatic inguinal hernias. He is fit for general anaesthesia. Which approach is generally preferred?

A. Bilateral open herniotomy without mesh
B. Bilateral Shouldice repair
C. Laparoscopic (TEP or TAPP) mesh repair
D. Open Lichtenstein repairs on separate occasions
E. Truss

16.10 Examining a right groin hernia in a 60-year-old man, pressure over the midpoint of the inguinal ligament (deep ring) after reduction controls the hernia when he coughs. What does this suggest?

A. Direct inguinal hernia
B. Femoral hernia
C. Hydrocele
D. Indirect inguinal hernia
E. Saphena varix

Answer key with explanations

16.1 — B (Obstructed femoral hernia). A lump below and lateral to the pubic tubercle in an elderly woman with features of obstruction is an obstructed/strangulated femoral hernia, which needs urgent surgery.

16.2 — A (Direct inguinal hernia). Direct hernias pass through Hesselbach's triangle, medial to the inferior epigastric vessels; indirect hernias enter the deep ring lateral to them. A pantaloon hernia has components on both sides.

16.3 — D (Urgent (early elective) herniotomy). Infant inguinal hernias (patent processus vaginalis) carry a high risk of incarceration, especially in premature babies, and should be repaired promptly by herniotomy without mesh.

16.4 — C (Observe; most close spontaneously by 4 years). Congenital umbilical hernias usually close spontaneously; repair is indicated if persisting beyond about 4 years, if large, or if complications occur. Strapping is ineffective.

16.5 — E (Richter's hernia). In Richter's hernia only part of the bowel circumference is trapped, so it can strangulate and perforate without causing obstruction; it is commonest in femoral hernias. Littre's contains a Meckel's diverticulum.

16.6 — C (Obturator hernia). Obturator hernias occur in thin elderly women and compress the obturator nerve, giving the Howship–Romberg sign (medial thigh pain). CT confirms the diagnosis.

16.7 — D (Ilioinguinal nerve). The ilioinguinal nerve runs in the inguinal canal and supplies the root of the penis/upper scrotum and medial upper thigh; entrapment causes chronic post-herniorrhaphy pain. The iliohypogastric supplies the suprapubic skin.

16.8 — D (Post-operative wound infection). Surgical site infection is the most important risk factor for incisional hernia, along with obesity, smoking and steroids. Small-bite closure with a suture-to-wound length ratio of at least 4:1 reduces risk.

16.9 — C (Laparoscopic (TEP or TAPP) mesh repair). Laparoscopic repair allows both sides to be repaired through the same incisions with less pain and faster recovery; it is also preferred for recurrence after open repair.

16.10 — D (Indirect inguinal hernia). Control of an inguinal hernia by pressure over the deep ring (just above the midpoint of the inguinal ligament) suggests an indirect hernia; a direct hernia bulges medially despite pressure. The test is not fully reliable.

CHAPTER 17

Kidney and Ureter

Key points

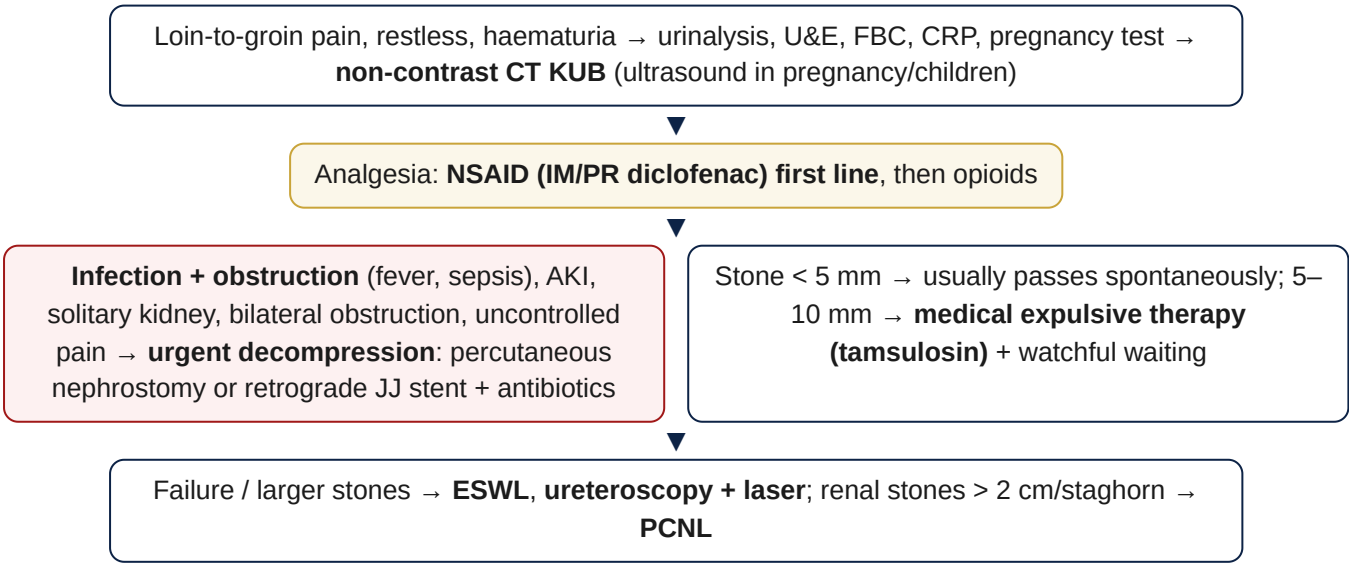
- **Ureteric colic**: loin-to-groin pain, haematuria; investigation of choice **non-contrast CT KUB**.
- An obstructed, infected kidney is a **urological emergency** → urgent decompression (nephrostomy or stent).
- **Visible haematuria** in an adult needs full investigation (cystoscopy + upper tract imaging) to exclude malignancy.
- Renal cell carcinoma is often found incidentally; classical triad is uncommon.

1. Urolithiasis

Stone type	Frequency	Key points
Calcium oxalate	~75–80%	Radio-opaque; hypercalciuria, hyperoxaluria (Crohn's/ileal resection), hypocitraturia
Calcium phosphate	~10%	Renal tubular acidosis, hyperparathyroidism
Struvite (magnesium ammonium phosphate)	~5–10%	**Urease-producing** organisms (*Proteus*); alkaline urine; **staghorn calculi**
Uric acid	~5–10%	**Radiolucent** on X-ray (visible on CT); gout, myeloproliferative disease; acidic urine → **alkalinise urine**
Cystine	~1%	Inherited cystinuria; hexagonal crystals

Pakistan lies in the "stone belt" (hot climate, dehydration). Common sites of impaction: **pelvi-ureteric junction, pelvic brim (crossing iliac vessels), vesico-ureteric junction (narrowest)**.

Management of ureteric colic



Prevention: fluid > 2.5–3 L/day, reduce salt and animal protein, normal calcium intake; stone analysis and metabolic screen for recurrent formers.

2. Renal tumours

Tumour	Key facts
Renal cell carcinoma	Adults 50–70; **clear cell** commonest; risk: smoking, obesity, hypertension, dialysis, **von Hippel–Lindau**. Classic triad (haematuria, loin pain, mass) in < 10%; ~50% incidental. Paraneoplastic: **polycythaemia** (EPO), hypercalcaemia (PTHrP), hypertension. Left **varicocele** (left renal vein invasion). Spread to **renal vein/IVC**, lung ("**cannonball**" metastases), bone. Treatment: **partial nephrectomy** (small tumours, T1) or radical nephrectomy; ablation; immunotherapy/TKIs for metastatic disease. Resistant to conventional chemo- and radiotherapy
Wilms' tumour (nephroblastoma)	Children 2–5 years; large abdominal mass not crossing midline; nephrectomy + chemotherapy; good prognosis
Angiomyolipoma	Benign, fat on CT; tuberous sclerosis; risk of haemorrhage if > 4 cm
Upper tract urothelial carcinoma	Renal pelvis/ureter; smoking; nephroureterectomy

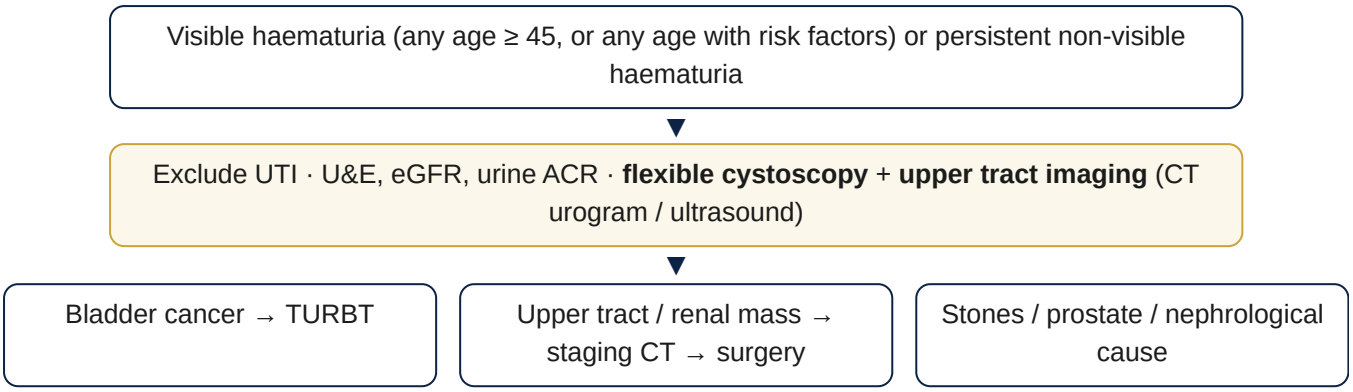
3. Hydronephrosis and PUJ obstruction

- Causes: stone, PUJ obstruction (congenital, aberrant lower-pole vessel), tumour, stricture, retroperitoneal fibrosis, pregnancy, prostatic obstruction (bilateral).
- PUJ obstruction: loin pain after drinking large volumes (e.g. beer — **Dietl's crisis**); diuretic renogram (**MAG3**) confirms obstruction and split function → **pyeloplasty** (Anderson–Hynes).

4. Urinary tract infection and renal trauma

Condition	Key facts
Acute pyelonephritis	Fever, rigors, loin pain, vomiting; *E. coli*; IV antibiotics; imaging to exclude obstruction if not improving within 48–72 h
Emphysematous pyelonephritis	Gas-forming infection in **diabetics**; CT; drainage ± nephrectomy
Renal/perinephric abscess	Percutaneous drainage + antibiotics
Genitourinary TB	Sterile pyuria, "thimble" bladder, calcified "putty" kidney; anti-TB therapy
Renal trauma	Mostly blunt; haematuria; **CT with contrast**; most managed **conservatively**; embolisation for active bleeding; surgery for instability or pedicle avulsion

5. Haematuria



Chapter 17 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

17.1 A 35-year-old man has severe colicky right loin pain radiating to the groin, with vomiting. Urine dipstick shows blood. He is afebrile with normal renal function. What is the investigation of choice?

A. Abdominal X-ray (KUB)
B. Intravenous urogram
C. MAG3 renogram
D. Non-contrast CT KUB
E. Ultrasound of the kidneys

17.2 A 45-year-old woman with a 7 mm left proximal ureteric stone has fever 39 °C, rigors, left loin tenderness and raised creatinine. CT shows hydronephrosis. After starting IV antibiotics, what is the most important next step?

A. Extracorporeal shock wave lithotripsy
B. Medical expulsive therapy with tamsulosin
C. Percutaneous nephrolithotomy
D. Repeat CT in 1 week
E. Urgent decompression by nephrostomy or ureteric stent

17.3 A 50-year-old man with gout has recurrent renal colic. His stones are not visible on plain X-ray but are clearly seen on CT. Urine pH is 5.0. What is the most likely stone type and its medical treatment?

A. Calcium oxalate — thiazide diuretic
B. Calcium phosphate — thiazide
C. Cystine — penicillamine
D. Struvite — antibiotics
E. Uric acid — urinary alkalinisation with potassium citrate

17.4 A 60-year-old woman with recurrent Proteus urinary infections has a large branching stone filling the renal pelvis and calyces. What is the stone composition and the usual definitive treatment?

A. Calcium oxalate — ureteroscopy
B. Cystine — ESWL
C. Magnesium ammonium phosphate (struvite) — percutaneous nephrolithotomy
D. Uric acid — oral dissolution
E. Xanthine — conservative

17.5 A 32-year-old man has a 4 mm stone at the right vesico-ureteric junction. Pain is controlled with diclofenac, he is afebrile and renal function is normal. What is the most appropriate management?

A. Emergency nephrostomy
B. Open ureterolithotomy
C. Percutaneous nephrolithotomy
D. Ureteroscopy today
E. Watchful waiting with analgesia (± tamsulosin) and fluids

17.6 A 62-year-old smoker has painless visible haematuria, a newly noticed left varicocele that does not empty on lying down, and Hb 185 g/L. What is the most likely diagnosis?

A. Bladder carcinoma
B. Left renal cell carcinoma with renal vein involvement
C. Polycystic kidney disease
D. Testicular tumour
E. Varicocele from idiopathic valve incompetence

17.7 A 58-year-old man has an incidental 3 cm enhancing solid mass in the lower pole of the right kidney on CT. There are no metastases and the contralateral kidney is normal. What is the preferred treatment?

A. Chemotherapy
B. Partial (nephron-sparing) nephrectomy
C. Radical nephrectomy with adrenalectomy
D. Radiotherapy
E. Surveillance only in all cases

17.8 A 3-year-old girl has a large, smooth, painless abdominal mass in the left flank that does not cross the midline, with haematuria and hypertension. What is the most likely diagnosis?

A. Hydronephrosis
B. Neuroblastoma
C. Polycystic kidney
D. Renal cell carcinoma
E. Wilms' tumour

17.9 A 20-year-old man has intermittent left loin pain after drinking large volumes of fluid. Ultrasound shows a dilated renal pelvis with a normal ureter. Which investigation confirms obstruction and assesses split renal function?

A. CT urogram
B. Diuretic MAG3 renogram
C. DMSA scan
D. Micturating cystourethrogram
E. Retrograde pyelogram

17.10 A 65-year-old poorly controlled diabetic woman has severe pyelonephritis with septic shock. CT shows gas within the renal parenchyma. What is the diagnosis?

A. Emphysematous pyelonephritis
B. Perinephric abscess
C. Pyonephrosis
D. Renal tuberculosis
E. Xanthogranulomatous pyelonephritis

Answer key with explanations

17.1 — D (Non-contrast CT KUB). Non-contrast CT KUB is the most sensitive and specific test for ureteric stones, showing size, site and alternative diagnoses. Ultrasound is preferred in pregnancy and children.

17.2 — E (Urgent decompression by nephrostomy or ureteric stent). An infected, obstructed kidney is a urological emergency (risk of urosepsis and death); it must be drained urgently with a percutaneous nephrostomy or retrograde JJ stent. Definitive stone treatment is deferred until infection settles.

17.3 — E (Uric acid — urinary alkalinisation with potassium citrate). Uric acid stones are radiolucent on X-ray, form in acidic urine and are associated with gout; they can often be dissolved by alkalinising the urine (potassium citrate) and allopurinol.

17.4 — C (Magnesium ammonium phosphate (struvite) — percutaneous nephrolithotomy). Staghorn calculi are usually struvite, formed by urease-splitting organisms such as Proteus in alkaline urine. PCNL is the treatment of choice for large renal stones and staghorns.

17.5 — E (Watchful waiting with analgesia (± tamsulosin) and fluids). Most stones under 5 mm pass spontaneously; uncomplicated cases are managed with analgesia and observation, with alpha-blockers aiding passage of distal stones. Intervention is for infection, AKI, uncontrolled pain or failure to pass.

17.6 — B (Left renal cell carcinoma with renal vein involvement). Left RCC may invade the left renal vein (into which the left gonadal vein drains), causing a varicocele that does not empty on lying down; erythropoietin secretion causes polycythaemia.

17.7 — B (Partial (nephron-sparing) nephrectomy). Small renal masses (T1a, < 4 cm) are best treated with partial nephrectomy, which preserves renal function with equivalent oncological outcomes. RCC is resistant to conventional chemotherapy and radiotherapy.

17.8 — E (Wilms' tumour). Wilms' tumour (nephroblastoma) presents at 2–5 years with a smooth flank mass that does not cross the midline. Neuroblastoma often crosses the midline, is irregular and causes systemic upset; urinary catecholamines are raised.

17.9 — B (Diuretic MAG3 renogram). A diuretic MAG3 renogram distinguishes true obstruction from simple dilatation and measures split function in suspected PUJ obstruction. DMSA assesses cortical scarring and function but not drainage.

17.10 — A (Emphysematous pyelonephritis). Gas within the renal parenchyma in a diabetic with severe sepsis is emphysematous pyelonephritis, a life-threatening infection requiring antibiotics, drainage and sometimes emergency nephrectomy.

CHAPTER 18

Bladder, Prostate and Urethra

Key points

- Painless visible haematuria in an adult = **bladder cancer** until proven otherwise (smoking is the main risk factor).
- **Benign prostatic hyperplasia (BPH)** causes lower urinary tract symptoms (LUTS) and retention; arises in the **transition zone**.
- **Prostate cancer** arises mainly in the **peripheral zone** (palpable on DRE); diagnosis by PSA, **multiparametric MRI** and biopsy.
- Suspected urethral injury: **no blind catheterisation**.

1. Lower urinary tract symptoms (LUTS)

Voiding (obstructive)	Storage (irritative)
Hesitancy, poor stream, intermittency, straining, terminal dribbling, incomplete emptying	Frequency, urgency, nocturia, urge incontinence

Assessment: **IPSS score**, DRE, urinalysis, U&E, **PSA** (after counselling), frequency–volume chart, flow rate (Qmax < 10 mL/s suggests obstruction), post-void residual (ultrasound).

2. Benign prostatic hyperplasia

Mild symptoms → watchful waiting, lifestyle (reduce evening fluids, caffeine, alcohol)

▼

α-blocker (tamsulosin): rapid symptom relief (days); side effects postural hypotension, retrograde ejaculation

5α-reductase inhibitor (finasteride): shrinks large prostates (> 30–40 g) over 6 months; ↓ PSA by ~50%; ↓ retention risk

▼

Surgery — failed medical therapy, **recurrent retention**, recurrent UTI, bladder stones, haematuria from BPH, renal impairment (high-pressure retention): **TURP**, HoLEP (laser enucleation), open prostatectomy (very large glands)

Complications of TURP	Notes
TUR syndrome	Absorption of **glycine** irrigation → **dilutional hyponatraemia**, confusion, bradycardia, hypertension, visual disturbance; prevented by bipolar resection in saline
Haemorrhage, clot retention	Three-way catheter with irrigation
Retrograde ejaculation	Commonest long-term (~70%)
Others	Erectile dysfunction, incontinence (sphincter injury), urethral stricture, bladder-neck contracture, infection

3. Urinary retention

Type	Features	Management
Acute	Painful, inability to void; precipitated by BPH, constipation, anticholinergics, anaesthesia, alcohol, UTI	Urethral (or suprapubic) catheter; record residual volume; treat cause; **α-blocker + trial without catheter**
Chronic	Painless, large residual (> 1 L), overflow incontinence, nocturnal enuresis	Check U&E: **high-pressure chronic retention** (hydronephrosis, renal impairment) needs catheterisation and monitoring for **post-obstructive diuresis**; then TURP

4. Prostate cancer

Topic	Key facts
Pathology	Adenocarcinoma, **peripheral zone** (~70%); **Gleason score** / ISUP Grade Group
Risk factors	Age, Black ethnicity, family history, *BRCA2*
Presentation	Raised PSA, hard irregular nodule on DRE, LUTS, **bone pain** (sclerotic metastases — spine), spinal cord compression
Diagnosis	PSA → **multiparametric MRI** → targeted (transperineal) biopsy; staging bone scan/PSMA-PET for high risk
Localised	Low risk: **active surveillance**; intermediate/high: **radical prostatectomy** or radical radiotherapy (+ hormones)
Metastatic	**Androgen deprivation**: LHRH agonist (goserelin — cover first 2–3 weeks with **anti-androgen** to prevent **tumour flare**), LHRH antagonist, bilateral orchidectomy; + docetaxel/novel anti-androgens

Exam pearl — metastatic spinal cord compression
Back pain + leg weakness/sensory level/sphincter disturbance in prostate cancer → **high-dose dexamethasone, urgent whole-spine MRI**, radiotherapy or decompressive surgery.

5. Bladder cancer

Topic	Key facts
Pathology	**Urothelial (transitional cell) carcinoma** ~90%; **squamous cell** with **schistosomiasis** and chronic irritation (stones, long-term catheter)
Risk factors	**Smoking** (most important), aromatic amines (dye, rubber industry), cyclophosphamide, pelvic radiotherapy
Diagnosis	Flexible cystoscopy → **TURBT** (diagnosis + staging, must include detrusor muscle); CT urogram
Non-muscle-invasive (Ta, T1, CIS)	TURBT + single post-op intravesical mitomycin; high risk → **intravesical BCG**; cystoscopic surveillance (high recurrence)
Muscle-invasive (≥ T2)	Neoadjuvant cisplatin chemotherapy → **radical cystectomy** with ileal conduit/neobladder, or radical radiotherapy

6. Urethra

Condition	Key facts
Posterior (membranous) urethral injury	Pelvic fracture; **blood at meatus, high-riding prostate**, inability to void → **retrograde urethrogram**; **suprapubic catheter**; delayed urethroplasty
Anterior (bulbar) urethral injury	Straddle injury; perineal "butterfly" haematoma; urine extravasation limited by Colles' fascia
Urethral stricture	Post-instrumentation, infection (gonorrhoea), trauma; poor stream; urethrotomy, dilatation, urethroplasty
Hypospadias	Ventral meatus, chordee, hooded prepuce — **do not circumcise** (foreskin used in repair); repair at 6–18 months
Phimosis / paraphimosis	Paraphimosis = retracted foreskin cannot be returned → manual reduction (ice, compression), dorsal slit

Chapter 18 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

18.1 A 68-year-old man has nocturia, hesitancy and a poor stream. DRE shows a smooth, symmetrically enlarged prostate of about 50 g. PSA is appropriate for age, and he is bothered by symptoms. Which drug gives the most rapid symptomatic relief?

A. Finasteride
B. Oxybutynin
C. Sildenafil
D. Tamsulosin
E. Tolterodine

18.2 During a TURP using glycine irrigation, a 72-year-old man under spinal anaesthesia becomes confused and restless, with bradycardia, hypertension and visual disturbance. What is the most likely cause?

A. Bladder perforation alone
B. Dilutional hyponatraemia from absorbed irrigation fluid
C. High spinal block
D. Hypoglycaemia
E. Transfusion reaction

18.3 A 75-year-old man is admitted with painless urinary incontinence at night. His bladder is palpable to the umbilicus; 1.8 L is drained on catheterisation. Creatinine is 340 µmol/L and ultrasound shows bilateral hydronephrosis. What should be closely monitored after catheterisation?

A. Blood glucose
B. Liver function
C. Post-obstructive diuresis with fluid and electrolyte balance
D. Serum PSA hourly
E. Urine cytology

18.4 A 70-year-old man with metastatic prostate cancer is to start goserelin (an LHRH agonist). What additional drug should be given for the first few weeks, and why?

A. Bicalutamide (anti-androgen) to prevent tumour flare
B. Bisphosphonate to prevent fractures
C. Dexamethasone to prevent cord compression
D. Finasteride to reduce prostate size
E. Tamsulosin to prevent retention

18.5 A 74-year-old man with known metastatic prostate cancer has 1 week of back pain and today has difficulty walking, with bilateral leg weakness and a sensory level at T10. What is the immediate management?

A. Bone scan and review in clinic
B. High-dose dexamethasone and urgent whole-spine MRI
C. Increase analgesia and physiotherapy
D. Lumbar puncture
E. Start bisphosphonate only

18.6 A 63-year-old man who worked for 30 years in a dye factory and smokes has painless visible haematuria. Flexible cystoscopy shows a papillary bladder tumour. What is the next step?

A. Intravesical BCG immediately
B. Radical cystectomy
C. Radiotherapy
D. Transurethral resection of the bladder tumour (TURBT)
E. Urine cytology only

18.7 A patient from an area endemic for Schistosoma haematobium develops a bladder tumour. Which histological type is most associated with this infection?

A. Adenocarcinoma
B. Small-cell carcinoma
C. Squamous cell carcinoma
D. Transitional cell carcinoma
E. Urachal carcinoma

18.8 A 25-year-old man has a pelvic fracture after a road traffic collision. He has blood at the urethral meatus and cannot pass urine; DRE shows a high-riding prostate. How should bladder drainage be achieved?

A. Blind urethral catheterisation with a 12 Fr catheter
B. Immediate open urethroplasty
C. Intermittent self-catheterisation
D. Suprapubic catheter after retrograde urethrogram
E. Wait for spontaneous voiding

18.9 A baby boy has the urethral meatus on the ventral surface of the penis with a hooded foreskin and ventral curvature. The parents request circumcision for religious reasons. What is the correct advice?

A. Circumcise at the same time as repair at 5 years
B. Circumcise immediately
C. Circumcise only if the meatus is glanular
D. Defer circumcision; the foreskin may be needed for hypospadias repair
E. Hypospadias does not require surgery

18.10 A 66-year-old man has a PSA of 9.2 ng/mL and a firm nodule on the right lobe on DRE. He is otherwise fit. What is the recommended next investigation?

A. Bone scan
B. CT abdomen and pelvis
C. Multiparametric MRI of the prostate
D. Repeat PSA in 1 year
E. Transrectal biopsy without imaging

Answer key with explanations

18.1 — D (Tamsulosin). α-blockers relax prostatic smooth muscle and improve symptoms within days. Finasteride shrinks larger prostates and reduces long-term retention risk but takes months to work; antimuscarinics treat storage symptoms.

18.2 — B (Dilutional hyponatraemia from absorbed irrigation fluid). TUR syndrome results from absorption of hypotonic glycine irrigant through opened venous sinuses, causing dilutional hyponatraemia, fluid overload and glycine toxicity (visual disturbance). Bipolar resection in saline largely prevents it.

18.3 — C (Post-obstructive diuresis with fluid and electrolyte balance). High-pressure chronic retention with renal impairment may be followed by a large post-obstructive diuresis, risking dehydration and electrolyte disturbance; hourly urine output and fluid replacement are needed.

18.4 — A (Bicalutamide (anti-androgen) to prevent tumour flare). LHRH agonists initially cause a testosterone surge that can worsen bone pain or precipitate cord compression; an anti-androgen is given for the first 2–3 weeks to block this flare.

18.5 — B (High-dose dexamethasone and urgent whole-spine MRI). Metastatic spinal cord compression is an emergency; high-dose steroids reduce oedema and urgent MRI guides radiotherapy or surgical decompression. Neurological outcome depends on function at treatment.

18.6 — D (Transurethral resection of the bladder tumour (TURBT)). TURBT is diagnostic and therapeutic; it must include detrusor muscle for accurate staging (muscle-invasive or not), which determines further treatment.

18.7 — C (Squamous cell carcinoma). Chronic schistosomal inflammation causes squamous metaplasia and squamous cell carcinoma of the bladder. Transitional cell carcinoma is commonest overall.

18.8 — D (Suprapubic catheter after retrograde urethrogram). Suspected posterior urethral injury is assessed by retrograde urethrogram; bladder drainage is by suprapubic catheter (or a single gentle attempt at urethral catheterisation by a urologist). Blind catheterisation can convert a partial into a complete rupture.

18.9 — D (Defer circumcision; the foreskin may be needed for hypospadias repair). In hypospadias the prepuce is often used for reconstruction; circumcision should be deferred until repair (usually 6–18 months).

18.10 — C (Multiparametric MRI of the prostate). Multiparametric MRI is now performed before biopsy to identify suspicious lesions for targeted biopsy and to avoid unnecessary biopsies. Bone scan is for staging once high-risk cancer is confirmed.

CHAPTER 19

Testis and Scrotum

Key points

- Acute scrotal pain in a boy or young man = **testicular torsion until proven otherwise** → **immediate surgical exploration** (salvage > 90% within 6 h).
- Scrotal swellings: can you **get above it**? Is it **separate from the testis**? Does it **transilluminate**?
- Any solid testicular lump is a **tumour until proven otherwise** → ultrasound, tumour markers, **inguinal orchidectomy**.

1. Approach to a scrotal swelling

Scrotal swelling — can you get above it?

No → inguino-scrotal hernia (cough impulse, reducible)

Yes → is the testis separately palpable?

Separate from testis
Transilluminates → **epididymal cyst** (above and behind testis)
Does not → varicocele ("bag of worms"), chronic epididymitis

Testis not separately palpable
Transilluminates → **hydrocele**
Does not → **testicular tumour**, haematocele, orchitis

2. Acute scrotum

Feature	Testicular torsion	Epididymo-orchitis	Torsion of appendix testis
Age	Peak 12–18 years (and neonates)	Sexually active adults; older men (UTI)	Pre-pubertal (7–12)
Onset	**Sudden**, severe, often with vomiting, may wake from sleep	Gradual, over days; dysuria, discharge	Gradual, localised upper pole
Signs	High-riding, horizontal lie, **absent cremasteric reflex**, diffusely tender	Tender epididymis, fever; **Prehn's sign** (pain relief on elevation) — unreliable	"**Blue dot sign**" at upper pole
Management	**Emergency exploration**, detorsion, **bilateral orchidopexy**; orchidectomy if non-viable. Do not delay for Doppler	Antibiotics (ceftriaxone + doxycycline if STI; quinolone if enteric organisms); exclude torsion	Analgesia; excise if diagnosis made at exploration

> **Exam pearl — bell-clapper deformity**
> Torsion is due to a high investment of the tunica vaginalis allowing the testis to rotate. The deformity is often bilateral — hence **fixation of the contralateral testis**.

3. Hydrocele, varicocele and epididymal cyst

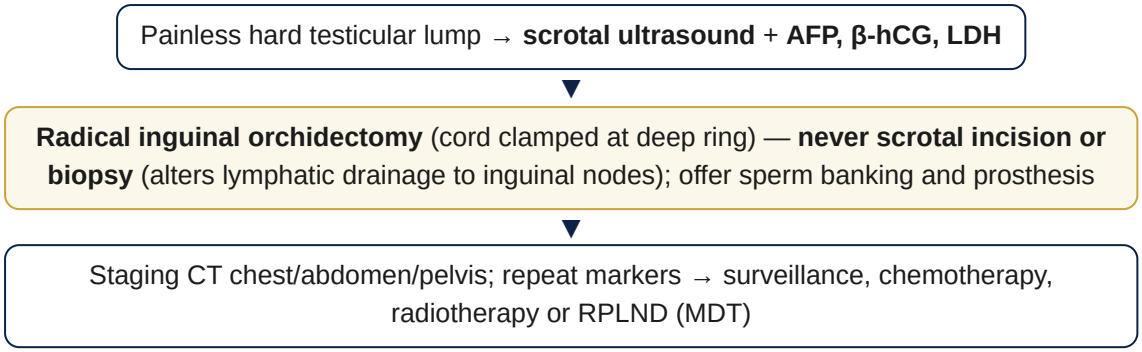
Condition	Key facts	Management
Hydrocele	Fluid in tunica vaginalis; testis impalpable within; transilluminates. Primary (idiopathic) or secondary (**tumour**, infection, trauma) → **ultrasound in young men**. Congenital (patent processus vaginalis) — infants	Adults: **Jaboulay** (eversion) or **Lord's** (plication) operation; infants: most resolve by 1–2 years, else herniotomy
Varicocele	Dilated pampiniform plexus; **left side ~90%** (left testicular vein drains at right angle into left renal vein); "bag of worms", disappears lying down; subfertility, testicular atrophy, dragging ache. New right or non-emptying varicocele → exclude **renal tumour**	Scrotal support; embolisation or ligation if symptomatic, subfertility, adolescent testicular atrophy
Epididymal cyst	Above and behind testis, separate, transilluminates (spermatocele contains sperm, milky)	Reassure; excise if symptomatic (may affect fertility)

4. Undescended testis (cryptorchidism)

- ~3–5% of term (more in preterm) boys; most descend by 3 months.
- Distinguish from **retractile testis** (can be brought to scrotum — no surgery) and **ectopic testis** (outside normal path — superficial inguinal pouch commonest).
- Risks: **infertility, malignancy** (~5–10× risk), torsion, trauma, associated hernia, psychological.
- Treatment: **orchidopexy at 6–12 months** (before 18 months); impalpable testis → **laparoscopy**.
- Orchidopexy improves fertility potential and allows self-examination, but does not eliminate cancer risk.

5. Testicular tumours

Feature	Seminoma	Non-seminomatous germ cell tumour (NSGCT)
Age	30–40	20–30
Markers	Usually normal; ↑ **LDH**; β-hCG ↑ in some; **AFP never raised**	**AFP** (yolk sac), **β-hCG** (choriocarcinoma), LDH
Spread	Lymphatic → **para-aortic nodes** (not inguinal, unless scrotal skin involved)	Lymphatic and blood (lungs)
Sensitivity	Very **radiosensitive** and chemosensitive	Chemosensitive (BEP: bleomycin, etoposide, cisplatin)
Prognosis	Excellent — cure rates > 95% overall	



Risk factors: **undescended testis**, previous contralateral tumour, family history, Klinefelter's, infertility. Lymphoma is the commonest testicular tumour in men > 60.

6. Other conditions

Condition	Key facts
Fournier's gangrene	Necrotising fasciitis of perineum/scrotum; diabetics; emergency debridement (see *Surgery in General*, Ch. 4)
Mumps orchitis	Post-pubertal males; unilateral or bilateral; atrophy, subfertility
Testicular trauma	Ultrasound; rupture of tunica albuginea → surgical repair
Vasectomy	Contraception; semen analysis to confirm azoospermia (~12 weeks); complications: haematoma, infection, sperm granuloma, chronic pain, recanalisation

Chapter 19 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

19.1 A 14-year-old boy wakes at 4 a.m. with sudden severe pain in the left testis and vomiting. The left testis is high-riding, lies horizontally, and the cremasteric reflex is absent. What is the most appropriate management?

A. Analgesia and review in the morning
B. Antibiotics for epididymo-orchitis
C. Colour Doppler ultrasound before deciding
D. Immediate scrotal exploration with bilateral fixation
E. Manual detorsion and discharge

19.2 A 28-year-old man has a painless, hard, irregular lump in the right testis. Ultrasound shows a solid intratesticular mass. AFP and β-hCG are raised. What is the most appropriate surgical approach?

A. Fine-needle aspiration
B. Partial orchidectomy via scrotal incision
C. Radical inguinal orchidectomy
D. Scrotal biopsy
E. Trans-scrotal orchidectomy

19.3 A 35-year-old man has a testicular tumour. AFP is markedly raised. Histology reports 'pure seminoma'. What is the correct interpretation?

A. AFP is typical of seminoma
B. Liver disease must be the cause
C. The histology is correct and AFP is irrelevant
D. The tumour is a lymphoma
E. The tumour should be managed as a non-seminomatous germ cell tumour

19.4 A testicular seminoma first metastasises via lymphatics. Which lymph node group is involved first?

A. Deep inguinal nodes
B. External iliac nodes
C. Internal iliac nodes
D. Para-aortic nodes at the level of the renal vessels
E. Superficial inguinal nodes

19.5 A 25-year-old man has a dull dragging ache in the left scrotum after standing. Examination while standing reveals a soft 'bag of worms' above the testis that disappears on lying down. What is the diagnosis?

A. Epididymal cyst
B. Hydrocele
C. Indirect inguinal hernia
D. Spermatocele
E. Varicocele

19.6 A 40-year-old man has a painless, smooth, fluctuant scrotal swelling. You can get above it, it transilluminates brightly, and the testis cannot be palpated separately. What is the diagnosis?

A. Epididymal cyst
B. Haematocele
C. Hydrocele
D. Inguinoscrotal hernia
E. Testicular tumour

19.7 A 22-year-old man has a newly diagnosed hydrocele. The testis cannot be felt. What investigation should be performed before surgery?

A. Aspiration of fluid for cytology
B. CT abdomen
C. No investigation needed
D. Scrotal ultrasound
E. Serum testosterone

19.8 A 10-month-old boy's right testis is not palpable in the scrotum or groin, even under examination by a paediatric surgeon. What is the next step?

A. Diagnostic laparoscopy
B. hCG injections and review at 5 years
C. Observation until puberty
D. Orchidectomy
E. Ultrasound of the scrotum only

19.9 A 9-year-old boy has gradual-onset pain in the upper pole of the right testis over 24 hours. A tender nodule with a bluish discoloration is seen at the upper pole; the testis is otherwise normal and the cremasteric reflex is present. What is the most likely diagnosis?

A. Epididymo-orchitis
B. Idiopathic scrotal oedema
C. Mumps orchitis
D. Testicular torsion
E. Torsion of the appendix testis (hydatid of Morgagni)

19.10 A 30-year-old sexually active man has 3 days of gradually increasing right scrotal pain, dysuria and urethral discharge. The epididymis is swollen and tender and the testis lies normally. What is the most appropriate management?

A. Ceftriaxone and doxycycline
B. Ciprofloxacin only
C. Emergency scrotal exploration
D. Oral amoxicillin
E. Reassurance and analgesia only

Answer key with explanations

19.1 — D (Immediate scrotal exploration with bilateral fixation). Testicular torsion is a clinical diagnosis; immediate exploration, detorsion and bilateral orchidopexy are required. Ultrasound must not delay surgery, as viability falls sharply after 6 hours.

19.2 — C (Radical inguinal orchidectomy). Testicular tumours are removed through an inguinal incision with high ligation of the cord; scrotal incisions or biopsy risk tumour spread to scrotal skin and inguinal lymphatics, altering drainage.

19.3 — E (The tumour should be managed as a non-seminomatous germ cell tumour). Pure seminomas do not produce AFP; a raised AFP indicates a non-seminomatous (yolk sac) component, and the tumour is treated as NSGCT. Other causes of raised AFP (liver disease) should still be considered.

19.4 — D (Para-aortic nodes at the level of the renal vessels). The testis develops near the kidney, so its lymphatics follow the testicular vessels to the para-aortic nodes. Scrotal skin drains to superficial inguinal nodes.

19.5 — E (Varicocele). A varicocele is a dilatation of the pampiniform plexus, usually left-sided because the left testicular vein drains into the left renal vein. A right-sided or non-collapsing varicocele raises suspicion of a renal or retroperitoneal mass.

19.6 — C (Hydrocele). A hydrocele surrounds the testis (so the testis is not separately palpable), transilluminates, and one can get above it. An epididymal cyst also transilluminates but is separate from, above and behind the testis.

19.7 — D (Scrotal ultrasound). A secondary hydrocele may hide an underlying testicular tumour, especially in young men. Ultrasound assesses the testis; aspiration is avoided because it risks infection and recurrence.

19.8 — A (Diagnostic laparoscopy). For an impalpable testis, laparoscopy is diagnostic (intra-abdominal testis, vanishing testis) and allows staged orchidopexy. Ultrasound is unreliable for locating intra-abdominal testes.

19.9 — E (Torsion of the appendix testis (hydatid of Morgagni)). Torsion of the appendix testis causes localised upper-pole tenderness with the 'blue dot sign' and a preserved cremasteric reflex; it is managed with analgesia. If torsion of the testis cannot be excluded, exploration is required.

19.10 — A (Ceftriaxone and doxycycline). Epididymo-orchitis in sexually active men under 35 is usually due to Chlamydia or gonorrhoea; treatment is ceftriaxone plus doxycycline with sexual health follow-up. Quinolones are used when enteric organisms are likely (older men, UTI).

CHAPTER 20

Paediatric Surgery

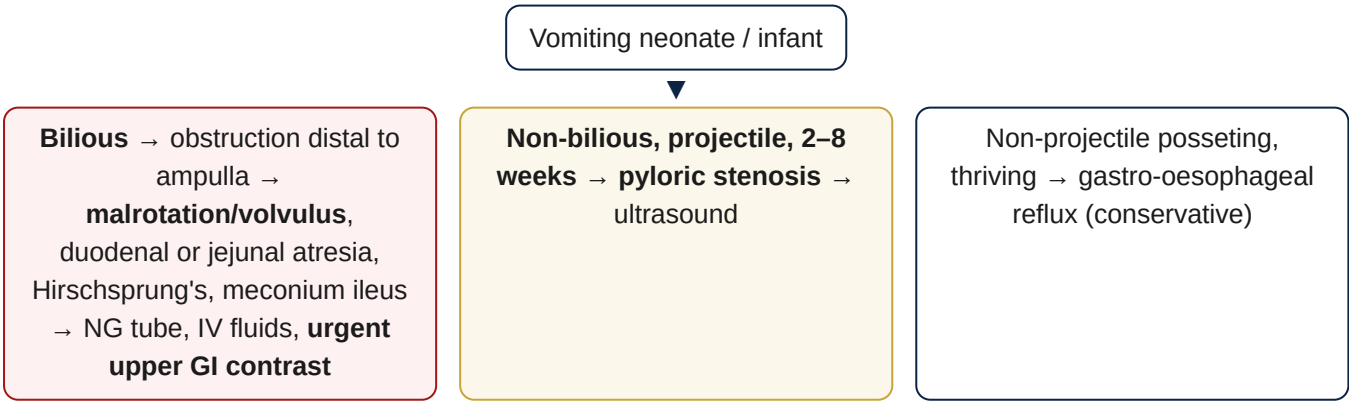
Key points

- Children are not small adults: higher surface area, smaller circulating volume (**~80 mL/kg**), rapid heat loss, and they compensate for blood loss until late collapse.
- **Bilious vomiting in a neonate** = **malrotation with volvulus** until proven otherwise → urgent upper GI contrast study.
- Infantile hypertrophic pyloric stenosis is **a medical emergency first** (correct alkalosis) and a surgical one second.
- Congenital anomalies often coexist — look for associations (e.g. **VACTERL**, Down's syndrome).

1. Fluids and physiology in children

Topic	Key facts
Maintenance fluid (Holliday–Segar "4-2-1")	4 mL/kg/h for first 10 kg + 2 mL/kg/h for next 10 kg + 1 mL/kg/h for each kg above 20
Fluid type	Isotonic (0.9% saline + 5% dextrose or Plasma-Lyte with dextrose); **avoid hypotonic fluids** (hyponatraemia)
Resuscitation bolus	10 mL/kg crystalloid (20 mL/kg in some protocols), reassess
Weight estimate (1–10 years)	(Age + 4) × 2 kg
Urine output target	1–2 mL/kg/h (infants up to 2)

2. The vomiting infant



Condition	Key features	Management
Infantile hypertrophic pyloric stenosis	2–8 weeks, **first-born males**; projectile non-bilious vomiting, hungry after feeds; visible peristalsis, "**olive**" in RUQ during test feed; **hypochloraemic hypokalaemic metabolic alkalosis**; US: muscle thickness ≥ 3–4 mm, length ≥ 15–16 mm	Correct fluids/electrolytes first (0.45% saline + 5% dextrose + KCl; Cl^- > 100, HCO_3^- < 28), then **Ramstedt's pyloromyotomy** (open or laparoscopic)
Malrotation with midgut volvulus	Any age, usually first month; sudden **bilious vomiting**; may be well initially → later shock, bloody stools; contrast: **DJ flexure right of midline**, "corkscrew"	**Emergency Ladd's procedure** (untwist anticlockwise, divide Ladd's bands, widen mesentery, appendicectomy)
Duodenal atresia	Bilious vomiting from birth; **Down's syndrome** (~30%); polyhydramnios; AXR "**double bubble**"	Duodenoduodenostomy
Oesophageal atresia ± TOF	Polyhydramnios, frothy saliva, choking/cyanosis with feeds; **NG tube coils in pouch** on X-ray; gas in stomach = distal TOF (commonest type); VACTERL	Replogle tube suction, avoid feeds; surgical repair (ligate fistula, primary anastomosis)
Meconium ileus	Cystic fibrosis; distal ileal obstruction, "soap-bubble" appearance	Gastrografin enema; surgery if fails
Necrotising enterocolitis	Premature neonates, formula feeds; bloody stools, distension; **pneumatosis intestinalis**	NBM, NG, antibiotics, TPN; surgery for perforation

3. Abdominal wall defects

Feature	Gastroschisis	Exomphalos (omphalocele)
Defect	Right of the umbilical cord	Through umbilical ring
Sac	**No sac** — bowel exposed, thickened	**Covered by sac** (peritoneum + amnion)
Associated anomalies	Uncommon (intestinal atresia); young mothers	**Common** — chromosomal (trisomy 13, 18), cardiac, **Beckwith–Wiedemann**
Management	Cover bowel (cling film), prevent heat/fluid loss; primary closure or silo	Investigate associations; staged closure

4. Other common conditions

Condition	Key facts
Intussusception	6–18 months; colic, red-currant jelly stool, sausage mass; air enema (Chapter 12)
Hirschsprung's disease	Delayed meconium; rectal suction biopsy; pull-through (Chapter 14)
Anorectal malformations	Imperforate anus; high vs low; colostomy then **PSARP** for high lesions; VACTERL screening
Inguinal hernia / hydrocele	Patent processus vaginalis; herniotomy (urgent in infants); hydroceles usually resolve by 1–2 years
Undescended testis	Orchidopexy at 6–12 months (Chapter 19)
Testicular torsion	Emergency exploration (Chapter 19)
Phimosis	Physiological non-retractile foreskin common until ~5 years; true phimosis (BXO/lichen sclerosus scarring) → circumcision
Wilms' tumour vs neuroblastoma	Wilms': smooth flank mass, does not cross midline, child well. Neuroblastoma: irregular, crosses midline, child unwell, **raised urinary catecholamines (VMA/HVA)**, calcification
Congenital diaphragmatic hernia	Usually left posterolateral (**Bochdalek**); respiratory distress, scaphoid abdomen; pulmonary hypoplasia → stabilise, delayed repair
Non-accidental injury	Inconsistent history, delayed presentation, multiple injuries of different ages, posterior rib fractures, scald patterns → safeguarding

VACTERL association
Vertebral · **A**norectal · **C**ardiac · **T**racheo-**E**sophageal fistula · **R**enal · **L**imb (radial) anomalies.

Chapter 20 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

20.1 A 5-week-old first-born boy has projectile non-bilious vomiting after every feed for 1 week and is hungry immediately afterwards. He is dehydrated. Blood gas shows pH 7.52, Cl^- 86 mmol/L, K^+ 2.9 mmol/L, HCO_3^- 34 mmol/L. What is the most appropriate immediate management?

A. Barium meal and same-day pyloromyotomy
B. Emergency Ramstedt's pyloromyotomy tonight
C. IV fluid and electrolyte correction before pyloromyotomy
D. Oral rehydration and discharge
E. Thickened feeds and omeprazole

20.2 A 10-day-old baby, previously well, suddenly develops bilious vomiting. He is alert and the abdomen is soft. What is the most urgent investigation?

A. Abdominal ultrasound for pyloric stenosis
B. Blood culture and observation
C. Rectal suction biopsy
D. Sweat test
E. Upper GI contrast study

20.3 A newborn with Down's syndrome has bilious vomiting within hours of birth. Antenatal scans showed polyhydramnios. Abdominal X-ray shows two gas bubbles and no distal gas. What is the diagnosis?

A. Duodenal atresia
B. Hirschsprung's disease
C. Jejunal atresia
D. Meconium ileus
E. Pyloric stenosis

20.4 A newborn baby has excessive frothy saliva and chokes and turns blue during his first feed. A nasogastric tube cannot be passed beyond 10 cm; X-ray shows the tube coiled in the upper chest and gas in the stomach. What is the most likely anomaly?

A. Choanal atresia
B. Congenital diaphragmatic hernia
C. Laryngomalacia
D. Oesophageal atresia with distal tracheo-oesophageal fistula
E. Pyloric atresia

20.5 A baby is born with loops of thickened bowel protruding through a defect to the right of a normal umbilical cord, with no covering membrane. What is the most likely diagnosis and its usual association?

A. Exomphalos — Beckwith–Wiedemann syndrome
B. Exomphalos — trisomy 18
C. Gastroschisis — congenital heart disease in most
D. Gastroschisis — few associated anomalies apart from intestinal atresia
E. Umbilical hernia — hypothyroidism

20.6 A 15-kg child is nil by mouth after surgery. Using the Holliday–Segar formula, what is the hourly maintenance fluid requirement?

A. 40 mL/h
B. 50 mL/h
C. 60 mL/h
D. 75 mL/h
E. 100 mL/h

20.7 A 2-year-old child is pale, irritable and losing weight, with a hard, irregular abdominal mass crossing the midline and bruising around the eyes. What investigation supports the most likely diagnosis?

A. 5-HIAA in urine
B. Serum AFP
C. Serum calcitonin
D. Urinary catecholamine metabolites (VMA/HVA)
E. Urine culture

20.8 A 3-week-old premature baby on formula feeds develops abdominal distension, bloody stools and lethargy. X-ray shows gas within the bowel wall. What is the diagnosis?

A. Hirschsprung's enterocolitis
B. Intussusception
C. Malrotation
D. Meconium ileus
E. Necrotising enterocolitis

20.9 A newborn has respiratory distress, a scaphoid abdomen and bowel sounds heard in the left chest. Chest X-ray shows bowel loops in the left hemithorax. What is the main determinant of survival?

A. Degree of pulmonary hypoplasia
B. Immediate surgical repair within 1 hour
C. Presence of a hernial sac
D. Side of the defect
E. Timing of the first feed

20.10 A newborn girl has no anal opening, and meconium is seen at the vaginal introitus. Which group of investigations is most important before definitive surgery?

A. Barium meal only
B. Screening for VACTERL anomalies (echocardiogram, renal ultrasound, spinal imaging)
C. Sweat chloride test
D. Thyroid function tests
E. Upper GI endoscopy

Answer key with explanations

20.1 — C (IV fluid and electrolyte correction before pyloromyotomy). Pyloric stenosis causes hypochloraemic hypokalaemic alkalosis; surgery is delayed until fluids and electrolytes are corrected, because alkalosis causes post-anaesthetic apnoea. Pyloromyotomy is then curative.

20.2 — E (Upper GI contrast study). Bilious vomiting in a neonate suggests malrotation with midgut volvulus until proven otherwise; an urgent upper GI contrast study shows an abnormal DJ flexure position. Delay can lead to loss of the entire midgut.

20.3 — A (Duodenal atresia). The 'double bubble' (stomach and proximal duodenum) without distal gas is typical of duodenal atresia, which is associated with Down's syndrome in about 30% of cases. Treatment is duodenoduodenostomy.

20.4 — D (Oesophageal atresia with distal tracheo-oesophageal fistula). A coiled NG tube in the upper pouch with gas in the stomach indicates oesophageal atresia with a distal TOF (the commonest type, ~85%). VACTERL anomalies must be sought.

20.5 — D (Gastroschisis — few associated anomalies apart from intestinal atresia). Gastroschisis lies to the right of the cord, has no sac and is rarely associated with other anomalies (except intestinal atresia). Exomphalos has a sac and frequent chromosomal and cardiac associations.

20.6 — B (50 mL/h). 4 mL/kg/h for the first 10 kg (40 mL) plus 2 mL/kg/h for the next 5 kg (10 mL) = 50 mL/h.

20.7 — D (Urinary catecholamine metabolites (VMA/HVA)). Neuroblastoma presents with an irregular mass that crosses the midline in an unwell child, often with periorbital ecchymoses ('raccoon eyes') from orbital metastases; urinary VMA/HVA are raised. Wilms' tumour usually does not cross the midline.

20.8 — E (Necrotising enterocolitis). NEC affects premature neonates; pneumatosis intestinalis is characteristic. Management is bowel rest, NG decompression, antibiotics and TPN, with surgery for perforation or deterioration.

20.9 — A (Degree of pulmonary hypoplasia). Congenital diaphragmatic hernia (usually left posterolateral, Bochdalek) causes pulmonary hypoplasia and pulmonary hypertension, which determine outcome. Infants are stabilised (intubation, avoid bag-mask ventilation) and repaired later.

20.10 — B (Screening for VACTERL anomalies (echocardiogram, renal ultrasound, spinal imaging)). Anorectal malformations are often associated with vertebral, cardiac, renal and limb anomalies; screening is essential. Management depends on the level, often with a colostomy followed by posterior sagittal anorectoplasty (PSARP).

CHAPTER 21

Plastic and Reconstructive Surgery

Key points

- The **reconstructive ladder**: choose the simplest technique that achieves a durable, functional and acceptable result (modern "reconstructive elevator" allows moving straight to complex options).
- A **graft** has no blood supply of its own and depends on the recipient bed; a **flap** carries its own blood supply.
- Grafts fail mainly from **haematoma/seroma, shear, infection** and a poor bed (bare bone, tendon, cartilage, irradiated tissue).
- Cleft lip and palate are managed by a multidisciplinary team with timed repairs.

1. The reconstructive ladder

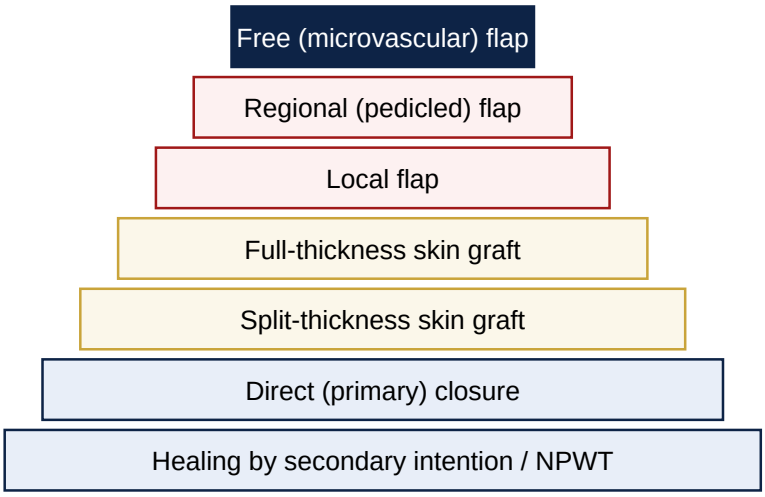


Figure 21.1 — The reconstructive ladder (simple at the bottom → complex at the top).

2. Skin grafts

Feature	Split-thickness (STSG)	Full-thickness (FTSG)
Composition	Epidermis + **part** of dermis	Epidermis + **whole** dermis
Donor sites	Thigh, buttock, scalp; donor heals by re-epithelialisation in ~2 weeks (can be re-harvested)	Post-auricular, supraclavicular, groin, upper eyelid; donor closed directly
Take	**More reliable**; can be **meshed** to cover larger areas	Less reliable; needs good bed
Contraction	Little primary, **marked secondary contraction**	Marked primary, **minimal secondary contraction**
Cosmesis	Poorer colour/texture match	Better — face, hands, digits
Uses	Large wounds, burns, leg ulcers	Face, eyelids, fingers, palms

Phases of graft take
Plasmatic imbibition (first 48 h — nourished by diffusion) → **inosculation** (vessel end-to-end connections, day 2–3) → **revascularisation/neovascularisation** (day 4–7). A graft will not take on bare bone without periosteum, tendon without paratenon, cartilage without perichondrium, or infected beds (especially **β-haemolytic Streptococcus**).

3. Flaps

Classification	Examples
By blood supply	**Random pattern** (no named vessel; length : breadth limits ~1:1–2:1) vs **axial pattern** (named vessel, e.g. forehead flap — supratrochlear)
By movement	Advancement (V–Y), rotation, transposition (rhomboid/Limberg, Z-plasty), interpolation
By tissue	Cutaneous, fasciocutaneous (radial forearm, ALT), musculocutaneous (**latissimus dorsi**, TRAM), muscle, bone (fibula)
By distance	Local, regional (pedicled), **free** (microvascular anastomosis — DIEP breast reconstruction, free fibula for mandible)

Z-plasty: lengthens a contracted scar (60° limbs gain ~75% length) and changes its direction. **Flap failure**: venous congestion (purple, swollen, brisk bleeding on pin-prick) or arterial insufficiency (pale, cold, no capillary refill) → urgent re-exploration of free flaps.

4. Cleft lip and palate

Topic	Key facts
Incidence	~1 in 700 births; cleft lip ± palate commoner in males; isolated cleft palate commoner in females and more often syndromic
Embryology	Cleft lip: failure of fusion of **medial nasal and maxillary processes**; cleft palate: failure of fusion of palatal shelves
Problems	Feeding, speech, hearing (glue ear — **Eustachian tube dysfunction**), dental, facial growth, psychosocial
Timing (typical)	**Lip repair ~3 months**; **palate repair 6–12 months** (before speech develops); alveolar bone graft 8–11 years; orthognathic surgery after growth
Team	Cleft surgeon, speech therapist, orthodontist, ENT, audiology, specialist nurse, psychologist

5. Hand injuries and other essentials

Topic	Key facts
Flexor tendon zones	**Zone II** ("no man's land" — within fibro-osseous sheath, FDS and FDP together) — worst prognosis; repair by specialist; early controlled mobilisation
Testing tendons	FDP: flex DIP with PIP held; FDS: flex PIP with other fingers held extended
Fingertip injuries	Dressings (heal well in children), V–Y advancement, cross-finger flap
Replantation	Amputated part: wrapped in saline-moistened gauze, in a sealed bag, placed **on ice — never in direct contact with ice**; best for thumb, multiple digits, children
Dupuytren's contracture	Palmar fascia thickening (ring, little fingers); Garrod's pads; fasciectomy, needle fasciotomy if MCP contracture > 30° or table-top test positive
Pressure sores	Debridement, offloading, nutrition; flap closure (e.g. gluteal rotation) for deep sacral sores

Chapter 21 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

21.1 A 60-year-old man needs coverage of a 15 × 20 cm granulating wound on the thigh after debridement of necrotising fasciitis. What is the most appropriate method of closure?

A. Free latissimus dorsi flap
B. Full-thickness skin graft from the groin
C. Healing by secondary intention alone
D. Meshed split-thickness skin graft
E. Tissue expansion

21.2 A 70-year-old woman has a basal cell carcinoma excised from the lower eyelid, leaving a 1.5 cm defect. Which graft gives the best result with least later contraction?

A. Full-thickness graft from the post-auricular region
B. Meshed split-thickness graft from the thigh
C. No graft; secondary intention
D. Split-thickness graft from the scalp
E. Xenograft

21.3 A split-thickness skin graft applied to a lower-leg wound has failed completely by day 5. The graft was lifted off by a collection beneath it. What is the commonest cause of graft failure?

A. Haematoma or seroma beneath the graft
B. Infection with Staphylococcus epidermidis
C. Mesh ratio too high
D. Patient age
E. Use of a thick graft

21.4 During the first 48 hours after application, how does a skin graft survive?

A. Angiogenesis from the graft itself
B. Inosculation with recipient vessels
C. Its own axial artery
D. Plasmatic imbibition from the recipient bed
E. Venous drainage only

21.5 A 35-year-old man has an exposed tibia with stripped periosteum after an open fracture. Why is a skin graft unsuitable here?

A. Bone is too painful for grafting
B. Grafts cannot be applied in the leg
C. Grafts need a vascularised bed, which bare bone without periosteum lacks
D. Grafts take only in children
E. It would cause osteomyelitis in all cases

21.6 A 3-month-old baby has a unilateral complete cleft lip and palate. Feeding is established with a special bottle. When is palate repair usually performed?

A. At 3 months with the lip
B. At 6–12 months
C. At 3 years
D. At 8–11 years with alveolar bone graft
E. After facial growth is complete

21.7 A child with a repaired cleft palate has recurrent middle-ear effusions and conductive hearing loss. What is the underlying mechanism?

A. Absence of the stapes
B. Chronic tonsillitis
C. Eustachian tube dysfunction due to abnormal tensor/levator palati muscles
D. Nasal polyps
E. Sensorineural damage from surgery

21.8 A carpenter's index finger is amputated through the proximal phalanx. How should the amputated part be transported for possible replantation?

A. Directly immersed in ice water
B. In a dry container at room temperature
C. In alcohol solution
D. Wrapped in dry gauze and frozen
E. Wrapped in saline-moistened gauze in a sealed bag placed on ice

21.9 Four hours after a free flap breast reconstruction, the flap is purple, swollen and tense, with rapid dark bleeding on pin-prick. What is the most likely problem?

A. Arterial thrombosis
B. Fat necrosis
C. Haematoma beneath the breast only
D. Normal post-operative appearance
E. Venous thrombosis/congestion

21.10 A 25-year-old man has a laceration on the volar aspect of the finger between the distal palmar crease and the middle phalanx. He cannot flex the DIP or PIP joints of that finger. In which flexor tendon zone is the injury?

A. Zone I
B. Zone II
C. Zone III
D. Zone IV
E. Zone V

Answer key with explanations

21.1 — D (Meshed split-thickness skin graft). A large, healthy granulating bed is best covered with a split-thickness graft, which takes reliably and can be meshed to cover a larger area. Full-thickness grafts are limited in size and less reliable.

21.2 — A (Full-thickness graft from the post-auricular region). FTSGs undergo minimal secondary contraction and give better colour and texture match, which matters on the eyelid (to prevent ectropion). Post-auricular and upper-eyelid skin are ideal donor sites.

21.3 — A (Haematoma or seroma beneath the graft). Fluid beneath the graft separates it from the bed and prevents plasmatic imbibition and inosculation; haematoma/seroma is the commonest cause of failure, followed by shear and infection (β-haemolytic Streptococcus).

21.4 — D (Plasmatic imbibition from the recipient bed). For the first 48 hours a graft is nourished by diffusion of plasma from the bed (imbibition); inosculation (connection of graft and bed vessels) follows at days 2–3, then revascularisation.

21.5 — C (Grafts need a vascularised bed, which bare bone without periosteum lacks). A graft relies entirely on its bed for blood supply; bone without periosteum, tendon without paratenon and cartilage without perichondrium cannot support graft take, so a flap is required.

21.6 — B (At 6–12 months). The palate is usually repaired at 6–12 months, before speech develops, to optimise speech outcome; the lip is repaired at about 3 months and the alveolar bone graft at 8–11 years.

21.7 — C (Eustachian tube dysfunction due to abnormal tensor/levator palati muscles). The palatal muscles that open the Eustachian tube are abnormally inserted in cleft palate, causing poor middle-ear ventilation and glue ear; audiology follow-up and grommets may be needed.

21.8 — E (Wrapped in saline-moistened gauze in a sealed bag placed on ice). Cooling (without direct contact with ice, which causes frostbite) extends ischaemic tolerance. The part is wrapped in moist gauze, sealed in a bag and placed in ice water.

21.9 — E (Venous thrombosis/congestion). Venous congestion causes a purple, swollen flap with brisk dark bleeding; arterial insufficiency causes a pale, cold flap with no bleeding. Both need urgent re-exploration.

21.10 — B (Zone II). Zone II extends from the distal palmar crease (A1 pulley) to the FDS insertion on the middle phalanx; both FDS and FDP lie within the tight fibro-osseous sheath, so adhesions are common and repair needs specialist care.

CHAPTER 22

Neurosurgery: Head Injury, Raised ICP and Spinal Disorders

Key points

- The aim in head injury is to prevent **secondary brain injury** (hypoxia, hypotension, raised ICP, hypercapnia, hypoglycaemia, seizures).
- **Cerebral perfusion pressure = MAP − ICP**; keep CPP ~60–70 mmHg.
- Extradural haematoma: **lucid interval**, biconvex; subdural: crescentic; subarachnoid: **thunderclap headache**.
- **Cauda equina syndrome** is a surgical emergency: urgent MRI and decompression.

1. Intracranial pressure

Monro–Kellie doctrine
The skull is a fixed box containing **brain, blood and CSF**. An expanding mass is compensated by displacing CSF and venous blood; once exhausted, ICP rises steeply → herniation. Normal ICP 5–15 mmHg.

Feature of raised ICP	Notes
Early	Headache (worse in morning, lying, coughing), vomiting, papilloedema, falling GCS
Uncal (transtentorial) herniation	**Ipsilateral fixed dilated pupil** (CN III compression), contralateral hemiparesis
Tonsillar herniation	Neck stiffness, respiratory arrest ("coning")
Cushing's reflex (late)	Hypertension, bradycardia, irregular breathing
Management	Head-up 30°, neck neutral (no tight tube ties), sedation, normocapnia ($PaCO_2$ 4.5–5 kPa), **mannitol or hypertonic saline**, treat seizures, evacuate mass lesion, CSF drainage, decompressive craniectomy

2. Head injury

ABCDE with C-spine immobilisation; avoid hypoxia (SpO_2 > 94%) and hypotension (SBP > 90 mmHg)

▼

GCS (Chapter 11, *Surgery in General*), pupils, lateralising signs, glucose

▼

CT head within 1 hour if: GCS < 13 initially or < 15 at 2 h, suspected open/depressed or **basal skull fracture**, post-traumatic seizure, focal deficit, > 1 episode of vomiting. (Within 8 h if anticoagulated with LOC/amnesia, or age ≥ 65 etc.)

▼

Surgical lesion (EDH, significant SDH, depressed fracture) → **neurosurgery**

GCS ≤ 8 → intubate, ventilate, ICP monitoring in ICU

Lesion	Key features	Management
Extradural haematoma	Temporal bone fracture, **middle meningeal artery**; lucid interval; **biconvex/lentiform**, limited by sutures	Urgent craniotomy and evacuation — excellent outcome if early
Acute subdural haematoma	Tearing of **bridging veins**; high-energy injury; often underlying brain injury; **crescentic**, crosses sutures	Craniotomy if significant; worse prognosis
Chronic subdural haematoma	Elderly, alcoholics, anticoagulants; trivial or no trauma; weeks of fluctuating confusion, headache, hemiparesis; hypodense crescent	**Burr-hole drainage**; reverse anticoagulation
Basal skull fracture	**Raccoon eyes**, **Battle's sign** (mastoid bruising), CSF rhinorrhoea/otorrhoea, haemotympanum	Avoid nasal tubes; most CSF leaks settle
Diffuse axonal injury	Deep coma with relatively normal CT; poor outcome	Supportive

3. Subarachnoid haemorrhage and space-occupying lesions

Condition	Key facts
Spontaneous SAH	~85% ruptured **berry aneurysm** (circle of Willis; polycystic kidneys, Ehlers–Danlos); sudden "worst ever" thunderclap headache, neck stiffness, photophobia, collapse. **CT** (sensitive early) → LP after 12 h for **xanthochromia** if CT normal → CT angiography. Treatment: **endovascular coiling** (preferred) or clipping; **nimodipine** to prevent vasospasm; complications: rebleeding, vasospasm/delayed ischaemia, hydrocephalus, hyponatraemia
Brain tumours	Adults: metastases commonest (lung, breast, melanoma, kidney); glioblastoma commonest primary; meningioma (benign, dural-based). Children: posterior fossa (medulloblastoma, astrocytoma). Dexamethasone reduces oedema
Brain abscess	Spread from ears/sinuses/teeth, haematogenous, congenital cyanotic heart disease; ring-enhancing lesion → aspiration + antibiotics
Hydrocephalus	Obstructive (non-communicating) vs communicating; in infants enlarging head, "sunset" eyes; **ventriculoperitoneal shunt** (complications: blockage, infection) or endoscopic third ventriculostomy
Neural tube defects	Spina bifida occulta, meningocele, **myelomeningocele** (neurological deficit, hydrocephalus/Chiari II); folic acid prevention

4. Spinal disorders

Condition	Key facts
Lumbar disc prolapse	Usually **L4/5 or L5/S1**; posterolateral prolapse compresses the **traversing (lower) root** — L4/5 disc → L5 root (weak great-toe extension, dorsum-of-foot numbness); L5/S1 → S1 root (lost ankle jerk, lateral foot, weak plantar flexion). Most settle with conservative care in 6–12 weeks; microdiscectomy for persistent radiculopathy or progressive deficit
Cauda equina syndrome	Large central disc; **saddle anaesthesia**, urinary retention/incontinence, faecal incontinence, bilateral sciatica, leg weakness → **emergency MRI and surgical decompression** (ideally within 48 h, sooner if incomplete)
Cervical myelopathy	Clumsy hands, gait disturbance, UMN signs in legs, Hoffmann's sign; MRI; decompression
Metastatic spinal cord compression	Back pain + neurology in cancer patient → dexamethasone, urgent MRI, radiotherapy/surgery (Chapter 18)
Spinal TB (Pott's disease)	Thoracolumbar, anterior vertebral body and disc destruction, gibbus, cold (psoas) abscess, paraplegia; anti-TB therapy ± surgery — common in Pakistan

Exam pearl — spinal cord injury
Neurogenic shock (hypotension + bradycardia, injury above T6) is different from **spinal shock** (temporary loss of all reflexes below the injury). Central cord syndrome (hyperextension in elderly) affects arms more than legs; Brown-Séquard (hemisection): ipsilateral motor and proprioception loss, contralateral pain/temperature loss.

Chapter 22 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

22.1 A 70-year-old man on warfarin has become increasingly confused and unsteady over 3 weeks after a minor fall. CT shows a hypodense crescentic collection over the left hemisphere with midline shift. What is the most appropriate management?

A. Burr-hole drainage after reversal of anticoagulation
B. Conservative management and repeat CT in 3 months
C. Decompressive craniectomy
D. Intravenous mannitol alone
E. Lumbar puncture

22.2 A 45-year-old woman has a sudden, severe occipital headache 'like being hit with a bat', neck stiffness and photophobia. CT head performed 2 hours after onset is normal. What is the next investigation?

A. Discharge with analgesia
B. EEG
C. Lumbar puncture at least 12 hours after onset for xanthochromia
D. MRI of the spine
E. Repeat CT in 1 week

22.3 A patient with aneurysmal subarachnoid haemorrhage is started on a drug to reduce the risk of delayed cerebral ischaemia due to vasospasm. Which drug is it?

A. Dexamethasone
B. Mannitol
C. Nimodipine
D. Phenytoin
E. Tranexamic acid

22.4 After a head injury, a patient's GCS falls from 14 to 9; the right pupil becomes fixed and dilated and the left limbs weaken. What process is occurring?

A. Central cord syndrome
B. Diffuse axonal injury
C. Right uncal (transtentorial) herniation
D. Spinal shock
E. Tonsillar herniation

22.5 A ventilated patient with severe head injury has MAP 80 mmHg and ICP 30 mmHg. What is his cerebral perfusion pressure?

A. 20 mmHg
B. 30 mmHg
C. 50 mmHg
D. 80 mmHg
E. 110 mmHg

22.6 A 40-year-old man with low back pain develops numbness around the anus and perineum, difficulty passing urine and bilateral leg pain over 24 hours. What is the most appropriate management?

A. Bed rest and analgesia
B. Emergency MRI and surgical decompression
C. Epidural steroid injection
D. Outpatient physiotherapy
E. Plain lumbar X-ray and review in 2 weeks

22.7 A 35-year-old man has sciatica with weakness of great toe extension and numbness over the dorsum of the foot. Ankle jerk is normal. Which nerve root is most likely compressed?

A. L3
B. L4
C. L5
D. S1
E. S2

22.8 A young man after a road traffic collision has bilateral periorbital bruising, bruising behind the ear and clear fluid dripping from the nose. Which tube should be avoided?

A. Chest drain
B. Nasogastric tube
C. Orogastric tube
D. Peripheral IV cannula
E. Urinary catheter

22.9 A 2-month-old infant has a rapidly enlarging head circumference, a tense anterior fontanelle and downward deviation of the eyes. Ultrasound shows dilated ventricles. What is the most common definitive treatment?

A. Acetazolamide alone
B. Lumbar punctures
C. Repeated ventricular taps
D. Steroids
E. Ventriculoperitoneal shunt

22.10 A 25-year-old man from rural Khyber Pakhtunkhwa has 6 months of thoracic back pain, night sweats and weight loss and now has a visible angular kyphosis and a fluctuant swelling in the groin. MRI shows destruction of two adjacent vertebral bodies and the intervening disc. What is the most likely diagnosis?

A. Ankylosing spondylitis
B. Metastatic carcinoma
C. Multiple myeloma
D. Osteoporotic fracture
E. Tuberculosis of the spine (Pott's disease)

Answer key with explanations

22.1 — A (Burr-hole drainage after reversal of anticoagulation). Symptomatic chronic subdural haematoma in an elderly anticoagulated patient is treated by reversing anticoagulation and burr-hole drainage. Lumbar puncture is dangerous with mass effect.

22.2 — C (Lumbar puncture at least 12 hours after onset for xanthochromia). CT is highly sensitive early, but if normal with a convincing history, lumbar puncture performed at least 12 hours after onset detects xanthochromia (bilirubin from red cell breakdown), confirming SAH.

22.3 — C (Nimodipine). Oral nimodipine (a calcium channel blocker) reduces poor outcomes from delayed cerebral ischaemia after SAH. Steroids have no role; tranexamic acid does not improve outcome.

22.4 — C (Right uncal (transtentorial) herniation). An expanding right-sided mass pushes the uncus through the tentorium, compressing the ipsilateral oculomotor nerve (fixed dilated pupil) and the cerebral peduncle (contralateral weakness). Urgent CT and neurosurgical decompression are needed.

22.5 — C (50 mmHg). CPP = MAP − ICP = 80 − 30 = 50 mmHg, below the target of 60–70 mmHg; treatment aims to lower ICP and support MAP.

22.6 — B (Emergency MRI and surgical decompression). Saddle anaesthesia with sphincter disturbance indicates cauda equina syndrome, usually from a massive central disc prolapse; urgent MRI and decompression prevent permanent bladder, bowel and sexual dysfunction.

22.7 — C (L5). L5 root compression (usually from an L4/5 disc) weakens extensor hallucis longus and causes dorsal foot numbness; S1 compression causes loss of ankle jerk and lateral foot sensory loss.

22.8 — B (Nasogastric tube). Features of a basal skull fracture (raccoon eyes, Battle's sign, CSF rhinorrhoea) contraindicate nasal tubes, which may pass intracranially; an orogastric tube is used instead.

22.9 — E (Ventriculoperitoneal shunt). Hydrocephalus in infancy (enlarging head, tense fontanelle, 'sunset' eyes) is usually treated with a VP shunt; endoscopic third ventriculostomy is an option for obstructive types. Common shunt complications are blockage and infection.

22.10 — E (Tuberculosis of the spine (Pott's disease)). Spinal TB destroys adjacent vertebral bodies and the intervening disc, producing a gibbus and a cold abscess that may track along the psoas into the groin. Metastases typically spare the disc.

CHAPTER 23

Cardiothoracic Surgery

Key points

- **Lung cancer** is the commonest cause of cancer death; surgery (lobectomy) offers the best chance of cure for early non-small-cell cancer in fit patients.
- A **chest drain** is inserted in the **safe triangle**, just above the upper border of a rib.
- Empyema = pus in the pleural space: drain early; organised empyema needs **decortication**.
- Coronary artery bypass grafting (CABG) is indicated for left main stem or multivessel disease, especially in diabetics.

1. Chest drain insertion

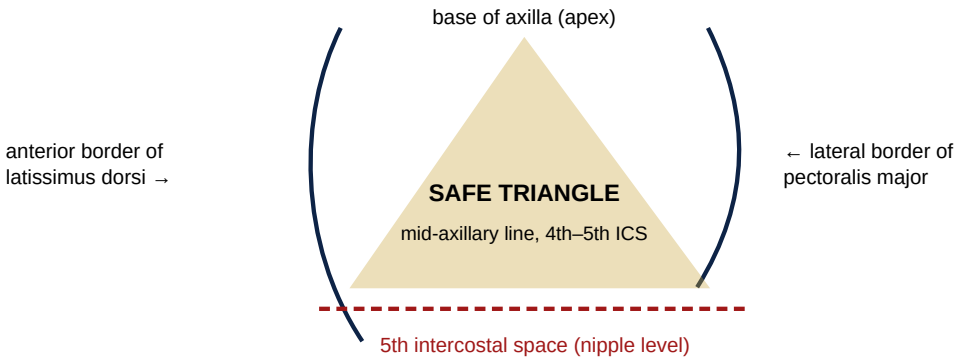


Figure 23.1 — The safe triangle for chest drain insertion (schematic, lateral chest wall).

Insert over the **upper border of the lower rib** (avoids the intercostal neurovascular bundle running in the subcostal groove). Use blunt dissection; underwater seal; check swinging. Complications: misplacement, organ injury, bleeding, infection, **re-expansion pulmonary oedema** (avoid draining > 1–1.5 L rapidly).

2. Lung cancer

Topic	Key facts
Types	**NSCLC ~85%** (adenocarcinoma — commonest, peripheral, non-smokers too; squamous — central, cavitation, **hypercalcaemia (PTHrP)**; large cell) · **SCLC ~15%** (central, smokers, **SIADH, ectopic ACTH**, Lambert–Eaton; early metastasis — chemotherapy, rarely surgery)
Presentation	Cough, haemoptysis, weight loss, chest pain, recurrent pneumonia, clubbing; **Pancoast tumour** (apex) → **Horner's syndrome**, shoulder/arm pain (T1 root); hoarseness (left RLN), SVC obstruction
Investigation	CXR → **CT chest/abdomen** → **PET-CT** (staging) → tissue: bronchoscopy/EBUS (mediastinal nodes), CT-guided biopsy
Fitness	Spirometry (FEV_1), **gas transfer (DLCO)**, CPET if borderline; predicted post-op FEV_1 and DLCO > 40%
Surgery	**Lobectomy** (VATS) standard; pneumonectomy for central tumours; contraindications: N3, metastases, malignant effusion, poor lung function

3. Pleural disease

Condition	Key facts
Primary spontaneous pneumothorax	Tall thin young men, apical blebs; small and asymptomatic → observe; symptomatic → **aspiration** or drain; surgery (VATS bullectomy + pleurodesis) for recurrence, bilateral, persistent air leak > 5 days, high-risk occupations (pilots, divers)
Secondary pneumothorax	Underlying lung disease (COPD); less tolerated → chest drain usually
Empyema	Post-pneumonic; pleural fluid **pH < 7.2**, low glucose, pus/organisms → **chest drain** + antibiotics (± intrapleural tPA/DNase); organised (fibrinous peel, trapped lung) → **VATS/open decortication**
Malignant effusion	Drainage + talc pleurodesis or indwelling pleural catheter
Mesothelioma	**Asbestos** (long latency 30–40 years); pleural thickening, effusion; poor prognosis
Chylothorax	Thoracic duct injury (oesophagectomy, trauma, lymphoma); milky fluid with high triglycerides

4. Cardiac surgery essentials

Topic	Key facts
CABG indications	**Left main stem** stenosis, **three-vessel** disease (especially with diabetes or reduced LV function), failed PCI
Conduits	**Left internal mammary (thoracic) artery to LAD** — best long-term patency (> 90% at 10 years); long saphenous vein, radial artery
Cardiopulmonary bypass	Heparinise (reverse with protamine), cardioplegia; complications: stroke, AF (commonest arrhythmia post-op), bleeding, tamponade, AKI, sternal wound infection
Valve disease	**Aortic stenosis**: angina, syncope, breathlessness (exertional) → valve replacement (surgical or **TAVI** in older/high-risk); **rheumatic mitral stenosis** (common in Pakistan) → balloon valvotomy or replacement
Prosthetic valves	**Mechanical**: durable, lifelong warfarin; **tissue (bioprosthetic)**: no long-term anticoagulation, degenerate in 10–15 years (older patients, women planning pregnancy)
Post-cardiac surgery tamponade	Falling BP, rising CVP, reduced drain output (clotted drains) → **re-sternotomy**
Aortic dissection	Tearing chest pain radiating to back, unequal arm BPs; **Stanford A** (ascending) → emergency surgery; **Stanford B** (descending) → BP control ± TEVAR

Congenital heart disease — surgical pearls

PDA: continuous "machinery" murmur — indomethacin/ibuprofen (preterm) or closure. **Coarctation of aorta**: radio-femoral delay, rib notching, "3" sign on CXR. **Tetralogy of Fallot**: VSD, overriding aorta, RV outflow obstruction, RV hypertrophy; cyanotic "tet spells" (squatting); boot-shaped heart; Blalock–Taussig shunt / complete repair.

Chapter 23 — Self-assessment MCQs (one best answer)

Choose the single best answer. Options are listed alphabetically.

23.1 A 20-year-old tall, thin man has sudden left-sided pleuritic chest pain and breathlessness. CXR shows a 3 cm rim of air on the left with no mediastinal shift; he is not hypoxic. This is his first episode. What is the most appropriate initial management?

A. Immediate VATS bullectomy
B. Needle aspiration
C. Observation only regardless of symptoms
D. Talc pleurodesis
E. Thoracotomy

23.2 Where should an intercostal chest drain be inserted to avoid the intercostal neurovascular bundle?

A. At the midpoint of the intercostal space
B. Just above the upper border of the rib below
C. Just below the lower border of the rib above
D. Through the 2nd intercostal space in the posterior axillary line
E. Through the 8th intercostal space posteriorly

23.3 A 58-year-old smoker has ptosis, miosis and anhidrosis on the right side of the face, with severe right shoulder pain radiating down the inner arm and wasting of the small muscles of the hand. What is the most likely diagnosis?

A. Brachial plexus neuritis
B. Cervical rib
C. Mesothelioma
D. Pancoast tumour of the right lung apex
E. Small-cell carcinoma with SIADH

23.4 A 65-year-old man with lung cancer has hypercalcaemia (3.1 mmol/L) with suppressed PTH and no bone metastases. Which histological type is most likely?

A. Adenocarcinoma
B. Carcinoid tumour
C. Large-cell carcinoma
D. Small-cell carcinoma
E. Squamous cell carcinoma

23.5 A 50-year-old man has a 2.5 cm peripheral adenocarcinoma in the right upper lobe. PET-CT and EBUS show no nodal or distant spread. His FEV_1 and DLCO are 85% predicted. What is the best treatment?

A. Chemotherapy alone
B. Palliative radiotherapy
C. Pneumonectomy
D. Right upper lobectomy with mediastinal lymph node dissection
E. Watchful waiting

23.6 Ten days after pneumonia, a 45-year-old man has persistent fever and a loculated left pleural effusion. Aspirated fluid is turbid with pH 7.0 and low glucose. What is the most appropriate management?

A. Chest drain insertion and antibiotics
B. Diuretics
C. Oral antibiotics and outpatient review
D. Repeated therapeutic aspiration only
E. Talc pleurodesis

23.7 Which conduit has the best long-term patency when used for coronary artery bypass grafting to the left anterior descending artery?

A. Cephalic vein
B. Gastroepiploic artery
C. Left internal mammary (thoracic) artery
D. Long saphenous vein
E. Radial artery

23.8 Four hours after CABG, a patient's blood pressure falls, CVP rises from 8 to 18 mmHg, and chest drain output suddenly stops after being heavy. What is the most likely diagnosis?

A. Cardiac tamponade
B. Hypovolaemia
C. Left ventricular failure only
D. Pneumothorax
E. Vasodilatation from sepsis

23.9 A 55-year-old hypertensive man has sudden tearing chest pain radiating to his back. BP differs by 30 mmHg between the arms. CT angiography shows a dissection flap starting in the ascending aorta. What is the most appropriate management?

A. Beta-blockade and discharge
B. Emergency surgical repair of the ascending aorta
C. Percutaneous coronary intervention
D. Thoracic endovascular repair (TEVAR) of the descending aorta
E. Thrombolysis

23.10 A 28-year-old woman who plans to have children needs aortic valve replacement. Which valve type avoids the need for lifelong warfarin?

A. Bileaflet mechanical valve
B. Bioprosthetic (tissue) valve
C. Caged-ball valve
D. Mechanical tilting-disc valve
E. Starr–Edwards valve

Answer key with explanations

23.1 — B (Needle aspiration). A symptomatic primary spontaneous pneumothorax is managed initially with needle aspiration (or a small-bore drain if this fails); minimal-symptom cases may be observed. Surgery is for recurrence or persistent air leak.

23.2 — B (Just above the upper border of the rib below). The intercostal vein, artery and nerve run in the subcostal groove along the lower border of each rib, so the drain is inserted just above the upper border of the rib below, within the safe triangle.

23.3 — D (Pancoast tumour of the right lung apex). An apical (superior sulcus) tumour invades the sympathetic chain (Horner's syndrome) and the lower brachial plexus (C8/T1 — pain and hand wasting). A cervical rib may cause neurological symptoms but not Horner's syndrome.

23.4 — E (Squamous cell carcinoma). Squamous cell carcinoma secretes PTH-related peptide, causing humoral hypercalcaemia of malignancy with suppressed PTH. Small-cell carcinoma classically causes SIADH and ectopic ACTH.

23.5 — D (Right upper lobectomy with mediastinal lymph node dissection). Early-stage NSCLC in a fit patient is treated by anatomical lobectomy (often VATS) with lymph node sampling; pneumonectomy is reserved for central tumours. Stereotactic radiotherapy is the alternative for unfit patients.

23.6 — A (Chest drain insertion and antibiotics). A complicated parapneumonic effusion/empyema (pH < 7.2, low glucose, turbid fluid) requires chest drainage and antibiotics; intrapleural fibrinolytics or VATS decortication are used if drainage is inadequate.

23.7 — C (Left internal mammary (thoracic) artery). The LIMA-to-LAD graft has excellent long-term patency (> 90% at 10 years) and improves survival; saphenous vein grafts have lower long-term patency.

23.8 — A (Cardiac tamponade). Hypotension with rising CVP and an abrupt fall in drain output (clotted drains) after cardiac surgery indicates tamponade; treatment is urgent re-exploration (re-sternotomy), which may be performed at the bedside if the patient arrests.

23.9 — B (Emergency surgical repair of the ascending aorta). Stanford type A dissection (involving the ascending aorta) needs emergency surgery because of the risk of rupture, tamponade and coronary involvement. Type B dissection is usually managed medically. Thrombolysis is contraindicated.

23.10 — B (Bioprosthetic (tissue) valve). Tissue valves do not require lifelong anticoagulation (warfarin is teratogenic), though they degenerate within 10–15 years and may need re-intervention. Mechanical valves are durable but need lifelong warfarin.