

GGR MANAGEMENT SERVICE LINE

THE ESSENTIALS OF GGR MANAGEMENT PROCEDURES

Brought to you by:

Procedural Education Committee of the GGR Management Service Line- Resident and Fellow Section, Society of Interventional Radiology

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PERCUTANEOUS NEPHROSTOMY

INDICATIONS

1. Upper urinary tract decompression: obstructive hydronephrosis/pyonephrosis
2. Percutaneous access for antegrade ureteral stent placement, nephrolithotomy, endopyelotomy, or foreign body retrieval
3. Urinary diversion
 - A. Ureteral fistulae
 - B. Hemorrhagic cystitis
 - C. Ureteral injury and urinoma

ABSOLUTE CONTRAINDICATIONS

1. Usually none

RELATIVE CONTRAINDICATIONS

1. Uncorrectable coagulopathy
2. Unstable respiratory status
3. Uncooperative patient

PREOPERATIVE PREPARATION

1. History and physical exam
 - A. If uroseptic consider antibiotic coverage, hemodialysis support
2. Check to make sure patient is not on antiplatelet or anticoagulant medications
3. Correct coagulopathies (INR < 1.5, platelets > 50k)
4. Ultrasound or CT to assess anatomy and/or degree of hydronephrosis
5. Administer broad-spectrum intravenous antibiotics 1-4 hours prior to procedure

CONSENT

1. Discuss risks including:
 - A. Pain
 - B. Bleeding
 - C. Infection
 - D. Pneumothorax
 - E. Conscious moderate sedation

PROCEDURE

1. Patient in prone position (supine for transplanted kidney)
 - A. Place wedge under ipsilateral side.
2. Sterilize area and cover with drape
3. Image guidance:
 - A. Ultrasound-guided access: Useful when there is hydronephrosis
 - B. Direct fluoroscopic guidance: direct puncture using either anatomic landmarks (inferior to the tip of the twelfth rib and lateral to erector spinae musculature), targeting a visible stone, obtaining concurrent IV nephrogram or retrograde contrast injection.
 - C. CT guided-access: helpful in malrotated kidney, anatomic variants, and severe kyphoscoliosis
4. Administer local 1% lidocaine. Perform dermatotomy with #11 blade and dilate tract with clamp.
5. Ideal needle entry:
 - A. Subcostal approach preferred
 - B. Access via posterior line of Brodel, which is a relatively avascular plane between anterior/posterior divisions of renal artery, 20-30° off sagittal plane
 1. External drainage target: lower pole posterior calyx
 1. Can inject air which will selectively appear under fluoroscopy in the posterior calices
 2. Avoid central access location due to increased risk of bleeding

2. Endoureteral interventions target: mid or upper pole calyx to facilitate entry into ureteral pelvic junction
3. Nephrolithotomy: target calyx which provides best access to calculus
6. Advance 18 gauge or micropuncture needle (1-stick or 2-stick approaches). Single stick approach usually used with moderate to severe hydronephrosis with visualization of the calyx for direct access. Double stick method useful for a nondilated collecting system. The first needle is used to access and opacity collecting system and second needle is for a more appropriate site for definite access.
7. Remove stylet and aspirate urine to confirm position.
 - A. Send urine specimen for gram stain and culture.
8. Advance 0.018 guidewire to secure position in the collecting system.
9. Inject water soluble contrast to perform antegrade nephrostogram, which also confirms proper positioning.
 - A. As a rule, the amount of contrast agent used for injection is equal to the amount of urine removed.
 - B. Overdistention of the collecting system with contrast or withdrawal of too much urine for culture should be avoided because these can cause bacterial seeding or render access difficult if the wire is inadvertently lost.
10. Place J-wire into renal pelvis/proximal ureter.
11. Dilate tract (typically 7-9F).
12. Load flushed pigtail catheter (typically 8F) onto stiffening cannula, unscrew stiffener and form pigtail in renal pelvis.
 - A. Inject water soluble contrast via pigtail catheter to confirm position in renal pelvis.
 - B. Secure pigtail catheter with suture.

POST-OPERATIVE CARE

1. Bedrest and monitor vital signs for 2-4 hours.
2. Technical success: 95-98% for a dilated system and 80-85% for a nondilated system
3. Flush catheter with 10mL NS prn if blood clots occlude the tube

POSSIBLE COMPLICATIONS (EARLY AND DELAYED)

1. Transient hematuria: usually resolves in 24-48 hours
2. Supracostal access: increase risk of pneumothorax, hydrothorax, hemothorax, or empyema
3. Catheter dislodgement- reported to be 20% after a few months
4. Clogging of catheter:
 - A. Increase frequency of flushes or exchanges
 - B. Upsize catheter
5. Vascular injury: look for persistent gross hematuria
 - A. Perinephric/capsular hematoma
 - B. Pseudoaneurysm formation
 - C. AV fistula
6. Urinoma or collecting system perforation
7. Visceral injuries
8. Sepsis: high risk in pyonephrosis

FOLLOW UP

1. Chronic indwelling nephrostomy tubes should be exchanged every 3-6 months to prevent encrustation and occlusion

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