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COCHLEAR IMPLANT

Surgical Specialty:	Otolaryngology
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Background:

- General Considerations
  - A cochlear implant is an electronic device that bypasses the cochlea and directly stimulates the cochlear nerve to help correct profound sensorineural hearing loss (SNHL)[1]
- Patient Considerations
  - There is a growing trend to perform surgery when the patient is younger due to the plasticity of the brain at an younger ags, thus improving hearing and aiding development.[2]
  - Candidates undergo significant pre-procedure evaluation including auditory testing and imaging before implantation.
  - Associated comorbidities/syndromes
    - 30% of children with SNHL have additional disabilities

Anesthetic Planning:

- Pre-Anesthetic Evaluation
  - Review any prior anesthetic record for complications
  - Review medical history for comorbidities
  - Discussions to have with surgeon/family
    - Standard risks of anesthesia
    - Increased risk of nausea and vomiting
- Specific or unique room set-up requirements
  - Airway
    - Extension on the circuit for turning bed 90-180 degrees
    - Supraglottic airway vs. endotracheal tube (ETT).
    - Oral RAE vs. placing an ETT on the opposite oral commissure of cochlear implant
  - Drugs/Infusions
    - Intubation
      - Short-acting paralytic for intubation if needed
      - Succinylcholine 0.5-1mg/kg
    - PONV Prophylaxis – consider the following
      - Ondansetron (0.1 – 0.15 mg/kg)

            - Dexamethasone (0.25mg/kg)
            - Propofol infusion (25mcg/kg/min) – if using volatile for maintenance
        - Anesthetic Maintenance
            - Volatile
            - Total intravenous anesthesia (TIVA)
                - Propofol infusion (125 – 300 mcg/kg/min)
                - Remifentanil infusion (0.05 – 1.3 mcg/kg/min)
        - Analgesics – consider
            - Fentanyl 0.5-2 mcg/kg
            - Long-acting opioid
            - Acetaminophen PO/IV/PR
            - Ketorolac 0.25-0.5mg/kg after discussion with the surgeon
            - Local anesthesia injected by the surgeon
            - If no local injected by the surgeon, anticipate the need for higher doses of opioids[4]
    - Monitors
        - Standard American Society of Anesthesiologists monitors
        - Invasive monitoring only if indicated by the patient's comorbidities
        - Facial nerve monitoring
    - Blood Availability
        - Usually not necessary
    - PICU Bed Availability
        - Only if indicated by the patient's comorbidities
    - Other Indicated Resources
        - Eye protection

Intraoperative Considerations:

- General
    - Maintain a steady level of anesthesia that allows for appropriate facial nerve monitoring and a smooth extubation
- Induction
    - Often will be inhalational induction due to the patient's age
- Positioning
    - Anticipate 180-degree turning of the operating room
    - Head turned to side with the operative side up
    - No immediate access to the airway
    - Place the blood pressure cuff on the contralateral side of the operation or lower extremities to avoid surgeon interference with the cuff
    - Consider eye goggles for patient eye protection
    - Double strap patient to ensure no patient movement with potential for extreme bed position changes
- Maintenance
    - Volatile agent, TIVA, or a combination of both are acceptable[6]
- Hemodynamic/Physiologic goals
    - Stable hemodynamics to minimize bleeding and impaired surgical visualization
    - Controlled vs. spontaneous ventilation with pressure support are acceptable if no hyperventilation parameters
- Surgical Considerations
    - Facial nerve monitoring – avoid paralysis

- Emergence/Disposition
  - Avoid bucking/coughing
  - Consider a deep extubation if the patient is a candidate
  - If not a candidate for deep extubation, consider dexmedetomidine to minimize bucking/coughing on emergence
- Post-op Care
  - PACU until standard discharge criteria are met
  - Discussion with the surgeon on the need for overnight observation

Case-Specific Complications/Pitfalls

- Lost Airway
  - No direct access to the airway
  - Ensure the airway is well secured before positioning and turning the patient over to the surgical team for prepping
- Surgical Stimulation
  - Local anesthesia from the surgeon will decrease the amount of anesthetic required, patchy areas may exist which could cause sudden unanticipated stimulation
- CSF leak
  - Hyperventilate to lower ICP during critical portions
  - Discuss with the surgeon regarding the possible use of mannitol
  - If mannitol is administered, place a Foley catheter

References

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