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CASE REPORT

Anaesthetic management in a case of TMJ ankylosis posted for gap arthroplasty

Anand.S[1] , Navaneetha Krishnan[2]
1. Post Graduate, Department of Anesthesiology, Saveetha Medical College, Chennai, Tamilnadu, India (dranandanesthesia@gmail.com)
2. Professor, Department of Anesthesiology, Saveetha Medical College, Chennai, Tamilnadu, India(navanee.priya@gmail.com)
Corresponding author's Mail id : dranandanesthesia@gmail.com

ABSTRACT
Managing anesthesia in pediatric patients with temporomandibular joint (TMJ) ankylosis is challenging due to limited mouth opening, requiring careful planning and a deep understanding of the condition's pathophysiology. This report discusses anesthetic management for a 3-year-old boy with TMJ ankylosis undergoing gap arthroplasty, highlighting the necessity for a tailored anesthetic plan. With the inability to perform awake fiber-optic intubation due to patient age and cooperation level, a combination of general anesthesia with preserved spontaneous respiration was implemented. The report details the use of fiberoptic bronchoscopy for intubation, the intraoperative pharmacological strategy involving sevoflurane and propofol, and the postoperative care that resulted in improved mouth opening. The case underscores the importance of multidisciplinary collaboration and advances in surgical and anesthetic techniques for managing complex airways in pediatric craniofacial surgery. The outcomes contribute to the literature on anesthetic approaches in such intricate scenarios, suggesting that with appropriate techniques, successful management is possible.
Keywords*: Anaesthetic management, pediatric patients, TMJ ankylosis , gap arthroplasty*

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INTRODUCTION

Temporomandibular Joint (TMJ) ankylosis represents a pathological condition characterized by the fusion of the mandibular condyle to the base of the skull, resulting in restricted mouth opening and posing significant challenges for anesthetic management.[1] This case report delves into the intricacies and unique considerations necessary for effectively managing anesthesia in a patient undergoing gap arthroplasty, a surgical intervention aimed at restoring jaw mobility and function. Children affected by TMJ ankylosis often pose a challenge for intubation due to their limited ability to open their mouth and protrude the lower jaw.[2] Consequently, the anesthetic management of young patients with this condition demands a high level of skill and preparation from anesthesiologists. The origins of TMJ Ankylosis can be multifaceted, encompassing:[3]

- Atypical development within the uterus where the fetus grows abnormally,
- Injuries sustained at birth, for instance, when forceps are used, causing damage to the TMJ,
- Chin trauma, which forces the condyle into the glenoid fossa and may cause bleeding within the joint space,
- Accidents or falls resulting in joint trauma,
- Improper healing of fractures in the condylar region.
- In the field of anesthesiology, managing pediatric patients and addressing complex airway situations are both encapsulated within this issue.

The preferred method in managing anticipated difficult intubation scenarios is often awake fibreoptic intubation utilizing topical anesthesia. Nevertheless, performing awake fibreoptic bronchoscopy (FOB) in

pediatric patients is typically impractical. Therefore, the most reliable alternative is often to perform FOB under deep sedation or general anesthesia while preserving spontaneous breathing.[4]

The report begins with a detailed account of the patient's medical history, emphasizing the etiology and progression of TMJ ankylosis. It then elaborates on the preoperative anaesthetic assessment, highlighting the specific difficulties anticipated in airway management due to the limited mouth opening and potential for difficult intubation. The discussion proceeds to describe the chosen anaesthetic technique, including the rationale behind the selection of specific drugs and methods.

Particular emphasis is placed on the intraoperative challenges, such as maintaining adequate ventilation, ensuring hemodynamic stability, and managing potential complications associated with limited jaw mobility. The report also details the postoperative care and analgesia, essential for patient comfort and early rehabilitation in such cases. Through this comprehensive case report, readers are provided with valuable insights into the multifaceted approach required for effective anaesthetic management in patients with TMJ ankylosis undergoing gap arthroplasty.[5] This case serves not only as a learning tool for anaesthetists and surgeons but also contributes significantly to the existing literature on anaesthetic considerations in complex maxillofacial surgeries.

Case Report:

A 3-year-old, 12 kg, boy presented with the chief complaint of inability to open his mouth for 2 years. A progressive decrease in mouth opening since birth was noted by his parents, resulting in a mouth opening of only 0.5 cm at the time of presentation. He was diagnosed as a case of TMJ ankylosis at the age of 2 in outside hospitals. The history of forceps delivery was noted. On examination: The child was playful and afebrile. Given poor oral intake, his weight percentile was lower than his peers. The rest of the history was unremarkable. Vitals include HR: 104/min, BP: 96/60 mm Hg, Spo2: 100%, RS and CVS examination were normal. All biochemical investigations were within normal limits. Airway assessment: Neck flexion and extension were normal. Mouth opening was severely restricted with inter incisor gap of 0.5 cm. Guided nasal intubation under general anesthesia was planned. The procedure and the need for the same was explained to the child's parents and written informed consent, including the consent for emergency tracheostomy, was taken pre-operatively.

Pt preparation: The patient fasted for 8 hours preoperatively. An i/v access was obtained and an infusion of ringer lactate with 2% dextrose was started at 2ml/kg/hour. Monitoring included ECG, pulse oximetry, and non-invasive arterial blood pressure (NIBP). IV glycopyrrolate 0.04 mg/kg was given to reduce secretions. All resuscitation equipment and difficult airway cart, including a cricothyroidotomy device and high-pressure ventilating device, were kept ready. Xylometazoline drops were put in both nostrils. Lignocaine 2% nebulization was started 30 min before surgery.

INTRA OP EVENTS: The patient was taken to the OR. Monitoring included ECG, pulse oximetry, capnography, and NIBP. IV fentanyl 0.5 ug/ kg was given. Gaseous induction with sevoflurane in 100% O2 was started using Jackson Rees (JR) circuit. Titrated dose of Inj. Propofol 0.5-1 mg/kg was given taking care to preserve spontaneous respiration. After confirming the ease of mask ventilation, the plane of anesthesia was deepened with a gradual increase in inspired sevoflurane concentration to achieve MAC of 1-1.2%. A well-lubricated 6.5 number nasopharyngeal airway fitted with a 5 mm ID ETT universal connector was inserted blindly through the left nostril. JR circuit was connected to the nasopharyngeal airway through the connector and a good trace of end-tidal carbon dioxide was obtained. Anaesthesia was maintained on oxygen and sevoflurane (MAC 0.8 to 1%) using a JR circuit. The plane of anesthesia was kept deep enough to allow the passage of FOB. Pediatric FOB (OD 3.8mm and length 60cm) was used for intubation A-Scope (AMBU). After checking the FOB, a cuffed endotracheal tube 4mm ID was lubricated loaded over the bronchoscope, and inserted through the right nostril. The FOB was gradually advanced and 1 ml of 2% lignocaine was sprayed through the suction channel on visualization of vocal cords. Intermittent suction through the suction channel of FOB facilitated the procedure. After FOB-guided intubation, the JR circuit was attached to the ETT and the tube position was confirmed by capnography and chest auscultation. Inj. Atracurium 0.75mg/ kg was given. Heart rate, ECG, NIBP, and oxygen saturation were monitored continuously throughout the procedure.

Anesthesia was maintained with sevoflurane, O2, and nitrous oxide (50:50) and intermittent dose of atracurium. After 4 hours of surgery, the mouth opening improved to 2 fingers. At the end of the procedure, residual neuromuscular blockade was antagonized using Inj. Neostigmine 0.05 mg/kg and Inj. Glycopyrrolate 0.08 mg/kg. Extubation was done successfully after the return of adequate muscle tone, power spontaneous breathing, and full awakening of pt. Inj. Paracetamol 15mg/ kg was given 8 hourly for pain relief.

DISCUSSION

This case report exemplifies the anesthetic management complexities in pediatric patients with TMJ ankylosis, particularly when presented with the formidable challenge of restricted mouth opening. The success of anesthesia in this scenario is not only indicative of meticulous planning and preparation but also a deep understanding of the pathophysiology and pharmacology at play.

Anesthesia for gap arthroplasty in the setting of TMJ ankylosis necessitates a customized approach, adapting to the constraints imposed by limited mouth opening. In the case of our 3-year-old patient, the choice of guided nasal intubation under general anesthesia was dictated by both the severity of the condition and the pediatric context. It underscores the importance of a multidisciplinary strategy, combining the expertise of anesthesiologists, surgeons, and pediatric specialists.

Awake fiber-optic intubation, the gold standard for difficult airways, was contraindicated due to the patient's age and the associated procedural intolerance. Hence, the use of general anesthesia with preserved spontaneous respiration was both a judicious and necessary adaptation. The successful application of fiberoptic bronchoscopy (FOB) for intubation further illustrates the vital role of technology in navigating complex airways.

The intraoperative events highlight the necessity for vigilance and the readiness to manage potential complications. The use of sevoflurane and a careful titration of propofol to maintain spontaneous respiration demonstrated a tailored pharmacological approach. Furthermore, the selection of atracurium as a neuromuscular blocker with subsequent reversal provided a balance between adequate surgical conditions and rapid recovery. Postoperative care, particularly pain management with paracetamol and ensuring return of muscle tone and power before extubation, are crucial for a smooth recovery. The significant improvement in mouth opening post-surgery also points towards the efficacy of the surgical intervention.

Untreated TMJ ankylosis can have far-reaching consequences, ranging from nutritional deficiencies due to feeding challenges to poor oral hygiene and altered speech development. These issues can subsequently impact facial and dental growth, potentially resulting in psychological distress.[6]

During critical growth phases, children with prolonged bilateral TMJ ankylosis can exhibit a pronounced 'bird face' deformity, characterized by an underdeveloped and retracted mandible, which can escalate to obstructive sleep apnea, a disorder with serious, even life-threatening, complications. [7] While awake nasal fiberoptic intubation with topical anesthesia is often the preferred method in managing such cases due to its safety profile, it requires patient cooperation, which is frequently unattainable in pediatric patients. Thus, general anesthesia or deep sedation, coupled with topical anesthesia, is usually necessary.[8] Maintaining spontaneous ventilation until the airway is securely intubated is a key principle in these scenarios. Children have a higher oxygen consumption rate and a lower functional residual capacity (FRC), making them less tolerant of apnea.[9] Ensuring sufficient oxygenation and an appropriate depth of anesthesia is critical for allowing the anesthesiologist time to use the fiberoptic bronchoscope and apply effective topical anesthesia to prevent laryngospasm, which is pivotal for successful pediatric fiberoptic intubation.[10]

Challenges specific to pediatric fiberoptic intubation include the small size of the airways, which can complicate the visualization during intubation as the scope may easily make contact with airway structures. Also, finding the correct size of an uncuffed endotracheal tube can be difficult and may require repeated bronchoscopy.[8,9] To circumvent these issues, using a small cuffed endotracheal tube with the "tube over scope" technique, as demonstrated in our case, is advisable to mitigate the risk of the tube catching on the arytenoids.

A comprehensive review of case series and reports focused on pediatric TMJ ankylosis and the outcomes of different surgical modalities including gap arthroplasty is available, offering insights into the preoperative and postoperative mouth opening measurements and complications observed.[1]

Another study compares the surgical outcomes related to interpositional arthroplasty materials, providing evidence for the management of TMJ ankylosis and considerations for choosing the appropriate surgical materials.[5] A detailed case report illustrates the specific challenges and approaches in managing a pediatric patient with TMJ ankylosis, emphasizing the importance of multidisciplinary care .[11]

Comparing the present case report to similar cases in the literature, we find a pattern of challenges and techniques in managing pediatric TMJ ankylosis. One similar case emphasizes the success of gap arthroplasty through transoral access for TMJ ankylosis, noting the importance of postoperative physiotherapy to prevent re-ankylosis.[12] Another discusses endoscopically assisted transoral gap arthroplasty, suggesting advancements in surgical technique that may offer better visualization and outcomes for patients with TMJ ankylosis.[13]

In the domain of anesthetic management, the principle of maintaining spontaneous ventilation till secure airway intubation mirrors our case report, underlining a consistent strategy across the board to mitigate risks associated with difficult airways in children.[14] Furthermore, the use of a small cuffed endotracheal tube as the best choice for the "tube over scope" technique has been recommended to navigate the smaller airways of pediatric patients.[15]

The literature suggests that individualized care, considering factors such as the child's age, condition severity, and the surgeon's experience, is essential for successful outcomes.[16] While the techniques and strategies used in our case are reflected in the literature, each case offers unique insights into optimizing care for these complex patients.

Overall, this case contributes to the broader discussion of anesthetic management in pediatric patients with TMJ ankylosis. It highlights the intricacies of airway management in a pediatric setting, the need for a comprehensive preoperative assessment, and a detailed planning process. Importantly, it serves as a reminder of the adaptability required in anesthesia practice, especially in the context of pediatric surgery for craniofacial anomalies. Future studies and reports can build upon this case, further refining anesthetic techniques and improving outcomes for this challenging patient population.

CONCLUSION

In conclusion, this case study of a 3-year-old patient with TMJ ankylosis who underwent gap arthroplasty illustrates the novel approach required in managing complex airway scenarios associated with pediatric craniofacial conditions. The success of the anesthetic technique, which involved guided nasal intubation under general anesthesia while maintaining spontaneous ventilation, emphasizes the importance of tailored anesthetic plans. This case reinforces the imperative for detailed preoperative assessment, the need for readiness to address intraoperative airway challenges, and the critical nature of postoperative care, including pain management and physiotherapy to improve outcomes. It highlights the valuable role of current technologies, such as fiberoptic bronchoscopy, which, when used judiciously, can significantly mitigate the risks during intubation. This case contributes to the growing body of evidence supporting the use of advanced airway management techniques in pediatric anesthesia, offering insights that may guide future cases with similar complexities. The patient's positive outcome also adds to the compendium of knowledge that underscores the feasibility and safety of gap arthroplasty in treating TMJ ankylosis in children, reaffirming the techniques and strategies employed as both sound and reproducible in pediatric anesthesiology practice.

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