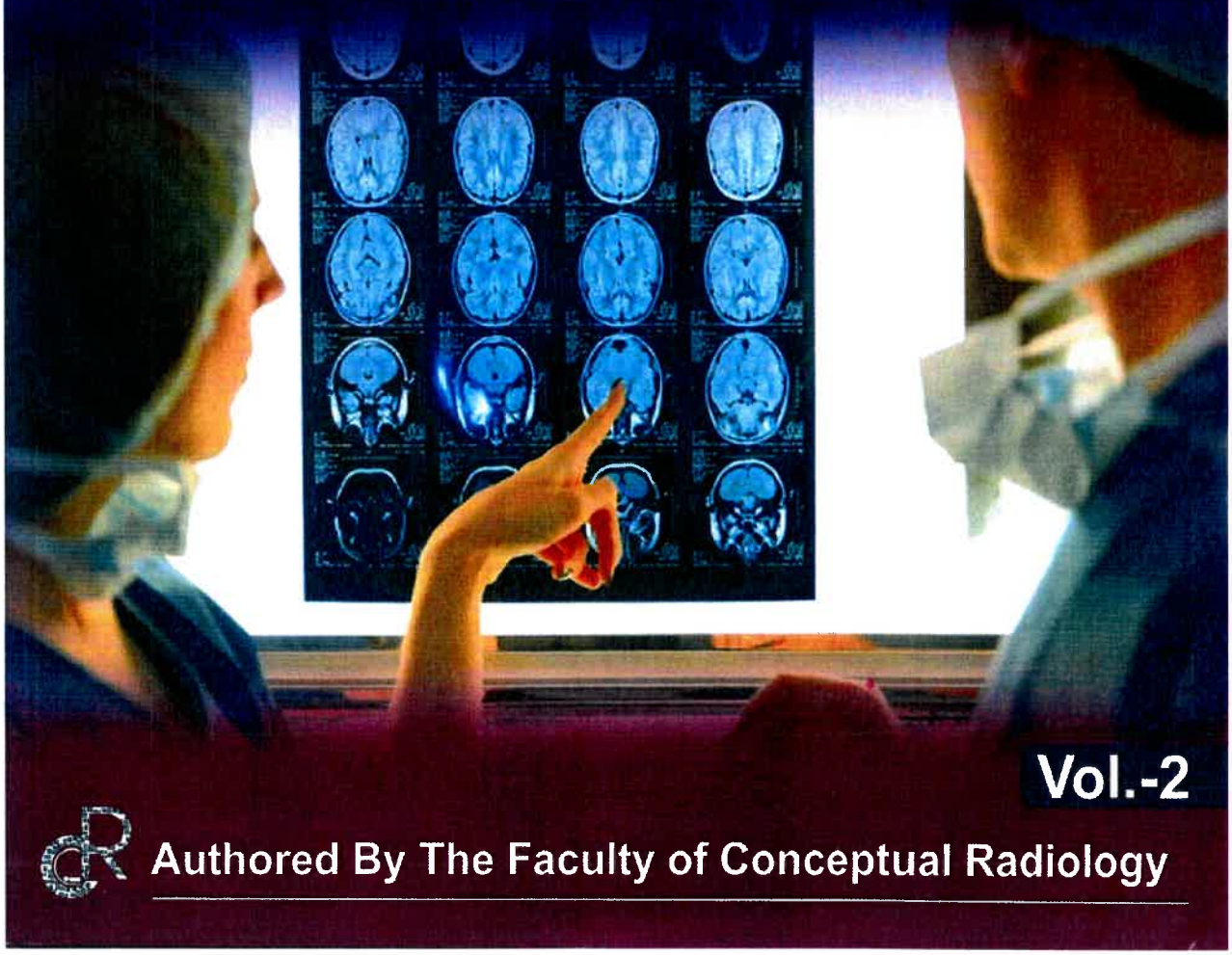
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Table of Content

Chapter Name **Page No.**

Section 4. Interventional Radiology

4.1. Non-Vascular Interventions - FNAC and Biopsy 1
4.2. Non Vascular Intervention - Abscess Drainage 10
4.3. Biliary Interventions Part-1 17
4.4. Biliary Interventions Part-2 27
4.5. Renal Intervention Part-1 36
4.6. Renal Intervention Part-2 40
4.7. Hepatic Interventions Part-1 45
4.8. Hepatic Interventions Part-2 54
4.9. Interventions in Budd Chiari Syndrome 67
4.10. Interventions in Portal Hypertension 72
4.11. Bronchial Artery Embolisation in Hemoptysis 77
4.12. Peripheral Artery Disease Part-1 84
4.13. Peripheral Artery Disease Part-2 89
4.14. GI Bleed Imaging and Interventions 97
4.15. Interventional Radiology Hardware part 1 111
4.16. Interventional Radiology Hardware part 2 117
4.17. Interventional Radiology Hardware part 3 122
4.18. Uterine Artery Embolisation 129
4.19. Prostate Artery Embolisation 136
4.20. Varicocele Embolisation 143
4.21. Vertebroplasty 154
4.22. Basics of Stroke Intervention 159
4.23. Management of Intracranial Aneurysms 167
4.24. Carotid stenting 172
4.25. Varicose Veins 178
4.26. IR in Treatment of DVT 187
4.27. Aortic Aneurysm 201

Chapter Name **Page No.**

4.28. Aortic Dissection 214
4.29. Vascular Malformation Part 1 225
4.30. Vascular Malformation Part 2 242

Section 5. MSK Radiology

5.1. Imaging of Bone Tumors 255
5.2. Imaging in Degenerative LS Spine 275
5.3. Metabolic Bone Disease 295
5.4. Imaging in Arthritis 307
5.5. Skeletal Dysplasias 331
5.6. Imaging of DDH 342
5.7. Brachial Plexus Imaging 347
5.8. Imaging of Shoulder 355
5.9. Imaging in Knee Pathologies Part - 1 372
5.10. Imaging in Knee Pathologies Part - 2 379
5.11. Radiological Anatomy of Ankle Joint 387
5.12. Radiological Anatomy of Wrist Joint 401
5.13. MSK Infections Part - 1 420
5.14. MSK Infection Part - 2 444
5.15. Bone Marrow Imaging 464
5.16 Imaging of Temporomandibular Joint 474

Section 4

Interventional Radiology

CHAPTER 4.1

Non-Vascular Interventions- FNAC and Biopsy

NEEDLES –

- Aspiration needles – cytologic analysis
  1. Smaller gauge (20-25G) beveled needles with a noncutting edge.
  2. Chiba needle
  3. Spinal needle
  4. Hypodermic needle





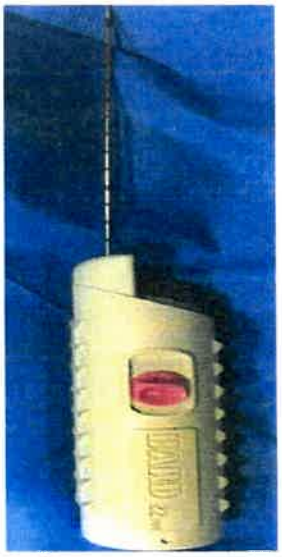
- Cutting needles – histological analysis
  1. 10 to 20 G
  2. End (Menghini, Franseen, Greene, Jamshidi) or side cutting.
  3. Manual, semiautomatic, automatic
  4. Length, throw & gauge.
  5. Coaxial system



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Main cannula with stellate



biopsy gun



co-axial biopsy needle

Preprocedure –

- Previous imaging
- Screening
- Coagulation profile – PT/INR
- Consent
- Admission if necessary
- IV line and antibiotic prophylaxis

INSTRUCTIONS FOR INTERVENTIONAL RADIOLOGY PROCEDURES

1. Get admitted in hospital
2. Come to Radiology department in hospital dress and on a trolley
3. Bring recent prothrombin time (PT) report.
4. Bring all your previous investigations and file.
5. Sign the consent form.
6. Elderly patients and children should have a patent IV line
7. Can have light diet and water up to 3 hours before the procedure.

Aseptic conditions

- Personal protection
- Hand asepsis
- Patient skin protection
- Probe decontamination
- Sterile ultrasound gel
- Disposable probe covers

Local anesthesia

- 2% lignocaine
- Should not exceed 4-5mg/kg

- 23G hypodermic needle
- Infiltrated along the desired tract
- Withdraw intermittently to prevent inadvertent vascular injection
- Just reach the capsule /pleural/peritoneal surface
- Raise a skin bleb in the end

Imaging guidance –

- Fibroscopy, ultrasound, CT, MRI
- Depends on –
  a) Size
  b) Location
  c) Depth
  d) Procedure
  e) Body habitus
- Combination (US and Fluoroscopy)
- Operator experience and preference

Ultrasound –

- Free hand technique or guided probes
- Low frequency transducers for deeper lesions
- High frequency for superficially located lesions and infants
- Transrectal and transvaginal probes for pelvic lesions
- Doppler for identification of vessels

Needle localization on USG –

- Needle can be inserted either perpendicular or from the sides of the probe.
- Entire needle should be visualized during insertion
- Misalignment between needle path and ultrasound beam
- Pan the transducer or gentle in-out motion of the needle.
- Needle tip should be documented as a discrete echogenic focus in atleast two views.

Computed Tomography –

- Small intra-abdominal /intrathoracic lesions / lesions obscured by bowel gas
- First scanned through the target area
- IV contrast maybe used to delineate surrounding vascular structure or lesions
- Marker grid to determine the needle insertion site and depth. Use the gantry laser.
- Vertical needle pathway is preferred.
- Gantry angulation in craniocaudal angled approach (adrenal, lung bx with overlying ribs)

Modality	Advantage	Disadvantage
USG	Real time No radiation Multiplanar imaging Portable Low cost	Operator dependent Needle often difficult to visualize
Fluoroscopy	Real time Monitoring catheter and guidewires	Radiation Not portable

CT	Visualize deep structures Not obscured by bowel or bone	Radiation Availability (Diagnostic vs. intervention)
MRI	High contrast resolution No radiation	Expensive MR compatible devices Artifacts

FNA Technique –

- Inner stylet is removed once the needle is inside target.
- Multiple short excursions in and out and rotation.
- Maximum of 8 to 10 excursions or till there is blood in the transparent needle hub
- Suction is applied if repeated attempts without suction fail
- Release suction while withdrawing.
- Rapid on site evaluation.
- Advantages –
  1. Minimal tissue disruption and bleeding
  2. Bowel can be traversed.
- Disadvantages –
  1. Inadequate sample
  2. Flexible and easily deviated from target.

Percutaneous Biopsy –

- Indications
  - Diagnosis of malignancy Primary/metastatic/recurrent
  - Infectious and inflammatory process
  - Diffuse organ disease
- Not indicated in patients who undergo surgery regardless of biopsy results

Technique –

- After LA nick is made in the skin with surgical blade 2 to 3mm deep
- Biopsy/puncture needle is then advanced just reaching the edge of lesion along the desired tract
- Then the inner slotted stylet is advanced into the lesion (manual and semiautomatic)
- Outer cutting cannula is then fired
- Both steps occur simultaneously in an automatic biopsy device
- The throw should not extend outside the lesion to be sampled/if it does-avoid injury to critical structures

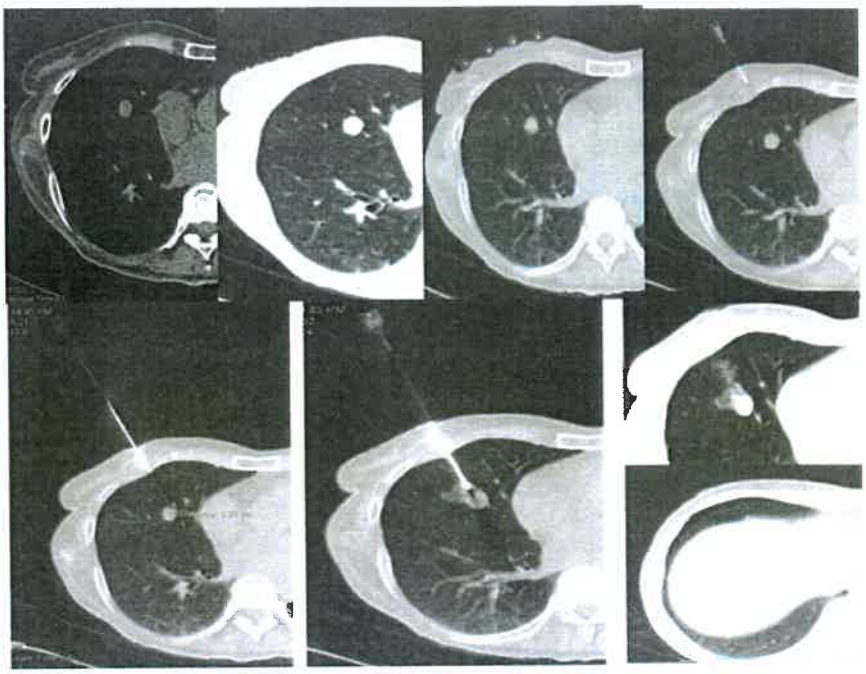


- Co axial technique – multiple punctures can be avoided
- Sample placed in formalin/culture/IHC bottles
- Clean the needle with betadine after each pass



THORAX-

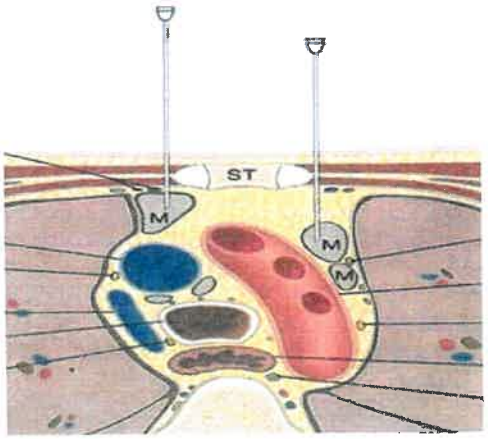
- Indications-
  1. Mediastinal masses/lymphadenopathy
  2. Focal or diffuse pleural thickening
  3. Chest wall masses
  4. Lung
     - New or enlarging solitary nodule/mass on chest radiograph not amenable to diagnosis by bronchoscopy
     - Multiple nodules in a patient not known to have a malignancy or who is on prolonged remission
     - Persistent focal infiltrates with negative sputum/blood culture, serology, bronchoscopy
     - Hilar mass
- Contraindications –
  1. Severe emphysema
  2. Unilateral pneumonectomy
  3. Positive pressure ventilation
  4. Pulmonary arterial or venous hypertension
  5. AVM, Hydatid cyst
  6. Uncooperative patients
- Patient positioned supine, prone, lateral decubitus
- Instruct the patient to breathe freely avoiding sudden movements
- Shortest possible path avoiding bullae, fissures, major vessels, bronchi, IMA
- Choose entry site cephalad to a rib
- Needle advanced and removed only on suspended respiration
- Co axial technique. Confirm the position before introducing the biopsy needle
- Aim for enhancing/solid component
- Outer cannula should not be left open without the inner stylet – risk of pneumo and air embolism or close the outer cannula with a finger



Mild bleed

Mediastinal mass –

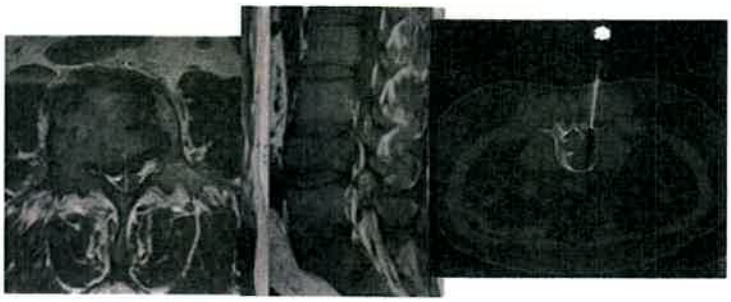
- Parasternal, trans-sternal, paravertebral, suprasternal, subxiphoid approach
- Choose a path avoiding internal mammary vessels, lung, pleura
- Aim away from major vessels, heart, pericardium
- Hydrodissection, iatrogenic pneumothorax, pleural effusion
- Through a preexisting pleural effusion



Complications –

- Immediate post procedure CT cuts
- Chest radiograph at 1 and 4 hours
- Pneumothorax - Conservative, aspiration, chest tube
- Pulmonary hemorrhage /hemoptysis-biopsied side down to prevent trans bronchial aspiration
- Air embolism

BONE BIOPSY –



ADRENAL BIOPSY –

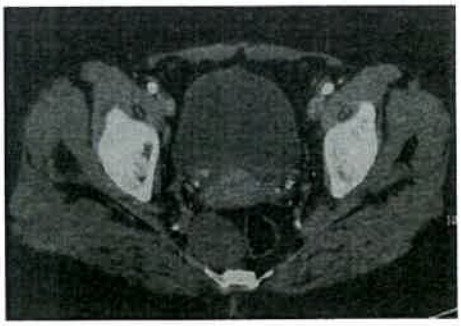
- Lateral decubitus (target side down), prone
- Trans hepatic, trans renal and trans gastric approach
- Avoid diaphragm, kidney, aorta, splenic vessels
- Gantry tilt, hydrodissection can be used
- Complications-pneumothorax, hemorrhage



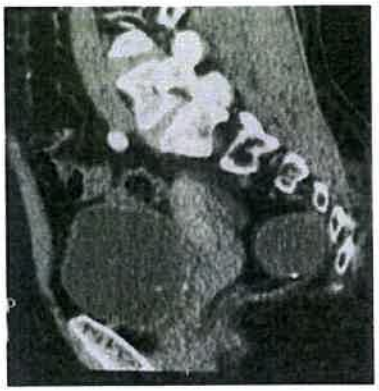
PROSTATE –

- Indications
  Abnormal DRE
  Elevated serum total PSA >4ng/ml PSA or increase 0.75ng/ml/year
- Contraindications
  - Acute prostatitis
  - Painful perianal disorder Coagulopathy
- Preprocedure Antibiotics, Enema
- Position – left lateral decubitus
- Probe- trans rectal with guide
- 18G 20cm with 15mm throw automatic /semi-automatic
- Local anesthesia – periprostatic block
- Fire after the prostatic capsule is indented
- Avoid injury to urethra, ED, seminal vesicle
- 12 core biopsy
- Label adequately

- Complications –
  1. Hematuria, hematospermia, acute prostatitis, rectal bleeding









CHAPTER 4.2

Non Vascular Intervention - Abscess Drainage

PERCUTANEOUS ABSCESS DRAINAGE

PAD has become the primary drainage procedure for most infected collections

- Rapid
- Minimally invasive
- Cheaper
- Avoid surgery, GA & morbidity

PAD – Indications

- Characterization
- Treatment of sepsis
- Relief of symptoms

Collections/ abscesses involving every organ (liver, spleen, pancreas, kidney) & location (pelvis, thorax, subphrenic, intramuscular) are essentially feasible for PAD

PAD – contraindications

- Absolute
  - Lack of safe route (rarely)
- Relative
  - Coagulopathy
  - Hemodynamic instability
  - Difficult positioning
  - Uncooperative patient

Equipments

- Catheters

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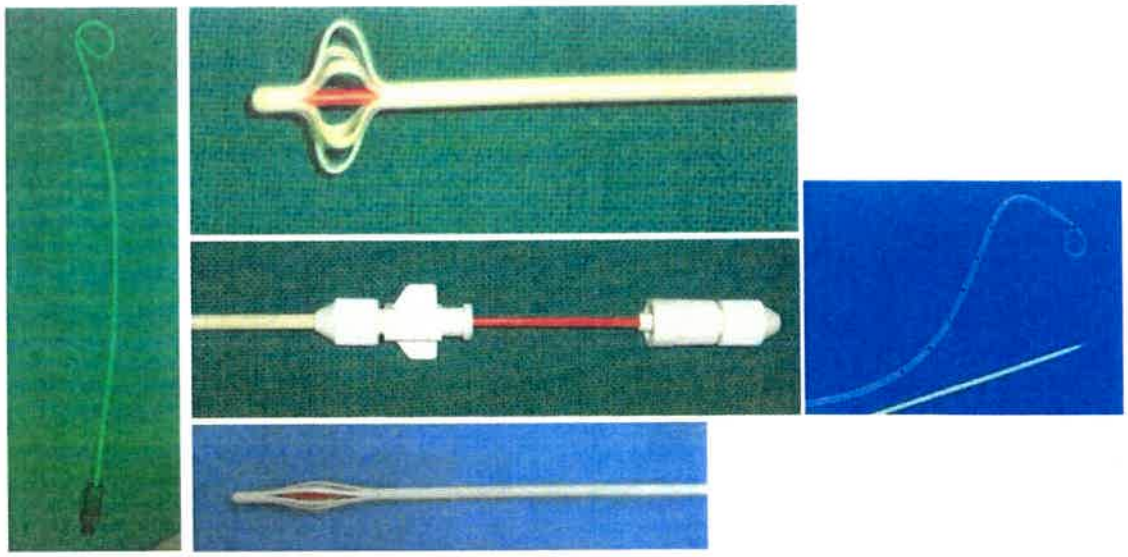


Fig: pigtail catheter, Malecot catheter, biliary drainage catheter

Steps

- Check list
  - Coagulation profile (PT, PLT)
  - Antibiotic coverage
- NPO, IV Access, Informed consent
- Localise the collection and plan the route (USG/ CT)
- Analgesia (Local +/- Parenteral)

US/CT/Fluoro

USG

- Real time & faster
- Widely available
- Cheaper
- Radiation free
- Bed side

CT

- Difficult locations – RP, pelvis etc

Flouro-Adjuvant

- Manipulation, positioning & repositioning upsizing

Optimal route

- Shortest and most direct path
- Avoid vital structures
- Try to be extraperitoneal/ extra-pleural
- Traversal of organs (liver & stomach)
- Avoid (pancreas, spleen, GB, bowel, UB, Uterus, ovaries, blood vessel)

Techniques

- Trocar method
  - One step procedure (Quick)
  - For Large & superficial collections
  - Expertise required
- Seldinger technique
  - Multiple steps
  - Greater accuracy & less traumatic
  - Time consuming
  - Real time guidance

Seldinger technique

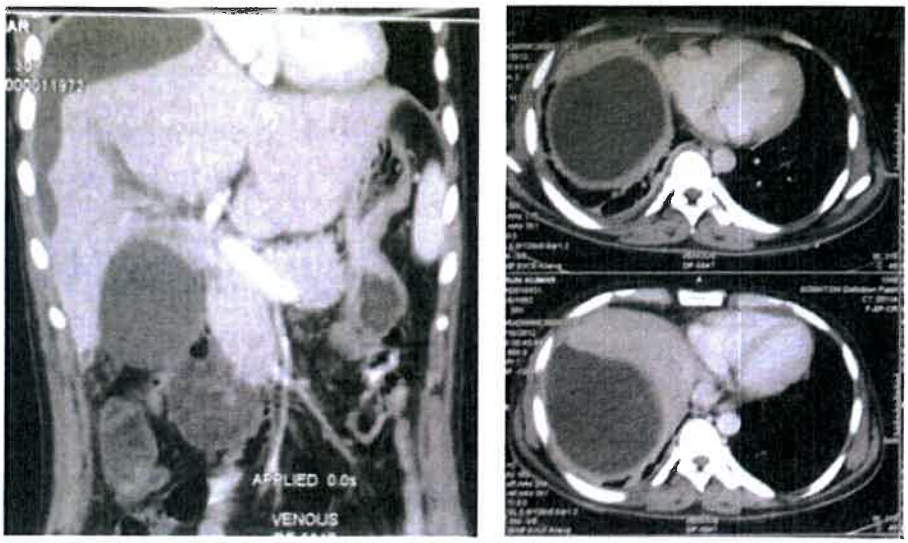
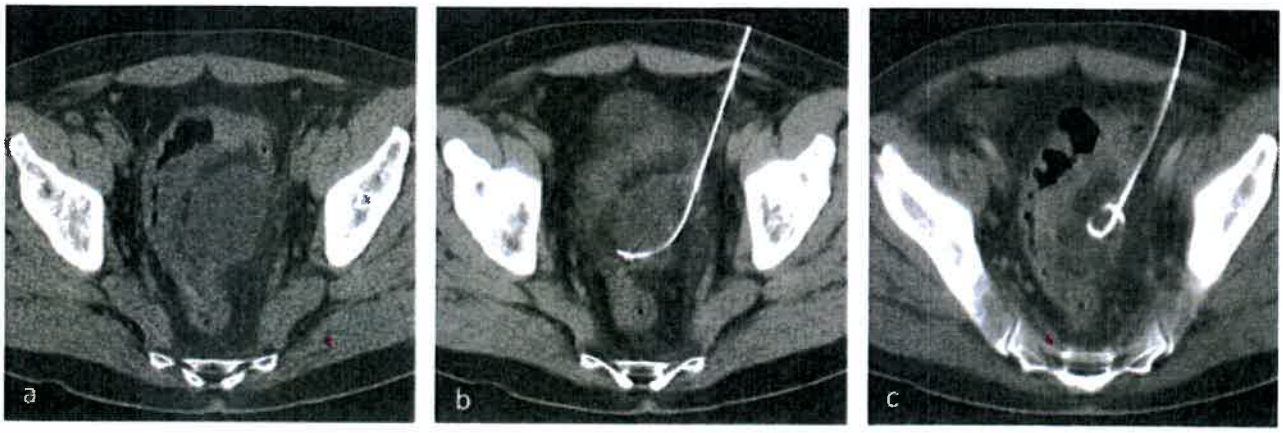


Fig: two abscesses present together: sub-diaphragmatic abscess slightly difficult to puncture, therefore we use seldinger technique



Post Procedural/ FUC

- Check final position (CT better than USG)
- Collection has to be decompressed with large syringes
- Irrigation in large cavities

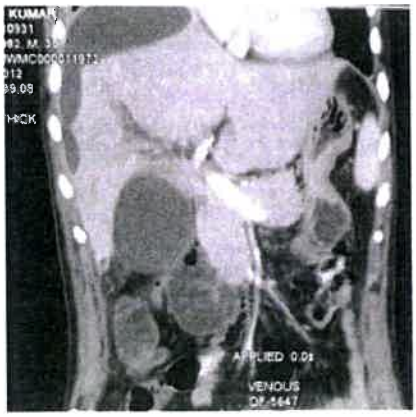
- Regular flushing

Complications

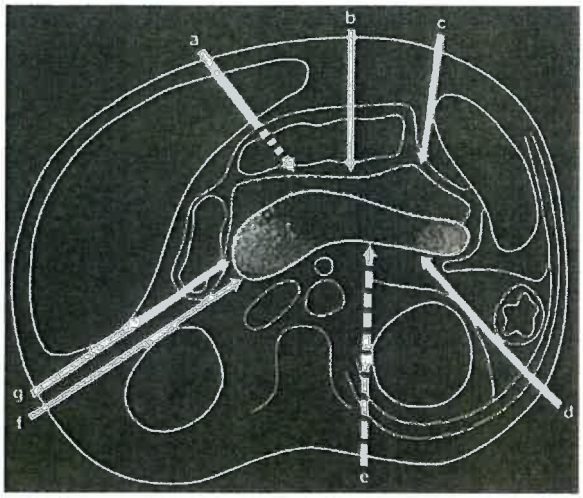
- MAJOR (<10%)
  - Septic shock / bacteremia
  - Hemorrhage requiring transfusion
  - Superinfection
  - Bowel transgression
  - Pleural transgression
  - Bladder injury
- MINOR
  - Mild fever < 2 days

Challenging locations

- Subphrenic
  - Avoid pleural space transgression
- Seldinger better
- Subcostal (safe)
- Intercostal
  (Below 7th rib anteriorly and 10th rib laterally)



- Pancreatic
  - CT guidance preferred
  - Transgastric
  - Transhepatic
  - Through paracolic gutter



Transhepatic Route



Deep Pelvis

- UB/Bowel injury
  - Decompress bladder with foleys
- CT preferred
- Trans gluteal
- Transrectal/ Transvaginal

Transgluteal

Through greater sciatic foramen

Closer to sacrum, caudal to pyriformis

