LUMBAR PUNCTURE

INDICATIONS

Diagnostic

1. suspected CNS infection
2. suspected subarachnoid hemorrhage (if diagnosis uncertain on CT)
3. normal pressure hydrocephalus
4. Guillain-Barré syndrome

Therapeutic

1. instillation of chemotherapy or contrast media for spinal cord imaging
2. removal of CSF in the treatment of idiopathic intracranial hypertension (pseudotumor cerebri) and normal pressure hydrocephalus

CONTRAINDICATIONS —

Absolute: increased intracranial pressure (do CT if suspected)

Relative:

1. bleeding diathesis (coagulation defects with activel bleeding, platelet counts <50,000/microL, or INR >1.4)
2. cardiopulmonary instability
3. soft tissue infection at the puncture site

COMPLICATIONS

1. postspinal headache
2. infection (meningitis)
3. spinal hematoma
4. cerebral herniation
5. epidermoid tumor

FOLEY CATHETER

Length of male urethra is 20-25 cm, female urethra is 3.5-4 cm. 1 French gauge = 0.3 mm and this is used to measure the diameter of the urethra for the circumference of the catheter. The appropriate size can be chosen based on the age of the patient:

Age (years)	Size (French gauge)
<5	5-8
5-10	8-10
10-14	10
14-18	10-14
>18	12-16 (clear urine) 18-20 (pus, blood)

Measure the size of the urethral meatus to decide which one to use exactly.

INDICATIONS

Diagnostic

1. obtain urine sample (in retarded patients, or for clean-catch)
2. monitor urine output
3. voiding cystourethrography
4. urodynamic studies
5. measurement of post-void residual volume

Therapeutic

1. to relieve urine retention
2. chronic use in debilitated patients (use condom in males if possible, intermittent self-catheterization in females)
3. irrigation of bladder
4. instillation of chemotherapy or immunotherapy
5. postoperative (hypospadias) or preoperative (to prevent bladder injury)

In chronic retention drain 250-500 cc of urine every hour to avoid hematuria.

CONTRAINDICATIONS

1. trauma to urethra
2. complete stenosis (shown by retrograde urethrography)
3. bladder neck contracture

COMPLICATIONS

Early

1. failure to insert, usually due to inadequate anesthesia (insert 10 cc and wait for 10 minutes; if not useful insert 20 cc), or may be due to stricture
2. trauma to bladder neck, hematuria, urethral injury, creation of false passage
3. allergy (not with silicon catheters) and anaphylaxis

Late

1. CAUTI → 80% of nosocomial infections; risk factors are improper technique, females, immune compromised, pre-existing UTI, open draining system; usually established from day 6; take a sample, remove the catheter, if needed you can put another catheter or insert silicon catheter (less chance of infection), but if stricture present do not remove catheter; can give prophylactic antibiotics (nitrofurantoin 100 mg nightly) to avoid this but it increases resistance of the bacteria and changes the flora of the urethra
2. obstruction
3. stone formation if left for long duration
4. squamous cell CA
5. failure to remove, if due to clot irrigate with saline, if not follow these steps:

a. inject some water then re-try deflation as this may reshape the contour of the balloon and facilitate deflation
b. cut the channel externally since the obstruction may be at that point
c. insert a guidewire into the channel and puncture the balloon by the rigid tip
d. US-guided puncture by 22-gauge spinal needle percutaneously or transvaginally

SUPRAPUBIC CATHETER

INDICATIONS

1. contraindications to foley catheter
2. preferred for prolonged catheterizations
3. postoperatively for hypospadias (which also have a foley in for patency) and ureteric re-implantation

CONTRAINDICATIONS

1. scar of previous operation in suprapubic region since there may be adhesions and cause injury to bowel
2. bleeding diathesis
3. suspected bladder tumor

COMPLICATIONS

1. same as those of foley catheter
2. extravasation of urine
3. bowel injury
4. seeding of bladder tumor

INTRAOSSEOUS ACCESS

Intraosseous (IO) infusion is possible because of the presence of veins that drain the medullary sinuses in the bone marrow of long bones. These veins, supported by the bony matrix, do not collapse in patients with shock or hypovolemia.

INDICATIONS

1. patients in full cardiopulmonary arrest or severe shock who do not have readily available intravenous access
2. emergencies with no reliable venous access (eg, patients with shock, sepsis, status epilepticus, extensive burns, multiple trauma)
3. patients for whom intravascular access is medically necessary and cannot be achieved by other means despite multiple attempts

The anatomic sites for placement are proximal tibia, distal femur, distal tibia or fibula, proximal humerus, and manubrium.

Drug and fluid dosing is the same as for intravenous administration. Infusion rates equivalent to a 21 gauge peripheral intravenous catheter are typically achieved.

An IO needle should be replaced with a venous line as soon as possible. Prolonged intraosseous infusions beyond 24 hours are associated with an increased risk of osteomyelitis.

CONTRAINDICATIONS

Absolute

1. fractured or previously penetrated bone
2. vascular interruption (from trauma or cutdown attempt) in the extremity

Relative

1. cellulitis, burns, or osteomyelitis involving the cannulation site
2. osteogenesis imperfecta or osteopetrosis due to bone fragility
3. right-to-left intracardiac shunts (eg, tetralogy of Fallot, pulmonary atresia) due to greater risk for cerebral fat or bone-marrow emboli

COMPLICATIONS

1. tibial fracture, osteomyelitis, compartment syndrome
2. skin necrosis, subcutaneous abscess
3. long-term: damage to the bone marrow and disturbance in growth of the bone, fat and bone marrow emboli
4. deaths from sternal approach using manual technique due to mediastinitis, hydrothorax, and cardiac or great vessel injury