HYPOSPADIAS REPAIR

Surgical Specialty:	Urology
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Background:

- General Considerations
  - Hypospadias is a congenital condition characterized by the urethral opening being located ventrally on the penis rather than at the tip
    - Hypospadias occurs far more commonly in males, but can occasionally occur in females, in which case the urethral opening exists within the vagina
    - Depending on the location of the urethral opening, a complex hypospadias repair may be performed in stages
  - Repair is often performed at an age when sufficient tissue has developed (approximately 12-18 months of age

Anesthetic Planning:

- Pre-Anesthetic Evaluation
  - Additional labs/tests indicated during work-up
    - Review patient history and spine imaging, if applicable, to determine candidacy for regional anesthesia
    - Contraindications to neuraxial anesthesia may include meningomyelocele or other sacral anomalies; physical exam should be conducted to search for sacral dimples or lipomas near the spine for this reason
    - Coagulopathy should be ruled out if neuraxial anesthesia is planned
  - Discussions to have with surgeon/family
    - Ensure that consent for regional anesthesia is performed with parent(s)/guardian(s) if planned
    - For most patients, a combination of general anesthesia with regional anesthesia (caudal block, penile block, or pudendal block) provides excellent anesthesia for hypospadias repair
    - The type of block performed should be a co-decision made between the anesthesia and surgical teams
- Specific or Unique Room Set-Up Requirements
  - Airway

        - Airway management may be performed with a supraglottic airway device, but if repair is expected to be lengthy, or if a supraglottic airway does not seat well, an endotracheal tube should be used
    - Drugs/Infusions
        - PONV Prophylaxis: Ondansetron (0.1-0.15 mg/kg) - max 4mg
        - Many options/combinations for maintenance of general anesthesia, institutional practice may vary
            - Inhalational
                - A volatile anesthetic like sevoflurane may be used for mask induction and maintenance; consider lower volatile maintenance dosing in patients who receive regional anesthesia
            - Propofol
                - Bolus to effect for anesthetic induction and endotracheal intubation
                - Can also be used to maintain anesthesia as part of a total intravenous anesthesia (TIVA) Technique
        - Regional Drugs and Adjuncts
            - Dexmedetomidine
                - Can be used intravenously as anesthetic/analgesic adjunct per provider preference, or administered as a neuraxial adjunct along with local anesthetic[1]
            - Clonidine
                - Can be used as a neuraxial adjunct should caudal epidural block be performed (typically 1mcg/kg body weight added to local anesthetic dose)[1]

    - Monitors: Standard ASA monitors
    - Other Indicated Resources
        - If regional technique is utilized, ensure that lipid emulsion and rescue medications are available in the event of local anesthetic toxicity
        - Ultrasound should be available for image guidance for pudendal blocks
        - Ultrasound can also be utilized for caudal blocks

Intraoperative Considerations:

- General
    - Consider lower maintenance anesthetic dosing if neuraxial or regional anesthesia is utilized
    - Avoid over-lightening maintenance anesthetic especially with a supraglottic airway in place to avoid laryngospasm
- Induction
    - Mask induction with high-dose sevoflurane, or intravenous induction with propofol if preoperative intravenous access is established
    - If mask induction performed, following intravenous catheter placement, consider additional propofol bolus to improve intubating conditions
    - Muscle relaxants are usually unnecessary
- Positioning
    - Following mask induction and airway device placement, if neuraxial anesthesia is planned, position patient in lateral decubitus for caudal block

    - Supine position without need for bed rotation
- Regional Anesthesia
    - Regional technique can involve caudal epidural injection, penile block or a pudendal block
    - Caudal block
        - Advantage – superior analgesic outcomes compared to penile blocks, allows for lower doses of maintenance anesthetic agents[6]
        - Position - best done in lateral decubitus position after patient is under general anesthesia
        - Equipment and drugs
            - 0.25% bupivacaine or 0.2% ropivacaine can be used for caudal epidural anesthesia (1 ml/kg, 2 mg/kg)
            - Consider epinephrine-containing test dose (1:200,000 concentration) prior to neuraxial administration of local anesthetic.
            - Adjuvants such as clonidine (1-2 mcg/kg) and dexmedetomidine (1-2 mcg/kg) have been shown to prolong the duration of action of the analgesic effect of the local anesthetic
            - Small gauge needle
            - Surgical sterile prep
            - Consider ultrasound guidance
        - Technique[3]
            - Identify coccyx and palpate the two sacral cornu to locate sacral hiatus between them (injection site)
            - Insert needle through the cornu through sacrococcygeal ligament to enter epidural space, loss of resistance may be felt
                - Consider using saline-filled syringe to assess for loss of resistance upon entry
        - Considerations
            - Must rule out contraindications first including sacral dimples, tethered cord, pilonidal cysts, and other spinal anomalies
            - Can contribute to postoperative urinary retention[5]
            - Can cause patient to have weak and/or numb lower extremities postoperatively for 8-10 hours[5]
            - Risk for subarachnoid injection
    - Pudendal block
        - Advantages – superior analgesic outcomes compared to penile blocks, technically less challenging than caudal blocks, and provides long-lasting analgesia (12-18 hours)[3]
        - Position – supine with helper to hold legs up in lithotomy position, with folded towel beneath tailbone to elevate the block site
        - Equipment and drugs
            - Ultrasound probe with sterile probe cover
            - 5 cm 22g hyperechoic nerve block needle
              0.2% ropivacaine or 0.25% bupivacaine, 0.2-0.3 cc/kg per side
            - Surgical sterile prep
        - Technique[3]
            - Injection sites at 3 and 9 o'clock positions in relation to anus just medial to ischial tuberosities bilaterally
            - Hold probe horizontally with non-dominant hand and lay center over injection site

                - Insert needle through skin directly parallel to upper surface of ultrasound probe
                - Visualize ischial tuberosity and walk needle off ischial tuberosity guiding it 1-2cm deeper than the upper hyperechoic dome of the tuberosity; pop should be felt as needle advances through sacrotuberous ligament or perineal membrane (not visualizable on ultrasound); inject local anesthetic and ensure visualization of solution spread medial and deep to the tuberosity[3]
            - Considerations
                - If hypospadias repair involves base of penis, pudendal block may be inadequate for total analgesia as this area is innervated by the ilioinguinal nerve[3]
        - Penile block[4] – usually performed by the surgeons
            - Position – supine
            - Equipment and drugs
                - 0.25% bupivacaine, 0.2-0.5 cc/kg
                - Small gauge needle
                - Surgical sterile prep
            - Technique
                - Prep penis with surgical prep
                - Pull down base of penis with thumb and insert needle below pubic symphysis through Scarpa's fascia into the sub-pubic space
                - Check for negative aspiration, then inject local anesthetic while fanning needle slightly
            - Must monitor and re-assess intermittently for hematoma formation
- Maintenance
    - Drugs as above
- Hemodynamic/Physiologic goals
- Surgical Considerations
    - Estimated blood loss in most cases is not clinically significant
- Emergence/Disposition

  The majority of patients can be discharged to home from the recovery room
- Post-op Care
    - Analgesia with ibuprofen and acetaminophen are typically adequate, but opioids may be needed in some patients
    - Procedure may be irritating especially if a urethral stent or suprapubic catheter is left in place, as this may stimulate bladder spasms
        - If this occurs, consider oral oxybutynin 1.25-2.5 mg/kg
    - Be aware that following single shot caudal anesthesia patient may have weak and/or numb legs and will likely need assistance with walking or crawling for 8-10 hours postoperatively

Case Specific Complications/Pitfalls

- Acute post-surgical complications include edema, bleeding, hematoma formation, wound dehiscence, flap necrosis, infection, and urethral fistulization which requires further surgical repair.

References

1. Saavedra-Belaunde JA, Soto-Aviles O, Jorge J, Escudero K, Vazquez-Cruz M, Perez-Brayfield M. Can regional anesthesia have an effect on surgical outcomes in patients undergoing distal hypospadia surgery?. *J Pediatr Urol*. 2017;13(1):45.e1-45.e4. doi:10.1016/j.jpurol.2016.09.011 PubMed Link

2. El-Hennawy AM, Abd-Elwahab AM, Abd-Elmaksoud AM, El-Ozairy HS, Boulis SR. Addition of clonidine or dexmedetomidine to bupivacaine prolongs caudal analgesia in children. Br J Anaesth. 2009 Aug;103(2):268-74. PubMed Link

3. Hecht, S., Piñeda, J., & Bayne, A. (2018). Ultrasound-guided pudendal block is a viable alternative to caudal block for hypospadias surgery: a single-surgeon pilot study. Urology, 113, 192-196. PubMed Link

4. McPhee AS, McKay AC. Dorsal Penile Nerve Block. [Updated 2022 May 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-.

5. Gunduz, M., Ozcengiz, D. İ. L. E. K., Ozbek, H., & Isik, G. (2001). A comparison of single dose caudal tramadol, tramadol plus bupivacaine and bupivacaine administration for postoperative analgesia in children. Pediatric Anesthesia, 11(3), 323-326. PubMed Link

6. Zhu C, Wei R, Tong Y, et al. Analgesic efficacy and impact of caudal block on surgical complications of hypospadias repair: a systematic review and meta-analysis. Regional Anesthesia & Pain Medicine 2019;44:259-267. PubMed Link

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