Ultrasound-assisted awake retrograde nasal intubation for bilateral post-traumatic temporomandibular joint ankylosis with frozen mouth: A case report

Keshav Adhikari,[1] Mrigendra Paudyal,[1] Laxmi Pathak[1]

ABSTRACT

INTRODUCTION

Temporomandibular joint (TMJ) ankylosis is a condition characterized by temporo-mandibular joint movement restriction resulting from fibrous or bony fusion. Bilateral involvement may lead to complete mouth closure, creating one of the most challenging airway scenarios encountered by anaesthesiologists. Awake airway management techniques are generally preferred in such patients because loss of spontaneous ventilation after induction of anaesthesia may result in a catastrophic cannot-intubate-cannot-oxygenate situation. Although awake fibreoptic intubation is considered the gold standard for anticipated difficult airways, retrograde intubation remains an important alternative, particularly in resource-constrained settings.

CASE PRESENTATION

We report the case of a 20-year-old ASA-I (physical status) male weighing 50 kg with bilateral post-traumatic TMJ ankylosis and complete absence of mouth opening. Airway examination revealed severe mandibular retrusion, inter-incisor distance of 0 mm, sternomental distance less than 12 cm, and adequate neck movements. Ultrasound-guided bilateral superior laryngeal nerve blocks and ultrasound-assisted transtracheal recurrent laryngeal nerve block were performed using lignocaine. Awake retrograde nasal intubation was successfully accomplished using an 18-gauge epidural needle, urology guidewire, and 6.5-mm cuffed flexometallic endotracheal tube. General anaesthesia was subsequently administered for surgical release of ankylosis.

CONCLUSION

Ultrasound-assisted awake retrograde nasal intubation provided safe and effective airway control while maintaining spontaneous ventilation throughout airway instrumentation. This case highlights the continuing relevance of retrograde intubation in modern difficult airway management, especially in low-resource settings.

KEYWORDS

Temporomandibular joint ankylosis, Difficult airway, Awake intubation, Retrograde intubation, Ultrasound guided airway block

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INTRODUCTION

Temporomandibular joint ankylosis refers to fibrous, fibro-osseous, or bony fusion between the mandibular condyle and the temporal bone, resulting in limitation of mandibular movement and progressive reduction in mouth opening. The condition usually arises secondary to trauma, infection, inflammatory arthropathies, congenital disorders, or previous surgery. Childhood trauma remains one of the leading causes of TMJ ankylosis in developing countries leading into functional and cosmetic deformities because of interference with mandibular growth and development.[1]

Adequate mouth opening is fundamental for direct laryngoscopy, videolaryngoscopy, insertion of supraglottic airway devices, and oral fibreoptic bronchoscopy. In advanced bilateral TMJ ankylosis disease, complete inability to open the mouth render conventional airway techniques impossible. Furthermore, associated mandibular hypoplasia and retrognathia may further complicate airway management.[1]

Current difficult airway guidelines recommend awake airway management whenever difficult intubation is anticipated and concerns exist regarding maintenance of oxygenation after induction of anaesthesia.[2] Awake fibreoptic intubation remains the preferred technique in many institutions. However, the availability of fibreoptic bronchoscopes, operator expertise, and maintenance requirements limit widespread use in many low and middle income countries. Under such circumstances, retrograde intubation remains an important alternative technique and continues to be included in difficult airway algorithms.[3]

Retrograde intubation was first described by Butler and Cirillo in 1960 and involves passage of a guidewire through the cricothyroid membrane into the upper airway, facilitating endotracheal tube placement.[4] Despite advances in airway technology, retrograde intubation retains value because it requires minimal equipment, preserves spontaneous ventilation, and can be performed successfully in patients with severe restriction of mouth opening.

We describe successful ultrasound-assisted awake retrograde nasal intubation in a young adult with bilateral post-traumatic TMJ ankylosis and complete mouth closure undergoing surgical release.

CASE PRESENTATION

A 20-year-old male presented to our pre-anesthesia checkup clinic before undergoing inter-positional gap arthroplasty under general anesthesia. He informed about progressive inability to open his mouth following facial trauma sustained during childhood. Over several years, he experienced gradual reduction in mouth opening until complete closure occurred. The patient reported difficulty chewing solid food and relied predominantly on a soft diet. There was no history of dyspnoea, dysphagia, obstructive sleep apnoea, or other respiratory symptoms.The patient weighed 50kg and measured 167 cm (5 feet 6 inches) in height. He was classified as ASA-I (physical status). There was no history of hypertension, diabetes mellitus, bronchial asthma, cardiovascular disease, neurological illness, or previous anaesthetic exposure.Physical examination demonstrated marked facial asymmetry with mandibular retrusion. Airway evaluation revealed complete absence of mouth opening with an inter-incisor distance of 0 mm. Mallampati classifications could not be assessed. Sternomental distance was less than 12 cm. Thyromental distance assessment was limited because of mandibular deformity. Neck flexion and extension were adequate. Both nostrils were patent without clinically significant septal deviation as shown in figure 1. Routine laboratory investigations including complete blood count, renal function tests, serum electrolytes, coagulation profile, chest radiography, and electrocardiography were within normal limits. Computed tomography of the temporomandibular joints demonstrated severe bilateral ankylotic changes with obliteration of the normal joint architecture, marked osseous remodeling, and distortion of condylar anatomy. These findings were consistent with advanced post-traumatic TMJ ankylosis and correlated with the clinical finding of complete mouth closure.

After multidisciplinary discussion involving anesthesiologists, ENT and, Oral and maxillofacial surgeons, awake retrograde nasal intubation was planned. Emergency tracheostomy was planned as a backup strategy.

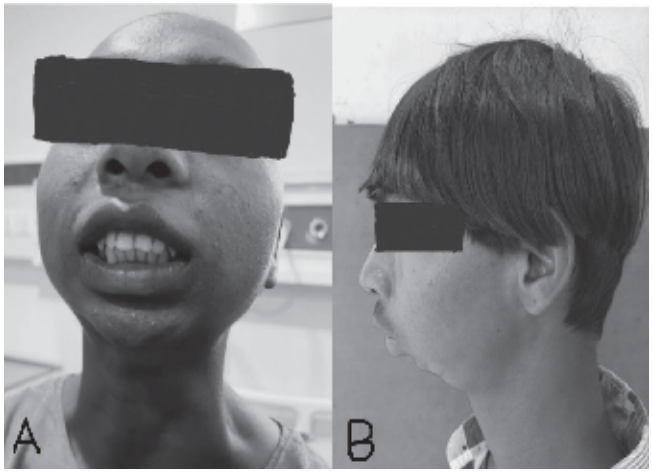

Figure 1 A. Unable to open mouth
B. Retracted mandible

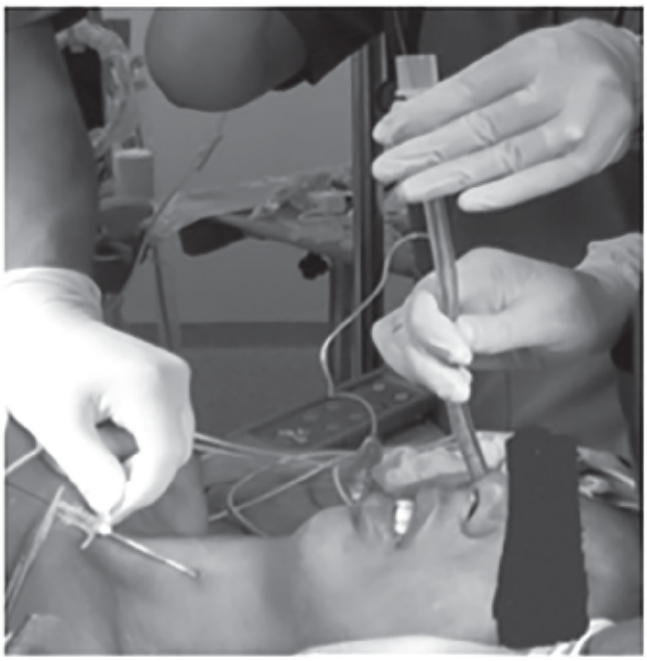

Figure 2. Railroading ET tube through guidewire--inserted through cricothyroid membrane

Anaesthetic Management

A comprehensive difficult airway plan was formulated before surgery. Standard ASA monitoring including electrocardiography, non-invasive blood pressure monitoring, and pulse oximetry was instituted. An 18-gauge intravenous cannula was secured and crystalloid infusion commenced. Preservation of spontaneous ventilation was considered essential. Therefore, no sedative or opioid medications were administered before airway instrumentation. Glycopyrrolate 0.2 mg was administered intravenously approximately 20 minutes before the procedure to reduce airway secretions and facilitate effective topicalisation. The nasal mucosa was prepared using lignocaine spray followed by placement of lignocaine-soaked nasal pledgets. After confirming bilateral nasal patency, the right nostril was selected for intubation.

Ultrasound-Guided Airway Blocks

A high-frequency linear ultrasound transducer was used to identify relevant airway anatomy.

Superior Laryngeal Nerve Block

The greater horn of the hyoid bone and surrounding structures were visualized sonographically. Under aseptic precautions, bilateral superior laryngeal nerve blocks were performed using 2 mL of 1% lignocaine on each side. This provided anaesthesia of the supraglottic airway, including the epiglottis, aryepiglottic folds, and laryngeal mucosa above the vocal cords.

Transtracheal Block

The cricothyroid membrane was identified using ultrasound and confirmed by palpation. Following skin preparation, a needle was introduced through the cricothyroid membrane into the tracheal lumen. Correct intratracheal placement was confirmed by aspiration of air. Subsequently, 3 mL of 2% lignocaine was injected rapidly. Immediate coughing facilitated widespread distribution of local anaesthetic over the vocal cords and tracheal mucosa, providing effective recurrent laryngeal nerve blockade. The patient tolerated airway preparation well and remained cooperative throughout.

Awake Retrograde Intubation Technique

Following satisfactory airway anaesthesia, the cricothyroid membrane was punctured using an 18-gauge epidural needle. A flexible urology guidewire was introduced through the needle and advanced cephalad into the upper airway.The guidewire was subsequently retrieved through the right nostril. A lubricated 6.5-mm cuffed flexometallic endotracheal tube was then railroaded over the guidewire and advanced through the right nasal passage into the trachea as shown in figure 2. Correct placement was confirmed by continuous waveform capnography, bilateral chest auscultation, equal chest expansion and stable oxygen saturation. The guide wire was removed after successful tracheal intubation and the tube was secured. Throughout the procedure, the patient maintained spontaneous ventilation with oxygen saturation above 98%.

Intraoperative Management

Following successful airway control, general anaesthesia was induced. Anaesthesia was maintained using oxygen, isoflurane, intermittent fentanyl supplementation, and rocuronium for neuromuscular blockade. Surgical release of bilateral TMJ ankylosis was performed successfully. Total surgical duration was approximately 3.5 hours. Estimated blood loss was approximately 200 mL. Intraoperative haemodynamic parameters remained stable and no significant complications occurred. At completion of surgery, neuromuscular blockade was reversed using sugammadex. Following confirmation of adequate spontaneous ventilation, sustained head lift, and return of the protective airway reflexes, awake extubation was done.

Postoperative Outcome

The immediate postoperative period at Post-anesthesia Care Unit was uneventful. Oxygen saturation remained normal and no airway related complications were observed. There was no nausea, vomiting or sore throat and patient was comfortable. Postoperative assessment demonstrated wide mouth opening of approximately 4 cm. After four hours of observation, patient was shifted to postoperative ward for further care.

DISCUSSION

Airway management in TMJ ankylosis continues to represent one of the most challenging situations encountered in anaesthetic practice. Complete mouth closure eliminates the possibility of direct laryngoscopy and significantly limits the usefulness of videolaryngoscopy and supraglottic airway devices.[5]

Awake fibreoptic intubation remains widely accepted as the gold standard for anticipated difficult airway management because it allows direct visualization of airway structures while preserving spontaneous ventilation.[6] Nevertheless, fibreoptic intubation requires expensive equipment, regular maintenance, operator experience, and favourable airway conditions. Blood, secretions, airway edema, or distorted anatomy may significantly reduce success rates.[7]

In contrast, retrograde intubation offers several advantages. It requires minimal equipment, is inexpensive, and can be performed successfully even in resource-limited environments. Spontaneous ventilation can be maintained throughout the procedure, reducing the risk associated with induction of general anaesthesia before airway control.[8]

The present case highlights the value of combining traditional airway techniques with modern ultrasound guidance. Ultrasound has emerged as an increasingly important adjunct in airway management. Sonographic identification of the superior laryngeal nerve region and cricothyroid membrane improves anatomical localization, particularly in patients with difficult surface anatomy. Ultrasound-guided airway blocks have been associated with increased accuracy and improved patient comfort compared with landmark-based techniques.[9]

Another notable aspect of this case was the avoidance of sedation during airway management. Although dexmedetomidine, remifentanil, and low-dose midazolam have been used successfully during awake intubation, excessive sedation may result in airway obstruction, hypoventilation, and loss of cooperation. Given the extreme difficulty of the airway and complete mouth closure, maintenance of full consciousness and spontaneous ventilation was considered safest.[10]

The successful outcome observed in our patient demonstrates that retrograde intubation remains a valuable component of the difficult airway armamentarium despite advances in airway technology. Anaesthesiologists should maintain familiarity with this technique, particularly while practicing in the hospitals where advanced airway devices may not be easily accessible.

CONCLUSION

Bilateral post-traumatic TMJ ankylosis with frozen mouth presents an extreme difficult airway. Ultrasound guided airway blocks combined with awake retrograde nasal intubation provided safe and effective airway management while preserving spontaneous ventilation. This case reinforces the continuing relevance of retrograde intubation in modern anaesthetic practice and highlights the utility of ultrasound as an adjunct to difficult airway management. Moreover, there must be preparedness for surgical tracheostomy too.

PATIENT CONSENT

Written informed consent was obtained from the patient for publication of this case report along with the radiological images.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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