CIRCUMCISION

Surgical Specialty:	Urology
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Background:

- General Considerations
  - Circumcision is the most performed surgical procedure in the world.[1]
  - Surgical removal of all or part of the distal penile foreskin is performed for medical, religious, or cultural reasons.
  - Neonatal circumcision techniques include Gomco clamp, Plastibell device, Mogen clamp, etc.
  - Infant (usually 6 months of age), children, and adult techniques include freehand sleeve resection.[2]
  - Properly performed neonatal circumcision prevents phimosis, paraphimosis, and balanoposthitis, and is associated with a markedly decreased incidence of cancer of the penis in the United States.[3]
- Patient Considerations
  - Phimosis - inability to retract the foreskin which may lead to increased risk of pain, swelling and infection.
  - Balanitis - pain and inflammation of the glans penis in an uncircumcised male.
  - Urinary tract infection(UTI) - Circumcision may decrease the incidence of UTI in patients with hydronephrosis.
  - Associated Comorbidities/Syndromes
    - None - Bleeding diathesis (Important to discuss family history of bleeding disorders).[4]

Anesthetic Planning:

- Pre-Anesthetic Evaluation
  - Additional labs/tests indicated during work-up – Indicated if positive patient or family history of bleeding.[5]
    - CBC, PT, PTT, fibrinogen
  - Vitamin K administration and normal voiding pattern prior to newborn circumcision.
  - Discussions to have with surgeon/family
    - Anesthetic options
      - General
      - Neuraxial (Spinal or Epidural)
      - Regional

- Specific or Unique Room Set-Up Requirements
  - Airway
    - Nasal cannula
    - Supraglottic airway
    - Endotracheal tube
  - Drugs
    - Induction medications – Mask induction with nitrous oxide and sevoflurane, propofol as needed
    - Pain Control
      - Intravenous (IV) multimodal analgesia (Local anesthetic, acetaminophen, +/- opioids)[6].
      - Regional – Penile nerve block, pudendal nerve block
      - Neuraxial – Spinal block, caudal block
    - Local anesthetic – lidocaine, ropivacaine, bupivacaine (without epinephrine for penile nerve block)[6]
    - Eutectic mixture of local anesthetics (EMLA).
  - Monitors – Standard ASA

Intraoperative Considerations:

- General Anesthesia (GA)
  - Anesthetic and physiologic implications of the surgical procedure
    - Bleeding is the most frequent complication. Hemostasis is achieved by manual pressure, compressive wrap, topical agents, or suture.[7]
- Induction
  - Mask induction with nitrous oxide and sevoflurane
  - Peripheral IV after induction
- Regional Anesthesia (RA)
    - Penile Nerve Block [8]
      - Dorsal Penile Nerve Block – no epinephrine
        - Needle 27g, 30g
        - Ropivacaine 0.2% 0.1 mL/kg per side
        - Bupivacaine 0.25% 0.1 mL/kg per side[9]
      - Ring Block – no epinephrine, subcutaneous injection, 1-4mL[10]
        - Needle 27g, 30g
        - Ropivacaine 0.2%
        - Bupivacaine 0.25%
    - *Pudendal Block* [11]
      - Needle – 5cm 22g hyperechoic nerve block needle
      - 0.2% Ropivacaine 0.2-0.3 mL/kg per side
      - 0.25% Bupivacaine 0.2-0.3 mL/kg per side
      - +/- Clonidine 1mcg/kg total
      - Both ultrasound-guided blocks, performed under general anesthesia, provide equivalent postoperative analgesia for pediatric circumcision as evidenced by low pain scores and opioid consumption. Surgeon satisfaction was higher in the pudendal group.[12]
    - Neuraxial Block
      - Spinal Block [13]
        - Indications include former preterm infants undergoing urologic surgery, including hernia repair, lower limb, lower abdominal

surgery at risk for postoperative apnea, desaturation, and bradycardia.
    - Expremies had decreased apnea in the early postoperative period (first 30 mins in pacu), reduction in the degree of oxygen desaturation, and decreased need for intervention during the first 30 mins.
    - Late apnea – (30mins – 12 hours) no difference in GA vs. RA[14]
    - Needle 25g Quincke 2-inch needle
    - EMLA or lidocaine 4% cream 30-60 mins prior to Spinal Anesthesia
    - Local – (multiple regimens published)
        - Bupivacaine 0.5% 0.5-1mgk/g Max 1.4mL (7mg)[15]
        - Ropivacaine or bupivacaine 0.5% 0.5-1mg/kg[16]
    - May require adjuvants for surgery greater than 90 mins (Variety of options include fentanyl and dexmedetomidine)[17]
- Caudal Block [18]
    - Needle - 22g angiocath or short bevel needle
    - Multiple dosing calculations include
        - Lumbosacral level 0.5mL/kg
        - 0.05 mL/kg per dermatome[19]
        - Higher volume/ lower concentration has been shown to be effective, less motor block[20]
    - Ropivacaine 0.2%
    - Bupivacaine 0.125-0.25%
- Positioning
    - Supine
- Maintenance
    - Inhalational agent
- Hemodynamic/Physiologic goals
    - Maintain standard end-organ perfusion goals
- Surgical Considerations
    - Maintain hemostasis
- Emergence/Disposition
    - Awake vs. deep extubation may be considered
- Post-op Pain
    - PO acetaminophen, ibuprofen, +/- opioid

Case Specific Complications/Pitfalls

- Contraindications for circumcision include unstable or significantly premature infants
- Bleeding is the most common surgical complication[21]
    - Stepwise treatment includes manual pressure, compressive wrap, topical hemostatic agents, and sutures.
    - Evaluation for coagulopathy if indicated would include CBC, PT,PTT, fibrinogen, and hematology consult[22]
- Penile nerve block complications
    - Superficial injection may distort anatomy and complicate surgery
    - Damage to penile vessels may cause hematoma or bleeding
    - Intravascular injection may lead to Local Anesthetic Systemic Toxicity[23]
    - Children receiving penile nerve block are among the highest incidence of local anesthetic systemic toxicity in a recent review [24]

References

1 Gregory, GA, Andropoulous, DB, eds. Gregory's Pediatric Anesthesia. 5th ed. p 745. Wiley Blackwell, 2012

2 Cote, CJ, Lerman, JL, Anderson, BA, eds. A Practice of Anesthesia for Infant and Children. 6th ed. p 679, 967. Elsevier, 2019

3 American Urologic Association. Policy and Position Statements. Available at https://www.auanet.org/about-us/policy-and-position-statements/circumcision. Accessed January 15, 2023.

4 Wiswell TE, Geschke DW. Risks from circumcision during the first month of life compared with those for uncircumcised boys. Pediatrics. 1989 Jun;83(6):1011-5. PMID: 2562792. PubMed Link

5 Rodeghiero F, Tosetto A, Abshire T, et al. ISTH/SSC bleeding assessment tool: a standardized questionnaire and a proposal for a new bleeding score for inherited bleeding disorders. *J Thromb Haemost*. 2010;8(9):2063-2065. doi:10.1111/j.1538-7836.2010.03975. PubMed Link

6 Cote, CJ, Lerman, JL, Anderson, BA, eds. A Practice of Anesthesia for Infant and Children. 6th ed. p 679, 967. Elsevier, 2019

7 Krill AJ, Palmer LS, Palmer JS. Complications of circumcision. *ScientificWorldJournal*. 2011;11:2458-2468. doi:10.1100/2011/373829 PubMed Link

8 Mannino, NA., Kalava, K. American Society of Regional Anesthesia. Peripheral Nerve Blocks for Urologic Procedures. Available at https://www.asra.com/guidelines-articles/original-articles/acute-pain-medicine/acute-pain-medicine/asra-news/2018/11/06/peripheral-nerve-blocks-for-urologic-procedures. Accessed January 15, 2023

9 Davis, PJ, Cladis, FP, Motoyama, EK, eds. Smith's Anesthesia for Infants and Children. 8th ed. p 502,503. Elsevier, 2011

10 Cote, CJ, Lerman, JL, Anderson, BA, eds. A Practice of Anesthesia for Infant and Children. 6th ed. p 679, 967. Elsevier, 2019

11 Pineda, JA. Open Anesthesia. Ultrasound Guided Pundendal Nerve Block for Children in the Lithotomy Position. Available at https://www.openanesthesia.org/ultrasound-guided-pudendal-nerve-block-for-children-in-the-lithotomy-position-with-jorge-pineda/. Accessed January 15, 2023

12 Boisvert-Moreau F, Turcotte B, Albert N, Singbo N, Moore K, Boivin A. Randomized controlled trial (RCT) comparing ultrasound-guided pudendal nerve block with ultrasound-guided penile nerve block for analgesia during pediatric circumcision [published online ahead of print, 2022 Nov 17]. *Reg Anesth Pain Med*. 2022;rapm-2022-103785. doi:10.1136/rapm-2022-103785 PubMed Link

13 Williams RK, Adams DC, Aladjem EV, et al. The safety and efficacy of spinal anesthesia for surgery in infants: the Vermont Infant Spinal Registry. *Anesth Analg*. 2006;102(1):67-71. doi:10.1213/01.ANE.0000159162.86033.21 PubMed Link

14 Davidson AJ, Morton NS, Arnup SJ, et al. Apnea after Awake Regional and General Anesthesia in Infants: The General Anesthesia Compared to Spinal Anesthesia Study--Comparing Apnea and Neurodevelopmental Outcomes, a Randomized Controlled Trial. *Anesthesiology*. 2015;123(1):38-54. doi:10.1097/ALN.0000000000000709 PubMed Link

15 De Jose Maria, B, Tielens, L, Roberts, S. New York School of Regional Anesthesia. Pediatric Epidural and Spinal Anesthesia and Analgesia. Available at https://www.nysora.com/topics/sub-specialties/pediatric-anesthesia/pediatric-epidural-spinal-anesthesia-analgesia/#toc_SPINAL-ANESTHESIA-FOR-PEDIATRIC-PATIENTS--TECHNIQUE. Accessed January 15, 2023

16 Candido, KD, Tharian, AR, Winnie, AP. New York School of Regional Anesthesia. Caudal Anesthesia. Available at https://www.nysora.com/techniques/neuraxial-and-perineuraxial-techniques/caudal-anesthesia/#toc_INDICATIONS-FOR-CAUDAL-EPIDURAL-ANALGESIA-IN-CHILDREN. Accessed January 15, 2023

17 Handlogten K, Warner L, Granberg C, Gargollo P, Thalji L, Haile D. Implementation of a spinal anesthesia and sedation protocol that reliably prolongs infant spinal anesthesia: Case series of 102 infants who received spinal anesthesia for urologic surgery. *Paediatr Anaesth*. 2020;30(12):1355-1362. doi:10.1111/pan.14024 PubMed Link

18 Candido, KD, Tharian, AR, Winnie, AP. New York School of Regional Anesthesia. Caudal Anesthesia. Available at https://www.nysora.com/techniques/neuraxial-and-perineuraxial-techniques/caudal-anesthesia/#toc_INDICATIONS-FOR-CAUDAL-EPIDURAL-ANALGESIA-IN-CHILDREN. Accessed January 15, 2023

19 Cote, CJ, Lerman, JL, Anderson, BA, eds. A Practice of Anesthesia for Infant and Children. 6th ed. p 679, 957. Elsevier, 2019

20 Verghese ST, Hannallah RS, Rice LJ, Belman AB, Patel KM. Caudal anesthesia in children: effect of volume versus concentration of bupivacaine on blocking spermatic cord traction response during orchidopexy. *Anesth Analg*. 2002;95(5):. doi:10.1097/00000539-200211000-00019 PubMed Link

21 Krill AJ, Palmer LS, Palmer JS. Complications of circumcision. *ScientificWorldJournal*. 2011;11:2458-2468. doi:10.1100/2011/373829 PubMed Link

22 Yiee, JH, Baskin, LS, Lockwood, CJ, Lorin, MI, Wilcox, D. Complications of Circumcision. UpToDate. Walthan, MA: UpToDate Inc. available at https://www.uptodate.com/contents/complications-of-circumcision#H4 Accessed January 15, 2023

23 Gitman, M, Fettiplace, M, Weinberg, G. New York School of Regional Anesthesia. Local Anesthetic Systemic Toxicity. Available at https://www.nysora.com/topics/complications/local-anesthetic-systemic-toxicity/#toc_MECHANISM-OF-LOCAL-ANESTHETIC-TOXICITY. Access on January 15, 2023

24 Singaravelu Ramesh A, Boretsky K, Local anesthetic systemic toxicity in children: a review of recent case reports and current literature
Regional Anesthesia & Pain Medicine 2021;**46:**909-914. PubMed Link

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