Complications of Percutaneous nephrolithotripsy: How to avoid and how to manage them

Evangelos Liatsikos
Associate Professor
University of Patras, Greece
PCNL complications

- Frequent, but not to be feared
- Standardization of technique minimizes chances of serious mishaps
- Mentoring program with experienced percutaneous surgeon helps in one’s initial attempts
Entering the collecting system but aspirating blood

- Do not dilate through this puncture, high chances of bleeding
- Possible puncture of vessel, will become worse if dilation occurs
- Exception if multiple punctures have been performed and there may be bleeding from other areas
Hemorrhage

• Most feared complication of PCNL
• Proper technique minimizes risk
  – Dilation with proper angulation away from major vessels
  – Use of hemostatic substances + drainage tube clamping will resolve practically all parenchymal bleeding
• Patient selection (abnormal vascularity, horseshoe)
55 years male presenting with gross hematuria one month after percutaneous nephrolithotripsy of a staghorn calculi of the left kidney.
A 45 years old male patient subjected to PCNL in the right kidney for a 3.5 cm pelvic stone. A 24 Fr malecot tail stent was left at the end of the operation for drainage.

Postoperative course was uneventful until drain removal.

On the 3<sup>rd</sup> PO day upon malecot removal patient experienced intensive pain during inspiration and respiratory distress.

A Chest X-Ray was performed
What is the diagnosis?
Urinothorax (delayed)
Hydropneumothorax

• Any puncture above 12\textsuperscript{th} Rib risks pleural injury
• Try to puncture during maximal expiration
• May be detected intraoperatively or post-op
  – Contrast seen into pleural cavity
  – Decreased respiratory sounds
• Most frequently occurs during puncture and dilation
• Passage of irrigation fluid into pleural cavity
Management of urinothorax

• Insert a chest drain
• Drain kidney preferably percutaneously (using a separate lower access) or alternatively via an internal stent+folley catheter.
• Remove chest drain on 2\textsuperscript{nd}-3\textsuperscript{rd} day, remove renal drainage few days later.
Case

- 37 years old female with a complete staghorn calculus in right kidney
- PCNL with two accesses in middle and lower calyx
- Few hours latter patient lies in bed in severe pain, exacerbated during inspiration.
- She is unable to take a deep breath due to intensive pain
- A chest X-Ray was performed
What is the diagnosis
Complete atelectasis of the left lung

Malecot tail stent
Reasons for complete atelectasia following PCNL

- Too deep intubation during anesthesia
- Increased postoperative pain
Management

- Proper pain management
- Intensive breathing exercises
- Respiratory physiotherapy
X-Ray the following day
Rupture of the collecting system
Rupture of the collecting system

Management

• If major, terminate procedure unless near to finish.
• Ensure that no stone fragments are present outside the system
• Ensure proper drainage (large bore nephrostomy eg. malecot stent and then exchange with JJ stent)
• Close monitor for signs of urinoma formation (pain, fever)
• Radiographic evaluation necessary only in case of complications
Rupture of collecting system

- Why did it occur??
  - Forceful introduction of extra stiff wires or dilators – medial rupture may also injure main hilar vessels
  - Over-injection of contrast material through ureteral catheter
  - Impacted stone in calyces, forceful use of lithotriptor

- Any puncture of the collecting system entails some degree of rupture of the collecting system. The point is to do it in a controlled manner
Rupture of collecting system

• If rupture is detected intraoperatively
  – Insert nephroureteral stent or nephrostomy tube + double J
  – Wait 2-7 days
  – Remove under visual guidance after nephrostomography

• If detected postoperatively (urinoma formation)
  – May need percutaneous urinoma drainage under CT guidance
Subscapsular hematoma

• Will occur in a large portion of patients, but usually resolves without problems. However, it is important to check extent and assess size changes – if necessary, conservative then interventional measures.
35 years old female

- Obesitas surgery 2 years ago
- Weight loss 40 kg
- Left-sided flank pain
46 year female presenting with staghorn calculus of the right kidney, hydro- and pyonephrosis. During access to the pelvocalyceal system, when injecting through the ureteral catheter → communication with pleura (fistula)
Damage to liver / spleen

- CT imaging to detect hepato / splenomegaly
- Alter puncture site as necessary (lower site, more medial/lateral)
- Recognition of injury
  - Conservative measures at first
  - If bleeding continues – surgical exploration
  - Hepatic injury less likely to require surgical care
Duodenal injury

34 year female presenting with staghorn calculus of the right kidney, hydro- and pyonephrosis. During access to the pelvocalyceal system → injury to the duodenum
Gram-negative sepsis

- 15-30% have post-op fever
- 1-2% will have sepsis
  - Preoperative urine culture
  - Maintain low-pressure system;
  - Amplatz sheath or continuous-flow sheath
  - Preoperative antibiotic, particularly for staghorn calculi

Supportive therapy; antibiotics

*If purulent material aspirated upon puncture, safest option is to abort procedure and insert nephrostomy
Take Home Message
PCNL complications

• The only surgeon without complication is the one that does no cases
• Become familiar with identification and management of complications
• Complications can happen to anyone experienced or novice – be prepared and you will be able to handle the situation
Mark the date