1. Metabolic response to injury

The metabolic response to injury is the coordinated physiological response to trauma, surgery and infection. It involves changes in neuroendocrine activity, inflammatory mediators, energy expenditure, glucose metabolism and protein turnover. The response is classically divided into the ebb phase and the flow phase.

A. Ebb phase vs flow phase — Cuthbertson

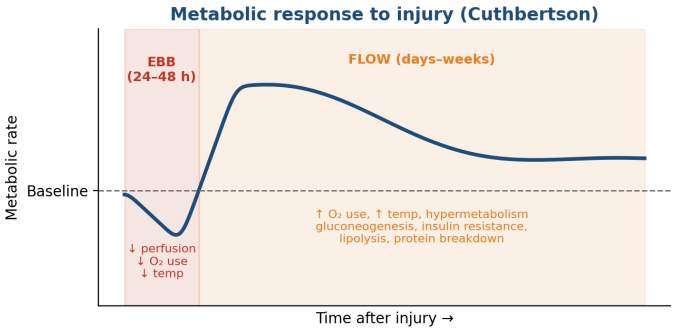


Figure 1. Schematic of ebb and flow phases (not to scale).

Feature	Ebb phase	Flow phase
Timing	Immediate period after injury, usually within the first 24–48 hours	Follows the ebb phase and may persist for days to weeks, depending on injury severity
Main purpose / response	Initial response to shock and reduced tissue perfusion	Hypermetabolic and catabolic response to injury
Circulation	Cardiac output and tissue perfusion may be reduced	Cardiac output and metabolic activity generally increase after resuscitation
Oxygen consumption	Reduced	Increased
Energy expenditure	Reduced initially	Increased
Temperature	May be reduced, especially in shock	Often increased
Hormonal response	Stress response begins	Sustained elevation of stress hormones and catabolic mediators
Metabolism	Reduced metabolic activity	Increased gluconeogenesis, insulin resistance, lipolysis and protein breakdown
Nitrogen balance	May become negative	Commonly negative due to protein catabolism
Clinical priority	Restore circulation, oxygen delivery and tissue perfusion	Control the cause of injury, support organ function and limit catabolism

The duration and intensity of each phase vary with the severity of injury, the degree of shock, infection and the adequacy of resuscitation.

B. Neuroendocrine mediators and their effects

Mediator	Major effects during the stress response
Cortisol	Promotes gluconeogenesis, protein catabolism and insulin resistance; supports the response to physiological stress

F. Chronic wounds and negative-pressure wound therapy (NPWT)

Feature	Key point
Chronic wound	Wound that fails to progress through an orderly healing process
Common causes	Poor perfusion, diabetes, pressure injury, venous disease and persistent infection
Initial assessment	Identify the underlying cause, assess perfusion, control infection and optimize nutrition
NPWT principle	Applies controlled negative pressure through a sealed dressing
Potential benefits	Fluid removal, wound-bed preparation and promotion of granulation tissue in selected wounds
Limitations	Not suitable for every wound; untreated necrosis, uncontrolled bleeding and certain exposed structures require careful assessment

IMPORTANT

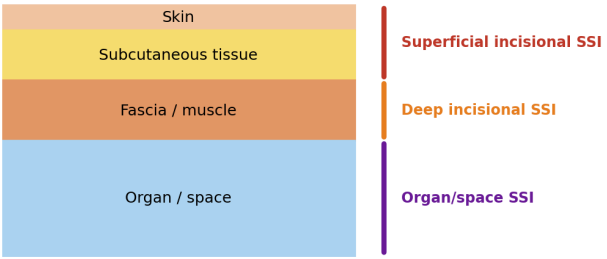
- Wound healing progresses through haemostasis, inflammation, proliferation and remodelling.
- Collagen changes from a type III-rich early matrix towards a type I-rich mature scar.
- Hypertrophic scars remain within the wound boundary; keloids extend beyond it.
- NPWT is an adjunct to wound management, not a substitute for debridement, infection control or correction of poor perfusion.

G. Debridement, dressings and tissue engineering

Debridement type	Use
Surgical	Fastest; gold standard
Enzymatic (collagenase)	Slow; for non-surgical candidates
Autolytic	Hydrogel / hydrocolloid dressings using the body's own enzymes
Mechanical	Wet-to-dry dressings, irrigation
Biological (maggot therapy)	Selective for necrotic tissue; disinfects

Dressing	Use
Hydrocolloid	Shallow, non-infected wounds
Alginate	Heavily exudating wounds
Silver dressing	Infected wounds
Collagen	Chronic ulcer healing

Tissue engineered	Cell type used
Skin	Keratinocytes, fibroblasts
Bone	Osteoblasts, MSCs
Cartilage	Chondrocytes
Cardiac	Cardiomyocytes / stem cells
Vascular graft	Endothelial cells, smooth muscle cells



Deep incisional SSI	Involves deep soft tissues, such as fascia and muscle	Deep incisional abscess or infection involving fascia or muscle
Organ/space SSI	Involves an organ or space other than the incision that was opened or manipulated during surgery	Intra-abdominal abscess after bowel surgery

Figure 9. Depth-based CDC SSI categories (schematic).

For surveillance, the usual time window is 30 days for many procedures, with a 90-day window for specified procedures and categories under applicable CDC/NHSN definitions. The historical 1-year implant rule is not a universal current rule; use the surveillance definition applicable to the procedure and guideline version.

- **Common SSI organisms:** Staphylococcus aureus (commonest); Gram-negatives (E. coli, Pseudomonas); anaerobes such as Bacteroides after colorectal surgery.
- The PDF source describes the SSI window as "within 30 days / 1 year if implant"; see the surveillance note above for the current CDC/NHSN wording.

B. Surgical wound classification

Class	Description	Examples	Approximate infection risk
Class I — Clean	No infection or inflammation; respiratory, alimentary, genital and uninfected urinary tracts are not entered	Elective hernia repair	Lowest
Class II — Clean-contaminated	Controlled entry into the respiratory, alimentary, genital or urinary tract without unusual contamination	Elective bowel resection under controlled conditions	Higher than clean wounds
Class III — Contaminated	Open, fresh accidental wounds; major breaks in sterile technique; gross spillage from the gastrointestinal tract or acute non-purulent inflammation	Bowel surgery with significant spillage	Higher
Class IV — Dirty/infected	Existing infection, perforated viscus or an old traumatic wound with devitalized tissue	Surgery for perforated bowel with established infection	Highest

Reported infection rates vary by procedure, patient risk, surveillance definitions and local conditions; a single percentage should not be applied to every operation within a class.

- Cholecystectomy is a typical clean-contaminated operation; abscess, peritonitis or perforation with pus is dirty/infected. Bowel injury with faecal contamination = Class IV (dirty).

C. Antibiotic prophylaxis

Principle	Key point
Timing	Administer the appropriate prophylactic antibiotic within 60 minutes before incision in most cases

Main treatment principle	Restore circulating volume and control losses	Improve cardiac function and treat the cause	Relieve the obstruction	Treat the cause and support perfusion

These are typical patterns rather than absolute rules. Haemodynamic values depend on the cause, timing, prior fluid administration and concurrent cardiac or respiratory disease.

Mixed venous oxygen saturation (mvO_2)

- Measured via a Swan-Ganz catheter in the pulmonary artery; normal 60-80%.
- **Low:** increased O_2 extraction, as in shock or low cardiac output.
- **High:** sepsis (cells not using oxygen) or cyanide poisoning.
- Earliest sign of shock: **tachycardia**.

C. Shock index and modified shock index

Measure	Formula	Interpretation
Shock index (SI)	Heart rate ÷ systolic blood pressure	Normal adult values are commonly around 0.5–0.7
Elevated SI	SI ≥0.9 is commonly used as a warning threshold	May indicate significant physiological stress or occult haemorrhage
Modified shock index (MSI)	Heart rate ÷ mean arterial pressure (MAP)	Commonly cited normal range is approximately 0.7–1.3; values above this range may indicate haemodynamic instability

Shock index is a screening aid, not a replacement for clinical assessment. Age, medications, pregnancy, pain and cardiac disease can alter the response.

- MSI (HR / MAP) is a better shock predictor in trauma than SI.

D. ATLS classes of haemorrhage

The traditional ATLS classification estimates blood loss and physiological response in an adult. Actual findings may differ from the textbook pattern, especially with age, comorbidity, medication use or pregnancy.

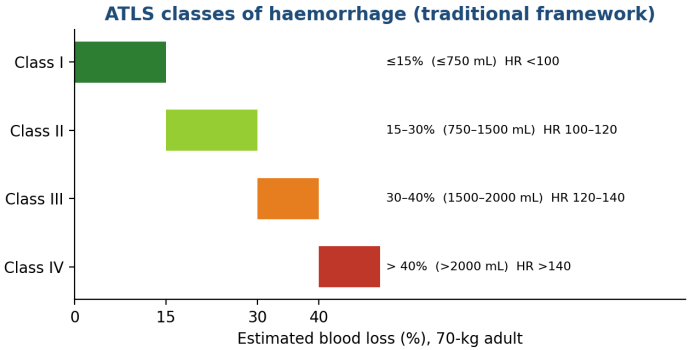


Figure 2. Blood-loss ranges for the four ATLS classes.

Parameter	Class I	Class II	Class III	Class IV
Estimated blood loss	Up to 15%	15–30%	30–40%	More than 40%

Traditional mnemonic	Association	Key considerations
Wind	Respiratory causes	Atelectasis is commonly taught in the mnemonic, but postoperative fever should prompt assessment for pneumonia, aspiration and other respiratory complications when clinically indicated
Water	Urinary tract	Catheter-associated infection, urinary infection and other urinary complications
Wound	Surgical site	Superficial or deep infection, abscess and wound complications
Walking	Venous thromboembolism	Deep vein thrombosis or pulmonary embolism, particularly with compatible symptoms
Wonder drugs	Drug fever	Medication-related fever after excluding more urgent causes

B. Postoperative day timeline

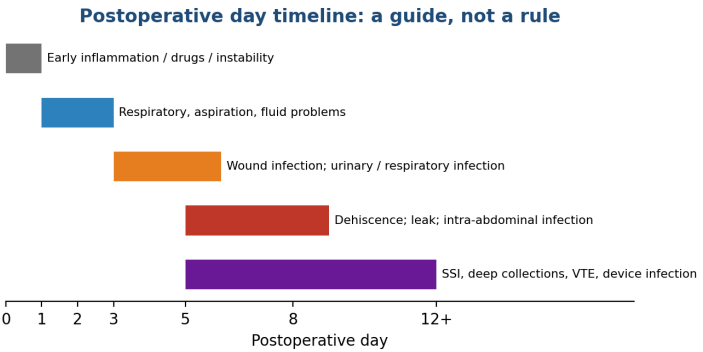


Figure 10. Typical windows for postoperative complications (guide only).

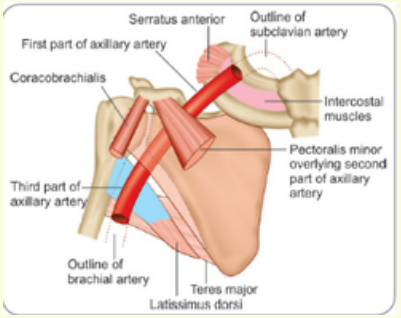
Time after surgery	Important considerations
First 24 hours	Inflammatory response to surgery, medication-related causes and early complications; investigate instability or focal findings promptly
POD 1–2	Respiratory complications, aspiration, fluid-related problems and other early postoperative causes
POD 3–5	Wound infection may emerge; urinary or respiratory infection and other sources remain possible
POD 5–8	Wound complications, including dehiscence, may present; assess for intra-abdominal infection or anastomotic leak when indicated
Later postoperative period	Surgical-site infection, deep collections, VTE, device-related infection and other complications remain possible

This is a practical mnemonic rather than a rigid timeline. Serious infection, haemorrhage, pulmonary embolism or an anastomotic leak can occur earlier or later than the traditional associations suggest.

C. Wound dehiscence / burst abdomen

Wound dehiscence is separation of a previously closed surgical wound. Fascial dehiscence is particularly serious because it can lead to evisceration.

D. Modified radical mastectomy (MRM): named types



Operation	Pectoralis major	Pectoralis minor	Axillary dissection
Patey	Preserved	Removed	Classically includes level I and II nodes
Auchincloss	Preserved	Preserved	Classically includes level I and II nodes
Scanlon	Technique varies by description and historical source	Technique varies by description	Historical eponym; verify the exact definition used in the prescribed textbook

Patey and Auchincloss are the standard named comparisons in most examination discussions. Scanlon terminology varies between sources, so its exact operative definition should be checked against the specific reference used.

7. Locally advanced and inflammatory breast cancer

A. Inflammatory breast cancer (IBC)

Inflammatory breast cancer is a clinical diagnosis characterized by rapid onset of breast erythema, edema and peau d'orange, often with warmth and enlargement. Dermal lymphatic tumor emboli are characteristic but are not required to establish the clinical diagnosis.

Feature	Important point
Clinical onset	Rapid, typically within 6 months
Erythema and edema	Involves at least one-third of the breast in the standard clinical definition
Peau d'orange	Caused by dermal edema
Histology	Invasive breast carcinoma is required
Dermal lymphatic invasion	Supports the diagnosis but may be absent on skin biopsy
Staging	T4d
Breast-conserving surgery	Generally not appropriate
Sentinel node biopsy	Generally not the standard approach because of diffuse disease and planned axillary treatment
Standard treatment	Multimodality treatment, typically neoadjuvant systemic therapy, mastectomy and radiotherapy

Additional considerations

- Breast imaging and biopsy should not be delayed when needed for diagnosis.
- Breast ultrasound is useful; mammography can be performed with appropriate technique when clinically indicated.
- Sentinel node mapping during pregnancy requires specialist assessment. Blue dyes, including methylene blue, are generally avoided; radiocolloid-based techniques may be considered under appropriate protocols.
- Breastfeeding is generally not recommended during cytotoxic chemotherapy, endocrine therapy or HER2-directed treatment.
- Definitive treatment should be coordinated between breast surgery, medical oncology, obstetrics and maternal-fetal medicine.

C. Male breast cancer

Feature	High-yield information
Most common histology	Invasive ductal carcinoma/no special type
Hormone receptors	Frequently ER-positive
Important hereditary association	BRCA2; BRCA1 and other genes may also be involved
Presentation	Painless subareolar mass, nipple retraction or discharge
Diagnosis	Triple assessment with imaging and tissue diagnosis
Surgery	Mastectomy is commonly used; breast conservation is possible in selected cases
Axillary staging	SLNB when appropriate
Systemic treatment	Based on stage and tumor biomarkers, as in female breast cancer

B. Stewart–Treves syndrome

Feature	Important information
Definition	Angiosarcoma arising in chronically lymphedematous tissue
Classical association	Chronic upper-limb lymphedema following mastectomy and axillary treatment
Presentation	Bruise-like, violaceous or nodular skin lesions
Diagnosis	Biopsy of suspicious lesions
Management	Multidisciplinary assessment, wide excision when feasible and additional treatment according to extent

Stewart–Treves syndrome is an important differential diagnosis for new skin lesions arising in a chronically lymphedematous limb.

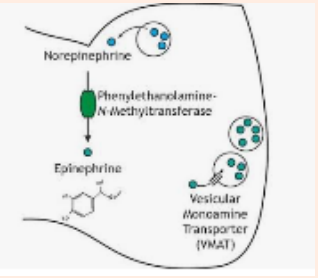




2. Neuroblastoma

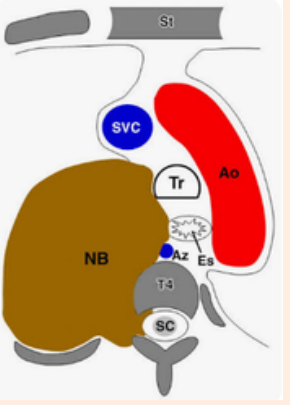
A. Basic features and tumor markers

Feature	High-yield information
Origin	Neural crest-derived sympathetic nervous system cells
Common primary sites	Adrenal medulla and sympathetic chain, including the paraspinal region
Age	Predominantly infants and young children
Urinary catecholamine metabolites	VMA (vanillylmandelic acid) and HVA (homovanillic acid)
Common metastatic sites	Bone, bone marrow, liver, skin and lymph nodes
Molecular marker	MYCN amplification is an important adverse prognostic factor
Imaging	MRI/CT for primary tumor anatomy; MIBG imaging for staging when the tumor is MIBG-avid
Clinical behavior	Ranges from spontaneous regression in selected infants to highly aggressive metastatic disease



B. INRG staging system

The International Neuroblastoma Risk Group (INRG) system uses pretreatment imaging-defined risk factors (IDRFs) to classify disease before surgery.



Stage	Definition
L1	Localized tumor without image-defined risk factors
L2	Locoregional tumor with one or more image-defined risk factors
M	Distant metastatic disease, except the specific infant pattern classified as MS
MS	Metastatic disease in children younger than 18 months, with metastases confined to skin, liver and/or bone marrow under the INRG criteria

B. Rhabdomyosarcoma

Feature	High-yield information
Origin	Malignant tumor showing skeletal muscle differentiation
Common sites	Head and neck, genitourinary tract and extremities
Common paediatric subtypes	Embryonal and alveolar rhabdomyosarcoma
Embryonal subtype	Often occurs in the head and neck or genitourinary tract; botryoid variant may occur beneath mucosal surfaces
Alveolar subtype	Often associated with PAX3::FOXO1 or PAX7::FOXO1 fusions
Treatment	Multimodality treatment with chemotherapy, surgery and/or radiotherapy according to site, stage and risk
Surgical principle	Obtain local control while preserving function and avoiding unnecessary mutilating surgery

Rhabdomyosarcoma: subtype comparison

Feature	Embryonal	Alveolar
Histology	Embryonal-type skeletal muscle differentiation	Alveolar architecture in classic cases
Common locations	Head and neck, genitourinary tract	Extremities and trunk; other sites may occur
Molecular association	Often lacks the defining FOXO1 fusion	May contain PAX3::FOXO1 or PAX7::FOXO1
Prognosis	Depends on site, stage, age and risk group	Fusion-positive disease is generally associated with higher-risk biology
Treatment	Risk-adapted multimodality therapy	Risk-adapted multimodality therapy

IMPORTANT

Wilms tumour: WT1 is located at 11p13; typical age is 1–4 years. Treatment uses protocol-directed chemotherapy and nephrectomy.
WAGR: Wilms tumour, aniridia, genitourinary abnormalities and developmental delay.
Denys–Drash: WT1-associated syndrome with nephropathy, disorders of sex development and Wilms tumour predisposition.
COG versus SIOP: COG generally uses upfront nephrectomy for selected unilateral tumors; SIOP generally uses preoperative chemotherapy.
Wilms tumour surgery: Avoid tumor spill and sample regional lymph nodes for staging.
Neuroblastoma: Neural crest origin; urinary VMA/HVA, MYCN amplification and MIBG imaging are high-yield.
INRG: L1 = localized without image-defined risk factors; L2 = locoregional with risk factors; M = distant metastases; MS = specific metastatic pattern in children younger than 18 months.
Neuroblastoma versus Wilms: Neuroblastoma commonly calcifies, crosses the midline and encases vessels; Wilms tumour typically arises from the kidney and displaces adjacent structures.
Opsoclonus–myoclonus: A characteristic paraneoplastic association of neuroblastoma.
Hepatoblastoma: AFP is commonly elevated; PRETEXT classifies pretreatment hepatic tumor extent.
Rhabdomyosarcoma: Embryonal and alveolar are important paediatric subtypes; PAX3::FOXO1 and PAX7::FOXO1 are associated with alveolar disease.

1.3 Vesicoureteric reflux (VUR)

- **Primary VUR:** short intramural tunnel (J-hook ureter).
- Grading by VCUG (I–V, international).
- DMSA for scars.
- Prophylactic antibiotics for low grades; high grade/breakthrough UTI → endoscopic sub-ureteric injection (Deflux, dextranomer/hyaluronic acid) or reimplantation (**Cohen** cross-trigonal; Politano-Leadbetter; **Lich-Gregoir** extravesical).
- **Secondary VUR:** PUV, neurogenic bladder (treat the cause). Reflux nephropathy is a major cause of childhood hypertension and ESRD.

1.4 Urolithiasis (B&L Ch 82)

Stone	Facts
Calcium oxalate	**Most common** (~80%). Radio-opaque. Hypercalciuria commonest metabolic cause (thiazide); hypocitraturia (K-citrate); enteric hyperoxaluria after ileal resection/bypass.
Calcium phosphate	Alkaline urine, distal RTA (type 1), hyperparathyroidism; commonest stone in pregnancy (alkaline urine, B&L).
Struvite (triple phosphate)	Urease-splitting (Proteus, Klebsiella); alkaline urine; staghorn, "coffin-lid" crystals; radio-opaque. Rx: complete clearance (PCNL), antibiotics.
Uric acid	*Radiolucent,* acidic urine (pH <5.5); alkalinise to pH 6.5-7 (K-citrate), allopurinol. Only stone dissolved medically.
Cystine	AR (COLA transporter), hexagonal crystals, faintly radio-opaque; sodium nitroprusside test; alkalinise pH >7.5, tiopronin; SWL-resistant.
Indinavir / xanthine/Triamterene	*Radiolucent.*

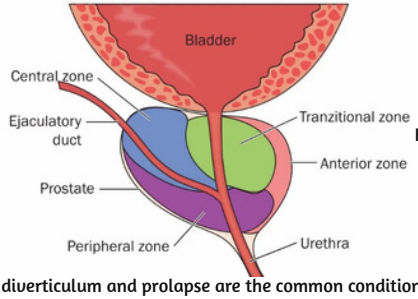
- **NCCT KUB = investigation of choice**. USG for pregnancy and children; MRI second-line in pregnancy.
- Ureteric stone narrowing sites: PUJ, pelvic brim (iliac vessels), VUJ (narrowest).
- Watchful waiting: stones <5 mm; up to 90% of 4-mm and 50% of 6-10 mm pass. **Medical expulsive therapy: tamsulosin** for distal ureteric stones >5 mm and fragments after SWL.

Modality	Indication	Notes
SWL	Renal/upper ureteric stone <2 cm	**Contraindicated**: pregnancy (absolute), coagulopathy, untreated UTI, distal obstruction, AAA. Hard stones (COM, brushite, cystine) resist. Steinstrasse = column of fragments in distal ureter. Clinically insignificant fragments ⩽4 mm.
RIRS (flexible URS + laser)	Renal stones <2 cm, lower pole, obesity, bleeding diathesis, skeletal deformity, HSK/pelvic kidney	Avoids PCNL morbidity.
PCNL	Renal stones >2 cm, staghorn, failed SWL/RIRS, unfavourable lower pole anatomy	Prone; posterolateral calyx; contraindicated: pregnancy, untreated UTI, bleeding diathesis, anticoagulation. Complications: bleeding (angio-embolisation), infection, pleural injury (supracostal). **Mini-PCNL <22 Fr; standard >28 Fr.**
Ureteroscopy	Ureteric stones; emergency in pregnancy	Complications: perforation, avulsion, retropulsion, stricture.
Open	Complex/infected stones, anatomical anomaly	Anatrophic nephrolithotomy, pyelolithotomy.

3.1 Applied anatomy [PYQ 22]

Part of male urethra

	Landmarks
Prostatic (3 cm)	Widest, most dilatable; urethral crest / verumontanum (seminal colliculus) with utricle and ejaculatory duct openings; prostatic sinuses. Image Q (2022): verumontanum → prostatic urethra.
Membranous (1-2 cm)	Shortest and narrowest (least dilatable), with external sphincter; vulnerable to pelvic-fracture shear.
Bulbar	Spongy; fossa navicularis in the glans; lined by glands of Littre; straddle injury site; Cowper glands open into bulbar urethra.
Penile (pendulous)	Corpus spongiosum; Buck fascia; Colles fascia continuity explains "butterfly" bruising.



- Female urethra: 4 cm, drains to periurethral (Skene) glands; caruncle, diverticulum and prolapse are the common conditions.
- Prostatic zones (McNeal): **peripheral zone 70% (palpable on DRE)**, central 25%, **transition zone 5% (BPH)**, anterior fibromuscular stroma.

3.2 Urethral stricture [PYQ 25]

- Causes: iatrogenic/catheter-related and endoscopic instrumentation (commonest in the West), **lichen sclerosus (BXO)** (penile/meatal), trauma (straddle → bulbar), infections (gonococcal), hypospadias repair. Symptoms: weak stream, spraying, post-void dribbling, retention, recurrent UTI, "spongiofibrosis".
- Diagnosis: **uroflowmetry (Qmax <10 mL/s)**, **ascending (retrograde) urethrogram + micturating cystourethrogram** (combined), urethroscopy. RGU best for the anterior urethra; USG urethrography for length.

Option	Selection
Dilatation / DVIU (direct vision internal urethrotomy)	First-line for short (<2 cm), single, bulbar, first-time stricture; 50-60% recurrence; success falls after the second attempt → offer urethroplasty. Clean intermittent self-dilatation reduces recurrence.
Excision and primary anastomosis (EPA)	Short (<2 cm) bulbar strictures; highest long-term success (~90%+). Not for penile urethra (chordee).
Buccal mucosal graft (BMG) urethroplasty (dorsal/ventral onlay)	Long (>2 cm), penile, recurrent strictures; BMG is the preferred graft (hairless, thick epithelium, resistant to infection); lingual graft alternative. Two-stage (Johanson/Bracka) for severe disease/lichen sclerosus.
Perineal urethrostomy	Salvage in unfit/long panurethral stricture.

Stricture length	Preferred treatment	Notes
1–2 cm	**EPA**	**Excellent results; tension-free anastomosis**

5.1 Undescended testis (cryptorchidism) [PYQ 23, 25]

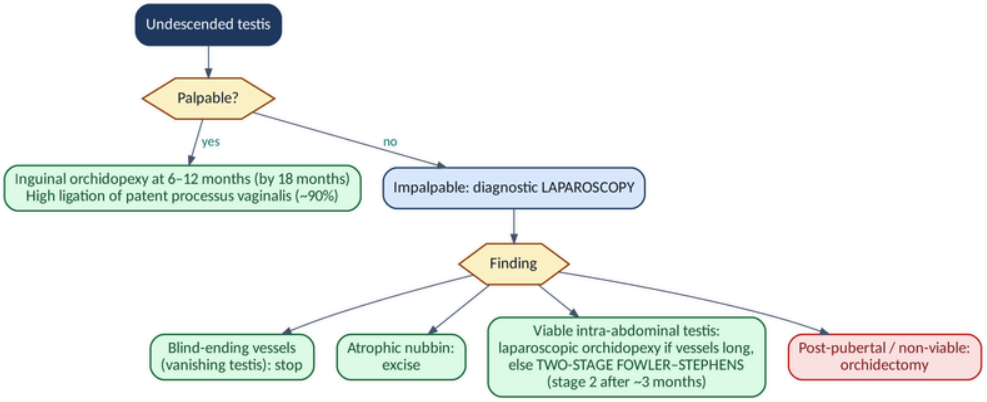
- Commonest congenital genital anomaly (3% term, ~1% at 1 yr). Types: palpable (inguinal, high scrotal), impalpable (intra-abdominal, canalicular, **vanishing/atrophic ~20%**), ectopic (superficial inguinal pouch **of Denis Browne**, commonest ectopic site), retractile (not a true UDT; observe annually).
- Complications: infertility (germ cell loss after ~12-18 months), torsion, hernia, trauma/psychological.
- **Early orchidopexy (before puberty) gives the best fertility outcome.**
- **Timing: orchidopexy at 6-12 months (ideally by 18 months)**; no hCG/GnRH hormonal therapy routinely recommended (B&L). Post-pubertal intra-abdominal/atrophic testis → orchidectomy.
- **Processus vaginalis patent in ~90%** (clinically evident hernia in fewer) and **must be ligated/divided (high ligation) at orchidopexy** (B&L p1559). **[PYQ 23]**
- Standard inguinal orchidopexy: isolate cord, divide gubernacular remnants, dissect PV off cord, open internal spermatic fascia, retroperitoneal dissection for length, **subdartos pouch** fixation.
- Extra length: divide lateral fascial bands, **Prentiss manoeuvre** (transpose cord medial to inferior epigastric vessels).

Situation	Management
Palpable UDT	Inguinal orchidopexy (open) at 6-12 months
Impalpable UDT	Diagnostic laparoscopy (best) → absent (blind-ending vessels): stop; atrophic nubbin: excise; viable intra-abdominal testis → (a) laparoscopic orchidopexy if vessels long enough; (b) **staged (two-stage) Fowler-Stephens**: stage 1 ligate testicular vessels (clip/divide), leave on collateral (vasal/cremasteric) supply; second stage after ~3-6 months (key: 3 months); (c) **single-stage FS** in older boys, or orchidectomy if post-pubertal/non-viable. **[PYQ 25]**
Bilateral impalpable + hypospadias	Think DSD / CAH (karyotype, 17-OHP, electrolytes) before surgery.
Microlithiasis / testis in adult	Self-examination, USG surveillance.

IMPORTANT PYQs: (asked before: high probability of repeat)

- 2025 PYQ: 1-year-old, impalpable testis, diagnostic laparoscopy shows a **viable intra-abdominal testis→ two-stage Fowler-Stephens, second stage 3 months later** (B&L p1560).
- 2025 PYQ: groin swelling that appears when a trapped testis is held in the scrotum and the child cries→ **indirect inguinal hernia** (herniotomy), not UDT/varicocele. **[PYQ 25]**

▶ **FLOWCHART: Undescended testis**



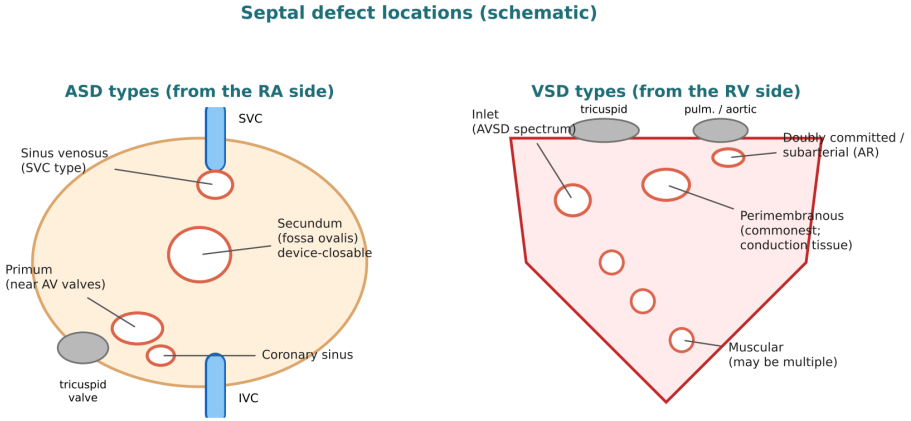


Figure 7. Locations of ASD and VSD types.

B. Indications for closure

Feature	Key point
Haemodynamic significance	Right ventricular volume overload
Shunt magnitude	Qp:Qs ≥1.5:1 is an important threshold in the supplied outline
Clinical objective	Prevent progressive right-heart volume overload and associated complications
Pulmonary hypertension	Pulmonary vascular resistance must be assessed when pulmonary hypertension is present
Eisenmenger physiology	Contraindication to routine closure because eliminating the shunt may worsen haemodynamics
Classic examination finding	Fixed splitting of the second heart sound (S2)

- **Frequency:** secundum about 70% (commonest). Primum is part of AV canal defects and Down syndrome. Sinus venosus lies near the SVC with PAPVC and needs a surgical patch. Coronary sinus (unroofed) ASD goes with a persistent left SVC.
- Further closure indications: RA/RV dilatation on echo, history of paradoxical embolism, symptoms (dyspnoea or AF). Pulmonary hypertension is a late complication.

```
Qp/Qs >1.5 or RA/RV dilatation?
  |                          |
 Yes                        No -> observe
  |
  +-- Secundum -> device closure
  +-- Primum / sinus venosus -> surgery
  +-- PAH / Eisenmenger -> do NOT close
```

C. Associated condition: Lutembacher syndrome

Lutembacher syndrome is the association of an ASD with mitral stenosis. It produces a combination of atrial-level shunting and obstruction to left ventricular inflow.

IMPORTANT

Secundum ASD is the principal type commonly suitable for device closure. Fixed splitting of S2 is a classic clinical finding. Eisenmenger physiology is a contraindication to routine closure.

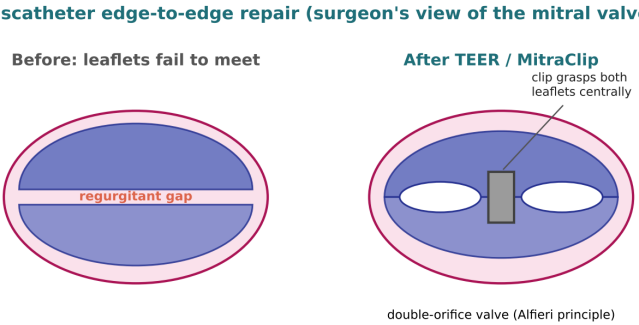


Figure 3. TEER brings the leaflets together centrally, creating a double-orifice valve.

Surgical indications in primary MR

Parameter	Important threshold
Left ventricular ejection fraction (LVEF)	≤60%
Left ventricular end-systolic diameter (LVESD)	≥40 mm

These thresholds are important markers of left ventricular dysfunction in severe primary MR and support consideration of surgery in the appropriate clinical setting.

```
Severe MR on echo
   |                        |
Symptomatic              Asymptomatic
   |                        |
Surgery                EF ≤60%, LVESD ≥40 mm, new AF or PASP ≥50 mmHg?
(repair preferred)        |                        |
                       Yes -> surgery        No -> echo every 6 months
```

COAPT vs MITRA-FR

Trial	Key relevance
COAPT	Evaluated TEER in selected patients with heart failure and secondary MR; demonstrated benefit in the studied population
MITRA-FR	Evaluated TEER in patients with secondary MR; did not demonstrate the same magnitude of benefit as COAPT

IMPORTANT

Carpentier classification identifies the mechanism of MR and guides repair strategy. TEER/MitraClip replicates the Alfieri edge-to-edge principle. In severe primary MR, LVEF ≤60% and LVESD ≥40 mm are important surgical thresholds.

3. Aortic valve disease

Aortic valve disease includes aortic stenosis (AS) and aortic regurgitation (AR). Severity assessment and the choice between surgical and transcatheter intervention depend on valve anatomy, symptoms, ventricular function, age and procedural risk.

#	Fact
1	HLHS: Duct-dependent systemic circulation: cyanosis + shock + single S2, small LV on echo; needs PDA + ASD/PFO for mixing. PGE1 first, intubate/inotropes if acidotic. Staged palliation: Norwood (neonate; modified BT shunt vs Sano RV–PA conduit, SVR trial) → bidirectional Glenn (3–6 months, SVC to PA) → Fontan (2–4 years). Not suitable for biventricular repair; hybrid stage I or transplant are alternatives. After Norwood the RV is the systemic ventricle.
2	TAPVC and PAPVC: TAPVC: all veins drain systemically, ASD essential for survival; Darling I supracardiac (commonest, snowman sign), II cardiac (coronary sinus/RA), III infracardiac (below diaphragm, most obstructed), IV mixed. Obstructed TAPVC = emergency surgery; PGE1 does not correct it. PAPVC: left-to-right, no cyanosis; commonest = right upper pulmonary vein to SVC with sinus venosus ASD; operate if Qp/Qs ⩾1.5 or RV overload (intra-atrial baffle; Warden if drains to SVC). Scimitar syndrome = right PAPVC to IVC with right lung hypoplasia.
3	d-TGA: Ventriculoarterial discordance, parallel circulations; cyanosis within hours, no response to oxygen, egg-on-string CXR, narrow pedicle. Mixing needed: PGE1 + Rashkind balloon atrial septostomy (day 1–7). Definitive = arterial switch (Jatene) within 2–3 weeks (LV deconditions; coronaries transferred — main risk). Rastelli = TGA + VSD + pulmonary stenosis; Mustard/Senning (atrial switch) are historical, with late arrhythmias and RV failure; ccTGA → double switch.
4	Tetralogy of Fallot: PROV: pulmonary (RVOT) stenosis, RVH, overriding aorta, VSD; boot-shaped heart; RVOT obstruction drives cyanosis. Tet spell: knee-chest/squatting (↑ SVR), oxygen, morphine, IV fluids, propranolol, phenylephrine; refractory/recurrent → emergency BT shunt (subclavian to PA). Complete repair at ~3–6 months: VSD closure + RVOT patch. Transannular patch → pulmonary regurgitation → RV dilatation → later valve replacement; valve-sparing preserves the valve. McGoon ratio/Nakata index assess PAs.
5	Pulmonary atresia with VSD and truncus: PA + VSD: extreme TOF, duct-dependent or MAPCA-dependent, single S2, oligaemic lungs; CT angiography is essential; PGE1 then unifocalisation + RV–PA conduit (or BT shunt if PAs unsuitable). Truncus arteriosus: single trunk + large VSD, early cyanosis then heart failure, wide pulse pressure (truncal regurgitation); Collett–Edwards I commonest; echo diagnostic; repair = separate PAs, VSD patch, RV–PA conduit (Rastelli-type), conduit stenosis later.
6	Ebstein anomaly: Apical displacement of septal and posterior tricuspid leaflets → atrialised RV, TR, right-to-left shunt at atrial level, WPW/accessory pathways; maternal lithium. Carpentier A–D by RV size and anterior leaflet mobility. Surgery: cone reconstruction (da Silva); Starnes procedure for critically ill neonates; Great Ormond Street score for neonatal risk.
7	Single ventricle and Fontan: Examples: tricuspid atresia, HLHS, double-inlet LV, unbalanced AVSD. Stage 1 BT shunt/PA band → Glenn (SVC to RPA) → Fontan (IVC to PA, passive flow, no subpulmonary ventricle); fenestration decompresses at the cost of mild desaturation. Suitable: low PVR (<2–4 WU), mean PAP <15, good ventricular function, no AV valve regurgitation, sinus rhythm. Failure: ↑ venous pressure, low output, protein-losing enteropathy (commonest), plastic bronchitis, arrhythmias, liver fibrosis, thrombosis.
8	ASD: Fixed split S2, RA/RV volume overload. Secundum (~70%, fossa ovalis) → device closure; primum (AVSD spectrum, Down) and sinus venosus (with PAPVC) → surgery; coronary sinus ASD goes with a persistent left SVC. Close if Qp/Qs ⩾1.5 or RA/RV dilatation, paradoxical embolism or symptoms; do NOT close in Eisenmenger. Lutembacher = ASD + mitral stenosis.
9	VSD and PDA: VSD: perimembranous 70% (conduction tissue nearby, heart block risk), muscular 20% ("Swiss cheese"), subarterial 5% (cusp prolapse via Venturi effect → AR, close early), inlet 5%. Small → observe (~90% close); large with failure → surgery <6 months; Qp/Qs >2 or growth failure → close; PVR must be <6 WU. PDA: left 6th arch, continuous machinery murmur, left recurrent laryngeal nerve at risk in ligation; preterm → indomethacin/ibuprofen; others → device or ligation; PGE1 keeps duct open; Eisenmenger → differential cyanosis (lower limbs).
10	Coarctation and AVSD: CoA: 95% just distal to the left subclavian; bicuspid aortic valve, Turner (~30%), berry aneurysm; arm BP > leg, weak/delayed femoral pulses, rib notching (late), "3" sign; CT/MR angiography best. Neonate in shock → PGE1, then end-to-end repair or subclavian flap; older → balloon + stent; complications re-coarctation, spinal ischaemia, paradoxical hypertension. AVSD: Down syndrome, primum ASD + common AV valve, Rastelli classification of the bridging leaflet.

3. Other neurosurgical positions

Position	Important consideration
Sitting	Venous air embolism is an important complication
Prone	Requires appropriate positioning and pressure-point protection
Park bench	Used for selected cranial and posterior fossa procedures; positioning-related complications must be considered

4. Neurosurgical equipment and monitoring

Equipment / technique	Purpose
Hudson brace	Instrument used for cranial drilling
Mayfield clamp	Rigid fixation of the head during surgery
Gigli saw	Used for cutting bone during selected cranial procedures
Kerrison punch	Used for bone removal and decompression
Bipolar cautery	Used for haemostasis
Neuronavigation	Assists anatomical localisation during surgery
Somatosensory evoked potentials (SSEP)	Intraoperative monitoring of sensory pathways
Motor evoked potentials (MEP)	Intraoperative monitoring of motor pathways

IMPORTANT
The sitting position is associated with VAE. TOE is the most sensitive detection method listed in the supplied notes; precordial Doppler and a fall in $EtCO_2$ are additional indicators. Mayfield clamps provide rigid head fixation, while SSEP and MEP are used for intraoperative neurological monitoring.

D. Movement disorders and epilepsy

1. Deep brain stimulation

Deep brain stimulation (DBS) targets are selected according to the movement disorder being treated.

Target	Full form	Disease association
STN	Subthalamic nucleus	Parkinson's disease
GPi	Globus pallidus internus	Parkinson's disease and dystonia
Vim	Ventral intermediate nucleus of the thalamus	Essential tremor

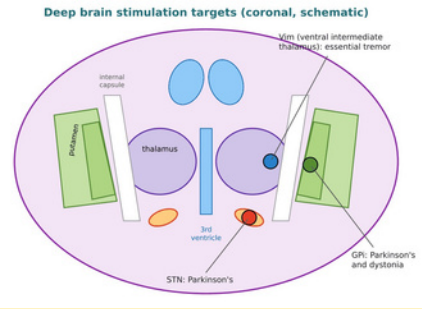


Figure 5. Deep brain stimulation targets: STN, GPi and Vim.

C. Ischaemia considerations

Factor	Important point
Warm ischaemia	Generally less well tolerated than cold ischaemia
Cold ischaemia	Cooling can extend tissue preservation time
Digits	Have different ischaemia tolerance from major limbs
Major limbs	Require particular attention to ischaemia duration and muscle viability

The supplied outline does not specify exact warm- and cold-ischaemia time limits; these should not be inferred from the table alone.

D. Amputated-part transport

- Protect the amputated part from further trauma and contamination.
- Wrap it in sterile gauze moistened with saline.
- Place the wrapped part in a sealed waterproof bag.
- Place the bag in a container with ice and water, avoiding direct contact between the tissue and ice.
- Arrange urgent transfer for specialist assessment.

IMPORTANT

Thumb amputation, multiple-digit amputation and selected paediatric injuries are important indications for replantation. The supplied repair sequence is bone, extensor tendon, flexor tendon, artery, nerve and vein.

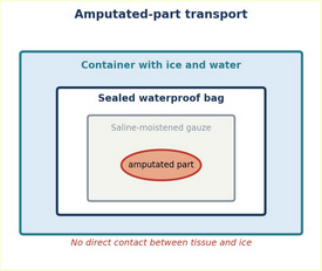


Figure 4. Amputated-part transport (schematic)

4. Supermicrosurgery and lymphoedema

Supermicrosurgery involves anastomosis of very small vessels, approximately 0.3–0.8 mm in diameter according to the supplied outline. In lymphoedema, treatment may be physiological, aiming to improve lymphatic drainage, or excisional, aiming to remove excess tissue.

A. International Society of Lymphology (ISL) staging

Stage	Clinical description	Treatment principles
Stage 0	Latent or subclinical lymphatic dysfunction without visible swelling	Monitoring and preventive measures
Stage I	Early swelling that may improve with elevation; fluid accumulation is relatively reversible	Conservative lymphoedema management; physiological procedures may be considered in selected cases
Stage II	Persistent swelling that does not resolve completely with elevation; fibrosis may develop	Compression and other conservative measures; consider lymphatic surgery according to anatomy and disease severity
Stage III	Advanced lymphoedema with substantial tissue changes, including fibrosis and skin changes	Advanced management; selected excisional procedures may be required

4. Breast Reconstruction

1. Autologous reconstruction

Autologous breast reconstruction uses the patient's own tissue to reconstruct the breast. Important options include TRAM, DIEP, SIEA, latissimus dorsi, TUG/PAP and Rubens flaps. The choice depends on the available donor tissue, vascular anatomy, abdominal wall morbidity and risk factors for flap complications.

A. Comparison of autologous breast reconstruction flaps

Flap	Vascular pedicle	Muscle sacrificed	Hernia / bulge risk	Important features
Pedicled TRAM	Superior epigastric vessels	Rectus abdominis muscle	Higher than muscle-sparing options	Uses abdominal tissue transferred on its pedicle
Free TRAM	Deep inferior epigastric artery (DIEA) system	Part of the rectus abdominis muscle	Higher than DIEP	Free-tissue transfer requiring microvascular anastomosis
MS-TRAM	Deep inferior epigastric vascular system	Part of the rectus muscle is preserved	Lower than conventional TRAM, but not absent	Muscle-sparing TRAM reconstruction
DIEP	Deep inferior epigastric perforators	Rectus muscle preserved	Lowest abdominal wall morbidity among the listed abdominal options	Preserves muscle while transferring abdominal skin and fat
SIEA	Superficial inferior epigastric artery	Rectus muscle preserved	Low abdominal wall morbidity	Depends on suitable superficial vascular anatomy
Latissimus dorsi	Thoracodorsal vessels	Latissimus dorsi muscle is transferred	No abdominal donor-site hernia risk	May be used with an implant or additional tissue
TUG	Profunda femoris vascular system	Gracilis muscle is transferred	No abdominal donor-site hernia risk	Uses tissue from the upper medial thigh
PAP	Profunda artery perforators	Major thigh muscle preservation	No abdominal donor-site hernia risk	Uses posterior thigh tissue
Rubens flap	Deep circumflex iliac artery	Peri-iliac fat pad transfer	Depends on donor-site dissection	Peri-iliac fat pad; mainly associated with breast reconstruction

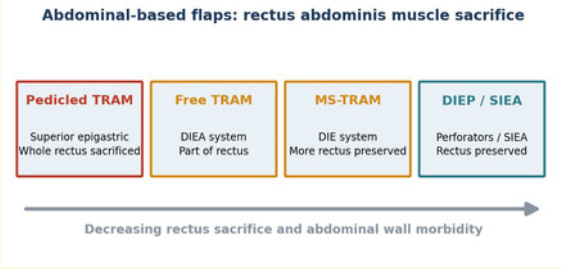
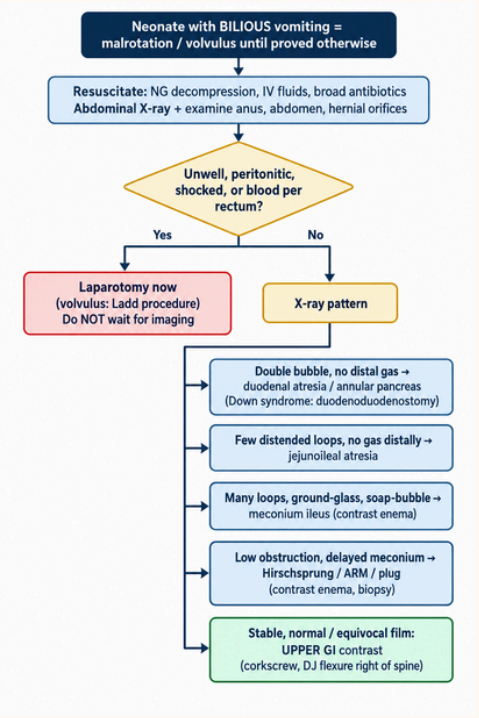


Figure 1. Rectus abdominis sacrifice across abdominal-based flaps

FLOWCHART: Neonatal bilious vomiting: the one algorithm to learn first



Fluid compartments

Age	TBW	ECF	Comment
Preterm	~85%	~50–55%	Highest water, thinnest skin, highest insensible loss
Term neonate	75–80%	~40–45%	Physiological diuresis days 2–5
1 year → adult	~60%	~20%	Adult values reached about 1–2 years

2. FLUIDS, ELECTROLYTES AND NUTRITION

Maintenance fluid (4-2-1 / Holliday–Segar)

Body weight	Per hour	Per day
First 10 kg	4 mL/kg/h	100 mL/kg/day
Next 10 kg (10–20 kg)	2 mL/kg/h	+ 50 mL/kg/day
Each kg above 20 kg	1 mL/kg/h	+ 20 mL/kg/day (max ~2.4 L/day adult)

Neonate: day 1 about 60 mL/kg/day (10% dextrose), increase by 15–20 mL/kg/day to 120–150 mL/kg/day by day 5–7; add Na 2–4 mEq/kg/day and K 1–2 mEq/kg/day once urine is passing. Preterm babies need more (high insensible loss, radiant warmers, phototherapy).

Fluid of choice: isotonic (0.9% saline or balanced solution) with dextrose; hypotonic fluids cause iatrogenic hyponatraemia / cerebral oedema. Sabiston: 0.45% saline is acceptable for pyloric-stenosis resuscitation (see HPS).

Shock: crystalloid bolus 20 mL/kg (repeat; consider blood after 40–60 mL/kg). Weight estimate (age + 4) × 2 kg. Urine output **goal:** neonate/infant 1–2 mL/kg/h, child 1 mL/kg/h, adult 0.5 mL/kg/h.

Dehydration: mild ~5%, moderate ~10%, severe ~15% of body weight. Deficit = % × weight (kg) × 10 mL; replace over 24 h (isotonic), correct Na slowly (⩽0.5 mEq/L/h; 8–10 mEq/L/24 h).

MUST-KNOW

- Cholestasis in a TPN-dependent baby: reduce lipid dose, switch to fish-oil (omega-3) emulsion, start enteral trophic feeds; do not stop calories.
- Hyponatraemia in a post-operative child on hypotonic fluids is a safety event: switch to isotonic fluid.

Acute scrotum

Cause	Age	Features	Management
Testicular torsion	Neonatal (extravaginal) and peripubertal (intravaginal, bell-clapper)	Sudden pain ± vomiting / lower abdominal pain; high-riding, horizontal lie, absent cremasteric reflex, Prehn's negative; Doppler: absent flow	Immediate scrotal exploration (do not delay for imaging); detorsion + 3-point fixation with non-absorbable sutures (both testes); orchidectomy if non-viable. Salvage >90% if <6 h, ~50% at 12 h, <10% after 24 h
Torsion of appendix testis	7–14 y	Localised upper-pole tenderness, blue-dot sign, cremasteric reflex preserved, Doppler normal	Rest, analgesia, NSAIDs; excise if persistent pain
Epididymo-orchitis	Any (infants: look for urinary anomaly)	Fever, UTI, Prehn's positive, Doppler ↑ flow	Antibiotics; urinary tract imaging in boys <2 y
Idiopathic scrotal oedema, HSP	School age	Red, oedematous scrotum, minimal pain	Observe

IMPORTANT PYQs: (asked before: high probability of repeat)
Bell-clapper deformity = intravaginal torsion (commonest cause in adolescents; bilateral) [PYQ 23]; extravaginal torsion = neonates only.
14-year-old with lower abdominal pain, vomiting and a high testis → torsion until proved otherwise [PYQ 23]; 5-year-old with blue dot = torsion of appendix testis [PYQ 23].
Cremasteric reflex absent in torsion; present in appendix torsion.

Link to urology: posterior urethral valves (PUV)

Commonest cause of bladder outlet obstruction in boys; antenatal bilateral hydronephrosis, keyhole sign, thick-walled bladder, oligohydramnios → pulmonary hypoplasia; infants with weak stream, UTI, palpable bladder [PYQ 25].
Diagnosis: VCUG (dilated posterior urethra). Treatment: transurethral valve ablation / fulguration (definitive); vesicostomy for small infants where TUA not possible [PYQ 25: definitive = endoscopic fulguration]; monitor for CKD, bladder dysfunction, VUR.

D. Normothermic regionalperfusion(NRP)

Normothermic regional perfusion restores warm, oxygenated circulation to selected anatomical regions after circulatory death, using an extracorporeal circuit and a protocol designed to preserve the organs intended for transplantation.

IMPORTANT

- **Static cold storage commonly uses a temperature near 4°C.**
- **·UW, HTK and Celsior are established preservation solutions with different compositions.**
- **HMP can reduce delayed graft function in selected kidney transplant settings.**
- **NRP is an active preservation strategy used in selected DCD protocols.**
- **The benefit of any preservation strategy depends on organ type, donor characteristics and the protocol used.**

Feature	Key point
Temperature	Near physiological temperature
Principle	Restores oxygenated circulation to selected regions after circulatory arrest Improve
Purpose	organ preservation and permit assessment in selected DCD protocols Must comply
Main consideration	with applicable law, ethical requirements and safeguards to prevent restoration of cerebral circulation where prohibited
Difference from static cold storage	Uses active regional perfusion rather than passive cold preservation
Difference from ex-situ perfusion	NRP occurs in the donor; ex-situ perfusion occurs after organ recovery

3. Organ-wise cold-ischaemia time

Cold-ischaemia time (CIT) is the duration an organ remains cold and without normal blood circulation between cooling / preservation and restoration of circulation in the recipient. Longer CIT generally increases ischaemic injury, although the effect varies by organ and donor quality.

These are approximate examination-oriented ranges, not absolute acceptance limits. Actual allowable CIT depends on donor characteristics, preservation method, organ quality and transplant-centre protocol. Machine perfusion may change preservation options, but it does not make ischaemic time irrelevant.

Organ	Commonly cited approximate cold-ischaemia range	Key point
Kidney	24–36 hours in selected circumstances	Often tolerates longer cold storage than thoracic organs; prolonged CIT increases delayed graft function risk
Liver	8–12 hours	Prolonged CIT increases preservation injury and biliary complications Highly
Heart	4–6 hours	sensitive to prolonged ischaemia; shorter preservation is preferred Prolonged
Lung	6–8 hours	preservation can increase primary graft dysfunction risk Prolonged
Pancreas	12–18 hours Approximately	ischaemia increases graft injury and thrombosis-related concerns
Small intestine	6–8 hours	Particularly sensitive to ischaemic injury

Feature	Keypoint
Threshold	GRWR ⩾0.8%
Clinical importance	Helps assess graft size adequacy
Too-small graft	Increases risk of small-for-size syndrome and inadequate functional reserve
Too-large graft	May create abdominal closure or graft-compression problems in selected recipients
Interpretation	GRWR is considered alongside graft quality, portal haemodynamics, recipient severity and other volumetric measures

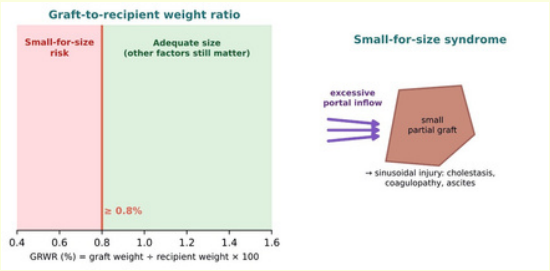


Figure 4. GRWR threshold of 0.8%, and how excess portal inflow injures a small graft.

D. Living-donor safety

Living-donor liver transplantation must prioritize donor safety because the donor undergoes major surgery without receiving a direct medical benefit from the graft.

Component	Key point
Donor assessment	Detailed medical, hepatic, anatomical and psychosocial assessment
Liver anatomy	Vascular and biliary anatomy must be assessed before choosing the graft
Future liver remnant	Must remain adequate to support donor recovery
Common planning benchmark	A future liver remnant of approximately 30% or more is often used in suitable donors with normal liver quality; requirements may be higher with steatosis or other risk factors
Donor morbidity	Bile leak, bleeding, infection, thromboembolic events and liver dysfunction are important concerns
Ethical principle	Donation must be voluntary, informed and free from coercion
Operative decision	Graft choice balances recipient graft adequacy against donor remnant safety

E. Small-for-size syndrome (SFSS)

Small-for-size syndrome occurs when a partial liver graft cannot meet the recipient's metabolic and physiological demands, often in association with excessive portal inflow relative to graft capacity.

IMPORTANT

- DDLT uses a deceased-donor graft; LDLT uses part of a living donor's liver.
- APOLT retains part of the recipient's native liver.
- Piggyback transplantation preserves the recipient IVC.

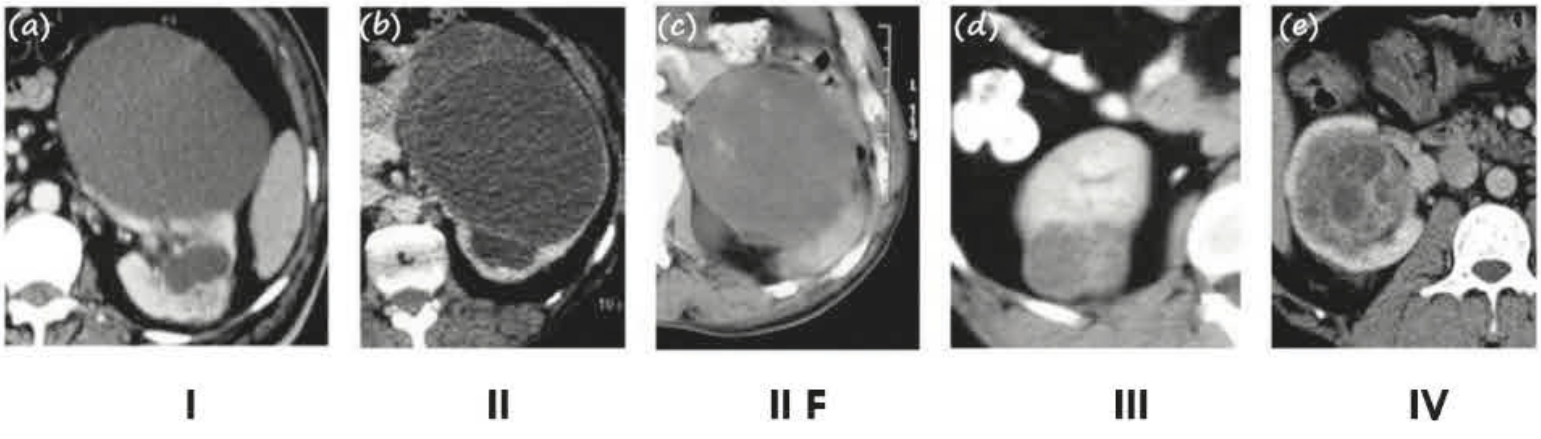
·GRWR ⩾0.8% is the threshold.

- SFSS is associated with inadequate functional graft mass and can be worsened by excessive portal inflow.

<table>
<tr><th>Names</th><th>Diseases</th></tr>
<tr><td>WFNS Classification – Clinical Grading of SAH</td><td>
<table>
<tr><th>Grade</th><th>Glasgow coma scale</th><th>Focal deficits</th></tr>
<tr><td>I</td><td>15</td><td>-</td></tr>
<tr><td>II</td><td>13-14</td><td>-</td></tr>
<tr><td>III</td><td>13-14</td><td>+</td></tr>
<tr><td>IV</td><td>7-12</td><td>+/-</td></tr>
<tr><td>V</td><td>3-9</td><td>+/-</td></tr>
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<tr><td>Young’s classification Posterior urethral valves</td><td>
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<tr><th>Type 1</th><th>Type 2</th></tr>
<tr><td>m/c

Occurs when two mucosal folds Extend antero inferiorly from bottom of verumontanum And fuse Anteriorly at lower level</td><td>Rare

Mucosal folds extend along posterolateral urethral wall From ureteric orifice to Verumontanum</td></tr>
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<tr><td>Zargar Classification of caustic injuries of esophagus</td><td>
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<tr><th>Grade</th><th>Description</th></tr>
<tr><td>0</td><td>Normal appearance</td></tr>
<tr><td>1</td><td>Edema and hyperaemia</td></tr>
<tr><td>2a</td><td>Superficial ulceration and friability</td></tr>
<tr><td>2b</td><td>Deep ulceration or circumferential ulceration</td></tr>
<tr><td>3a</td><td>Multiple deep ulceration ad scattered necrosis</td></tr>
<tr><td>3b</td><td>Extensive necrosis</td></tr>
<tr><td>4</td><td>Perforation</td></tr>
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</table>



Milwaukee Biliary Group Classification

Group	Biliary-Type Pain	Abnormal LFTs	Dilated CBD	Delayed Drainage
I	+	+	+	+
II	+	One or two of the above	– / (not consistently present)	– / (not consistently present)
III	+	None of the above	-	-

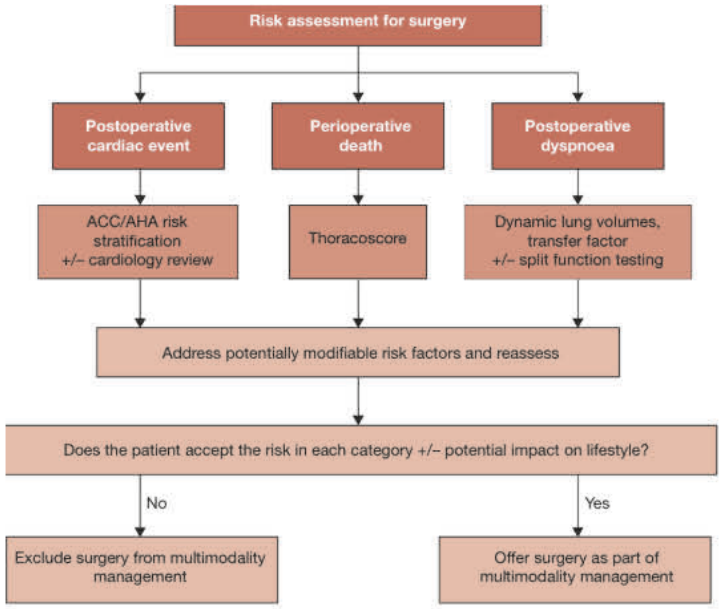
*Alanine aminotransferase and aspartate aminotransferase more than two times normal value on at least two occasions
†Dilated CBD: >12 mm on ultrasound scan or 10 mm on ERCP
‡Delayed drainage: >45 minutes on ERCP, supine position
LFTs, liver function tests; CBD, common bile duct; ERCP, endoscopic retrograde cholangiopancreatography

Milan System for Reporting Salivary Gland Cytopathology

Diagnostic Criteria	Risk of Malignancy	Usual Management
I – Non-diagnostic	25%	Clinical and radiological correlation / repeat FNAC
II – Non-neoplastic	10%	Clinical follow-up and radiological correlation
III – AUS (Atypia of Undetermined Significance)	20%	Repeat FNAC or surgery
IV – Neoplasm		
IVA – Benign	<5%	Conservative surgery or clinical follow-up
IVB – SUMP (Salivary gland neoplasm of uncertain malignant potential)	35%	Conservative surgery[a]
V – Suspicious for malignancy	60%	Surgery[a]
VI – Malignant	>90%	Surgery[a] (extent depends on tumor type and grade of malignancy)

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<tr><td>Abnormal renal or liver function (1 point each)</td><td>1 or 2</td></tr>
<tr><td>History of stroke</td><td>1</td></tr>
<tr><td>History of bleeding</td><td>1</td></tr>
<tr><td>Labile INRs</td><td>1</td></tr>
<tr><td>Elderly (>65 years)</td><td>1</td></tr>
<tr><td>Drugs or alcohol (1 point each)</td><td>1 or 2</td></tr>
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• 0-1 : Low risk of bleed
• 2: Intermediate risk
• 3: High risk
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<tr>
<td>LRINEC Score</td>
<td>
Necrotizing Fasciitis
Components of LIRNEC score :

LRINEC Scoring System
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<tr><td>C-reactive protein</td><td>≥150 mg/L</td><td>4 points</td></tr>
<tr><td>White blood cell count</td><td>15–25 (per mm^3)
>25</td><td>1 point
2 points</td></tr>
<tr><td>Hemoglobin</td><td>11.0–13.5 g/dL
<11 g/dL</td><td>1 point
2 points</td></tr>
<tr><td>Serum sodium</td><td>≥135 mmol/L
<135 mmol/L</td><td>1 point
2 points</td></tr>
<tr><td>Serum creatinine</td><td>>1.6 mg/dL (or >141 pmol/L)</td><td>2 points</td></tr>
<tr><td>Serum glucose</td><td>>180 mg/dL (or >10 mmol/L)</td><td>1 point</td></tr>
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Risk Category Interpretation
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<tr><th>Risk Category</th><th>LRINEC Score (points)</th><th>Probability of NSTIs (%)</th></tr>
<tr><td>Low</td><td>≤5</td><td><50%</td></tr>
<tr><td>Intermediate</td><td>6–7</td><td>50–75%</td></tr>
<tr><td>High</td><td>≥8</td><td>>75%</td></tr>
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<tr>
<td>Prevention of Pressure Sores – BNW</td>
<td>Braden scale
Norton Risk assessment scale
Waterlow score</td>
</tr>
</table>

Tripartite risk assessment score • Post operative cardiac event • Peri operative death • Post operative dyspnea	
Veterans Affairs Medical Centre (VAMC) score	Abdominal wall suture complications.

Rockall Score – Bleeding Severity

Parameter	Score 0	Score 1	Score 2	Score 3
Age	<60	60–79	>80	
Shock	Pulse <100 bpmSystolic BP >100 mmHg	Pulse >100 bpmSystolic BP <100 mmHg	Pulse >100 bpmSystolic BP <100 mmHg	
Comorbidities	None		Circulatory failure / coronary artery disease	Renal failureLiver failureDisseminated malignancy
Endoscopic signs of bleeding	None / dark spot		Blood / adherent clot / visible or spurting vessel	
Diagnosis	Mallory–Weiss syndrome / no pathology	All other diagnoses	Malignancy of the upper GI tract	

Ideal Timing of procedures & Tumor Margin clearance

Procedure	Ideal time
Invertogram for Imperforate Anus	6 hours after Birth
Boerhaave Syndrome Surgery	Within 24 hours
Maximum time of Sengstaken Blakemore Tube	12 Hours
T tube Cholangiogram	7th POD
T Tube removal	10-14 days
Bile duct injury repair	After 8- 12 weeks
Urethral injury repair	After 8-12 weeks
EC fistulas Surgical treatment	After 6 weeks
Maximum Time Drain left for Serous Collections(Eg. Mastectomy)	5 days
Maximum Time Drain for Post Operative Bleeding (Eg. Thyroid Surgery)	24 hours
Maximum Time Drain kept after Colorectal Surgery	5-7 days

Tumor Clearance Margin

<table>
<tr><th>Tumors</th><th>Clearance</th></tr>
<tr><td>Esophageal Cancer</td><td>Proximal 10, Distal 5 cm</td></tr>
<tr><td>Stomach Distal :</td><td>Proximal margin :
EGC: 2-3 cm LAGC : 4-6 cm</td></tr>
<tr><td>Small intestine</td><td>10 cm on Both Sides</td></tr>
<tr><td>Rectum</td><td>Distal 2 cm (Post neoadjuvant CRT- 1cm)</td></tr>
<tr><td>Malignant Melanoma</td><td>
<table>
<tr><th>Thickness
Insitu</th><th>Margin
5 mm</th></tr>
<tr><td><1mm</td><td>1 cm</td></tr>
<tr><td>1-2 mm</td><td>1-2 cm</td></tr>
<tr><td>>2-4mm</td><td>2 cm</td></tr>
<tr><td>>4 cm</td><td>2 cm</td></tr>
</table>
</td></tr>
<tr><td>BCC</td><td>2-4 mm Margins</td></tr>
<tr><td>SCC</td><td>Tumor size < 2cm : 4 mm margin
>4 cm tumor : 1 cm margin</td></tr>
<tr><td>Cancer Penis</td><td>5 mm- 1cm
Gross 1 cm usually</td></tr>
<tr><td>Cancer breast (BCS)- Wide local excision</td><td>2 cm all around</td></tr>
<tr><td>Invasive Breast cancer</td><td>Negative inked margin (NSABP 06 trial)</td></tr>
<tr><td>DCIS</td><td>2 mm margin</td></tr>
<tr><td>Soft Tissue Sarcoma</td><td>Negative inked margin (NSABP 06 trial)</td></tr>
</table>

Name of Criteria	Used in
AGS Beers Criteria	For Potentially Inappropriate Medication Use
Amsterdam Criteria Rule of 3-2-1-0	Lynch Syndrome / HNPCC • >/= 3 members affected with a Lynch syndrome-related cancer (colorectal, endometrial, small bowel, ureter, renal pelvis) • one of whom is a first-degree relative of the other two. • >/=2 successive affected generations • At least 1 tumor diagnosed at < 50 years • FAP excluded • Tumors verified by pathological examination
ATLAS Criteria A-Age T-Temp L-Leukocytosis A-Albumin S-Systemic antibiotic Rx	Clostridium difficile Colitis Used to assess response to Rx
Balthazar criteria	CT severity of pancreatitis
Berkow Formula	Burns
Bethesda Criteria Lynch Syndrome / HNPCC Includes polyps also in criteria	Tumors from individuals in the following situations should be tested for MSI: • CRC diagnosed @ < 50yrs. • Synchronous/metachronous colorectal or other (HNPCC)–related tumors (including endometrial, stomach, ovarian, pancreas, ureter and renal pelvis, biliary tract, brain (usually glioblastoma), sebaceous gland adenomas and keratoacanthomas, and carcinoma of the small bowel), regardless of age. • CRC with the MSI histology (defined by the presence of tumor infiltrating lymphocytes, Crohn-like lymphocytic reaction, mucinous/signet ring differentiation, or medullary growth pattern) diagnosed in a patient before age 60. • CRC diagnosed in at least one first-degree relative with an HNPCC-related tumor in which one cancer was diagnosed before age 50. • CRC diagnosed in at least two first- or second-degree relatives with HNPCC-related tumors, regardless of age.
Bleed risk Criteria	Bleeding Duodenal Ulcer
Cambridge Criteria	Chronic Pancreatitis (ERCP)
Cameron criteria (Schwartz)	Non operative Mx of Esophageal Perforation • Perforation to be contained within the mediastinum and drain well back into the oesophagus • Symptoms should be mild • Minimal evidence of clinical sepsis If these criteria are met , treat the patient with hyperalimentation, antibiotics, and cimetidine to decrease acid secretion and diminish pepsin activity.

Mirel's criteria/score

Objective assessment of pathologic fracture risk in patients with bone Tumors

SCORE	1	2	3
Site	Upper Limb	Lower limb	Peri trochanteric
Pain	Mild	Moderate	Functional
Lesion	Blastic	Mixed	Lytic
Size	< 1/3	1/3 to 2/3	>2/3

Bailey	Sabiston
Score > 8: High risk of fracture & primary stabilization should be done (Prophylactic fixation) >/=9: Prophylactic fixation	Score < 8: Low risk of fracture; orthopedic intervention may not be required <7: Radiation and medical therapies

Radiation induced Sarcoma -Criteria

- **Histology different from original lesion**
- **Sarcoma develops in the irradiated field**
- **A 3 to 5 years latent period between radiation and sarcoma development**

Shionoya criteria
Olin criteria

TAO (Buerger's disease)

Warren & Gates criteria
Oral cavity ca (To differentiate b/w Second primary or Recurrence)

- HPE confirmed at both sites
- Separated by Normal Mucosa (1.5 to 2 cm)
- Metastases from index cancer is excluded (3 years/ 5 years after Primary; Molecular Studies)

Weigert Meyer Rule

Duplication of ureter : Ureter from a upper pole moiety inserts into a more inferior and medial location than lower pole moiety

Weiss criteria for adrenocortical carcinoma (to differentiate malignant adrenal tumors from benign ones) >/=4 criteria : More chance of metastasis / recurrence	1. Microscopic necrosis 2. Presence of Haemorrhage 3. Capsular invasion 4. Vascular (Venous/Sinusoidal) invasion 5. Nuclear grade III or IV 6. Mitotic rate >5/50 HPF 7. Atypical mitoses 8. Clear cells comprising </=25% of tumor 9. Diffuse architecture
Wilson–Junger criteria	For a screening programme
Traditional criteria for performing a local excision for a rectal cancer	• Small lesions (<2 cm in diameter) • Well-differentiated cancers within reach of the index finger • Lesions that are mobile (not fixed). T1 lesions are ideal (t2 lesions are C/I)

Diagnostic criteria of Shionoya

- **Smoking history**
- **Onset before the age of 50 years**
- **Infrapopliteal arterial occlusions**
- **Either arm involvement or phlebitis migrans**
- **Absence of atherosclerotic risk factors other than smoking**

Diagnostic criteria of Olin

Age under 45 years

Current or recent history of tobacco use

The presence of distal-extremity ischemia indicated by claudication, pain at rest, ischemic ulcers or gangrenes and documented by non-invasive vascular testing

Gangrenes and documented by non-invasive vascular testingMoving Forward

Exclusion of autoimmune diseases, hypercoagulable states and diabetes mellitus

Exclusion of a proximal source of emboli by echocardiography or arteriography

Consistent arteriographic findings in the clinically involved and non-involved limbs

Indications of surgeries

Operative Indications of Hepatic artery aneurysm:

- Regardless of size, all pseudoaneurysms should be repaired.
- Regardless of size, all symptomatic aneurysms should be repaired.
- Regardless of size, all aneurysms associated with vasculopathy or vasculitis should be repaired.
- True aneurysms .2.0 cm in diameter in low-risk patients should be repaired.
- If open repair is required, true aneurysms .5.0 cm among high-risk patients should be repaired.

Elective prostatectomy for severe symptoms:

Relatively strong indications for operative treatment:

1. Severe symptoms not responding to drug therapy,
2. A low maximum flow rate (<10 mL/s) and
3. An increased residual volume of urine (100–250 mL)

Indications for Operation in Thyroid Swellings

Category	Indication	Details
Neoplasia	FNAC positive (Thy 3–5)	
	Clinical suspicion	• Age• Male sex• Hard texture• Fixity• Recurrent laryngeal nerve palsy• Lymphadenopathy• Recurrent cyst
Toxic adenoma		
Pressure symptoms		
Cosmesis		
Patient's wishes		

Indications of surgical intervention in Hyperparathyroidism

Category	Criteria
Measurement of serum calcium	0.25 mmol/L (1.0 mg/dL) above the upper limit of normal
Skeletal	• BMD by DEXA: T-score ≤ −2.5 at lumbar spine, total hip, femoral neck, or distal one-third radius• Vertebral fracture
Renal	• Creatinine clearance <60 mL/min• 24-hour urinary calcium >10 mmol/dL (>400 mL/day) or increased risk of stone formation by risk analysis
Age	<50 years

TUMORS Classifications

American Joint Committee on Cancer Staging for Soft Tissue Sarcomas

Primary Tumor (T)	
Primary tumor cannot be assessed	TX
No evidence of primary tumor	T0
Tumor 5 cm or less in greatest dimension	T1
Tumor more than 5 cm and less than or equal to 10 cm in greatest dimension	T2
Tumor more than 10 cm and less than or equal to 15 cm in greatest dimension	T3
Tumor more than 15 cm in greatest dimension	T4

Regional Lymph Nodes (N)	
Regional lymph nodes cannot be assessed	NX
No regional lymph node metastasis	N0
Regional lymph node metastasis	N1

Distant Metastasis (M)	
No distant metastasis	M0
Distant metastasis	M1

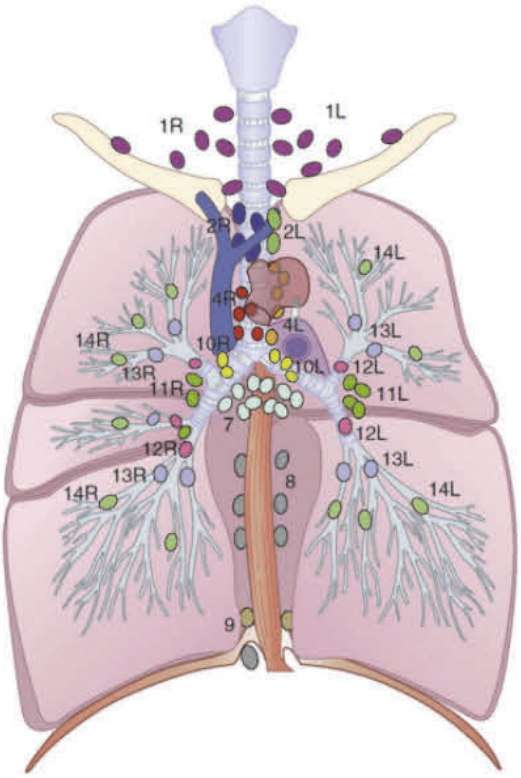
ANATOMIC STAGE AND PROGNOSTIC GROUPS FOR SOFT TISSUE SARCOMAS.

GROUP	T	N	M	GRADE
Stage IA	T1	N0	M0	G1, GX
Stage IB	T2-T4	N0	M0	G1, GX
Stage II	T1	N0	M0	G2, G3
Stage IIIA	T2	N0	M0	G2, G3
Stage IIIB	T3,T4	N0	M0	G2, G3
Stage IV	Any T	N1*	M0	Any G
Stage IV	Any T	Any N	M1	Any G

For retroperitoneal sarcoma, N1 disease is designated as stage IIIB, not stage IV.

TUMORS Classifications

- EBUS can detect: 2,3,4,7,10,11
- Cervical mediastinoscopy: 2,3,4,7
- Anterior mediastinoscopy /Chamberlain procedure : Sampling of station 5,6



Supraclavicular zone
1 Low cervical, supraclavicular, and sternal notch nodes

Superior mediastinal nodes

Upper zone
2R Upper paratracheal (right)
2L Upper paratracheal (left)
3a Prevascular
3p Retrotracheal
4R Lower paratracheal (right)
4L Lower paratracheal (left)

Aortic nodes

AP zone
5 Subaortic
6 Para-aortic (ascending aorta or phrenic)

Inferior mediastinal nodes

Subcarinal zone
7 Subcarinal

Lower zone
8 Paraesophageal (below carina
9 Pulmonary ligament

N1 nodes

Hilar/interlobar zone
10 Hilar
11 Interlobar

Peripheral zone
12 Lobar
13 Segmental
14 Subsegmental

