PYELOPLASTY

Surgical Specialty:	Urology
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Background:

- General Considerations
  - Pyeloplasty is performed to relieve ureteropelvic junction (UPJ) obstruction caused by narrowing or kinking of the ureter as it enters the renal pelvis. This obstruction results in hydronephrosis and prolonged pressure that can reduce renal function if left untreated.[1]
  - The surgical goal is to remove the stenotic section and reattach the normal ureter to the renal pelvis.
- Patient Considerations
  - UPJ obstruction is most commonly identified when hydronephrosis is present on prenatal ultrasound.[1]
  - Patients are usually healthy and without electrolyte disturbance or changes in renal function. Later diagnosis may present as urinary infection, hematuria, or abdominal mass from an enlarged kidney.[2,3]
  - Associated Comorbidities/Syndromes
    - Can be associated with CHARGE syndrome.[1,2]

Anesthetic Planning:

- Pre-Anesthetic Evaluation
  - Evaluate for changes in renal function, recent infections, or other symptoms. Additional imaging may be indicated.
  - Patients typically do not have any electrolyte or renal changes, and the surgery is typically performed electively +/- overnight admission.
  - Patients should be appropriately nil per os (NPO).
  - Consider epidural/ spinal /caudal or other regional techniques (T10-L2 dermatome) if an open procedure is planned.[4] Local anesthetic infiltration and opioids are usually sufficient for laparoscopic/robotic approach.
- Specific or Unique Room Set-Up Requirements
  - Airway
    - Endotracheal intubation is typically performed for possible muscle relaxation, carbon dioxide insufflation, and lateral positioning.
  - Drugs/Infusions
    - Maintenance of general anesthesia with inhalational or intravenous agents.

        - Fluid maintenance and fluid goals – helpful to discuss goals with the surgeon at the beginning of the case.
        - PONV prophylaxis as age appropriate.
        - Regional procedure where appropriate. If an epidural catheter is placed, it should be secured away from the surgical field.
    - Monitors
        - Standard American Society of Anesthesiologists monitors.
        - Foley for urine output.
    - Blood Availability
        - Usually not required.
    - PICU Bed Availability
        - Not required, but patients may stay overnight or up to 2 days for urine output monitoring and pain control.

Intraoperative Considerations:

- General
    - The procedure may be performed open, robotically, or laparoscopically.[2]
    - Open procedures are performed laterally via a subcostal incision and are more painful than robotic procedures because of the splitting of muscles.[5]
    - $PaCO_2$ will rise during robotic/laparoscopic procedure insufflation and will require ventilation adjustment.
- Induction
    - Routine induction
    - Tracheal intubation +/- muscle relaxation
- Positioning
    - Lateral or supine; possible jackknife of operating room (OR) table.
    - Special consideration to keep neck neutral and pressure points padded.
- Maintenance
    - Fluid maintenance with fluid goals per discussion with surgeon
    - Close urine output monitoring
- Hemodynamic/Physiologic goals
    - Euvolemia; a fluid bolus may be requested by the surgeon at the conclusion of surgery.
- Surgical Considerations (such as neuromonitoring, muscle relaxation, anticipated blood loss)
    - Muscle relaxation can facilitate surgical dissection.
    - Blood loss is usually minimal.
- Emergence/Disposition
    - Extubation in the OR with possible overnight admission.
- Post-op Care
    - Admission for pain control and urine output monitoring

Case Specific Complications/Pitfalls

- Fluid management
    - Clear communication with the surgeon on fluid goals is important. Postoperatively, the surgical team will closely monitor the patient's urine output.
- Pain control
    - Open procedures with a subcostal incision are more painful than robotic or laparoscopic procedures.[5]

  - Regional procedure in T10-L2 dermatome: epidural, intrathecal morphine, caudal +/- clonidine, quadratus lumborum block, paravertebral block or other regional techniques.[4] A single shot block is more appropriate for patients being discharged home the same day.
  - Bladder spasms can occur, and oxybutynin may be prescribed by the surgical team.
- Lateral positioning
  - Care to not cause arm or neck hyperextension during positioning.
  - Verify the accuracy of blood pressure reading after the patient is placed in the lateral position.

References

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5.) Sukumar, S., Djahangirian, O., Sood, A. Minimally invasive vs open pyeloplasty in children: the differential effect of procedure volume on operative outcomes. *Urology*; 2014; 84:180. PubMed Link

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