Retromolar fibreoptic orotracheal intubation in a patient with severe trismus undergoing nasal surgery

Intubation orotrachéale par fibroscopie rétromolaire chez une patiente avec un trismus grave subissant une chirurgie nasale

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Abstract

Purpose A considerable challenge arises when passage of an endotracheal tube between the teeth is impossible because of severe trismus and the presence of concomitant contraindications to nasotracheal intubation. We report a novel technique to circumvent the need for tracheostomy by using the retromolar space for oral fibreoptic intubation.

Clinical features A 50-yr-old female with a history of pharyngeal cancers treated with surgery and radiotherapy presented for right dacryocystorhinostomy. She had undergone left dacryocystorhinostomy after nasotracheal intubation one week earlier. This time, orotracheal intubation was requested since surgery would involve the right nostril and left nasal intubation might dislodge the recently placed nasolacrimal tube.

Due to severe trismus, the patient's interincisor distance was only 9 mm, and it was impossible to pass a 6.0 mm endotracheal tube through that gap. A flexible bronchoscope loaded with a 6.0 mm tracheal tube was inserted through the retromolar space into the pharynx and maneuvered through the vocal cords for endotracheal intubation.

Conclusions The retromolar space is located between the last molar and the ascending ramus of the mandible. Even with complete mandibular occlusion, it is usually able to accommodate a 7.0 mm endotracheal tube. Despite its hidden location, it can be used successfully for orotracheal fibreoptic intubation. With practice, the expertise achieved

in performing this technique will confer a much needed option for securing the airway in this challenging situation.

Résumé

Objectif Un défi de taille surgit lors le passage d'une sonde endotrachéale entre les dents est impossible en raison d'un trismus grave et de la présence de contre-indications concomitantes à l'intubation nasotrachéale. Nous rapportons une technique innovante pour contourner le recours à une trachéostomie en utilisant l'espace rétromolaire pour réaliser une intubation orale par fibroscopie.

Éléments cliniques Une femme de 50 ans, avec des antécédents de cancers du pharynx traités par chirurgie et radiothérapie, s'est présentée pour subir une dacryocystorhinostomie droite. Elle avait déjà subi une dacryocystorhinostomie gauche après une intubation nasotrachéale la semaine précédente. Cette fois-ci, une intubation orotrachéale était requise étant donné que la chirurgie serait située à la narine droite et qu'une intubation nasale gauche pourrait déloger le tube lacrymo-nasal.

En raison d'un trismus grave, la distance entre les incisives de la patiente n'était que de 9 mm, et il était impossible de passer une sonde endotrachéale de 6,0 mm dans cet espace. Un bronchoscope flexible chargé d'une sonde trachéale de 6,0 mm a été inséré via l'espace rétromolaire dans le pharynx et dirigé entre les cordes vocales pour réaliser une intubation endotrachéale.

Conclusion L'espace rétromolaire est situé entre la dernière molaire et le rameau ascendant de la mandibule. Même dans les cas d'occlusion mandibulaire complète, cet espace peut en général laisser passer une sonde endotrachéale de 7,0 mm. Malgré son emplacement caché, cet espace peut être utilisé pour réaliser une intubation orotrachéale par fibroscopie. Avec la pratique, l'expertise

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acquise dans la réalisation de cette technique apportera une alternative indispensable pour avoir accès aux voies aériennes dans cette situation délicate.

Endotracheal intubation to ensure airway control is the cornerstone of anesthesia practice. The availability of two alternate routes to the trachea confers invaluable flexibility in the choice of intubation.¹ The approach chosen, oral or nasal, depends not only on the patient's airway anatomy but also on surgical considerations. A formidable challenge arises when passage of an endotracheal tube (ETT) between the teeth is not possible due to a restricted mouth opening and the presence of concomitant contraindications to nasotracheal intubation. Under these circumstances, hoping to avoid the need for a tracheostomy and its potential complications,^{2,3} we present a novel technique using the retromolar space as the point of insertion to perform flexible fibreoptic orotracheal intubation. Written patient consent was obtained for the submission and publication of this case report.

Case presentation

A 50-yr-old (48 kg, 160 cm) Caucasian female with a complex history of multiple head and neck cancers presented for right dacryocystorhinostomy (DCR). In 1982, she was first diagnosed with epidermoid carcinoma of the soft palate, which was treated by resection and radiation therapy. In 2008, she was found to have papillary thyroid carcinoma, and she underwent a thyroidectomy and right paratracheal node dissection. Later the same year, a squamous cell carcinoma of the right nasopharynx was detected. Again, she was treated with chemoradiation. Subsequently, the patient developed progressive stiffness of her jaw, and her mouth opening became more and more restricted despite intensive physical therapy. At the same time, she also developed bilateral nasolacrimal duct obstruction. The patient had undergone left DCR and silicone tube placement one week earlier. For that procedure, an awake fibreoptic right nasotracheal intubation was performed. This time, orotracheal intubation was requested since right DCR would involve the right nostril, and intubation through the left nasal passage might dislodge the recently placed nasolacrimal tube. Physical examination revealed a thin underweight patient with a body mass index of 19. The interincisor distance was 9 mm, and it was impossible to pass a 6.0 mm ETT through that gap (Fig. 1). There were no other risk factors for difficult ventilation, intubation, or pulmonary aspiration, and there were no cardiovascular, pulmonary, or other comorbidities.

Fig. 1 Severe trismus not allowing passage of 6.0 endotracheal tube

Fig. 2 Successful retromolar intubation with 6.0 endotracheal tube

In the operating room, routine monitors were applied. General anesthesia was induced with propofol 100 mg *iv* and fentanyl 100 µg *iv*. After confirming that bag and mask ventilation was achieved without difficulty, rocuronium 50 mg *iv* was given. A 3.5 mm flexible fibreoptic bronchoscope loaded with a reinforced 6.0 mm ETT was inserted into the left corner of the patient's mouth into the retromolar space. The epiglottis was identified; the flexible bronchoscope was maneuvered through the vocal cords, and the ETT was advanced for orotracheal intubation (Fig. 2). Right DCR with placement of a silicone tube proceeded uneventfully. The ETT was removed at the conclusion of surgery, and the patient was discharged home later that evening in good condition.

Discussion

The conjunction of severe trismus and contraindications to nasotracheal intubation presents considerable difficulties

for airway management. Patients with a restricted mouth opening are encountered with increasing frequency, especially for head and neck surgery. The prevalence of trismus has been reported to be from 5% to 38% after treatment for head and neck malignancies.⁴ Trismus may result from a variety of conditions, such as trauma, tumours, infections, surgery, and radiotherapy involving the mandible, maxilla, temporomandibular joint, muscles of mastication, oral cavity, teeth, and pharynx. Severe trismus that is secondary to masseter muscle rigidity associated with malignant hyperthermia and neuroleptic malignant syndrome is rare but potentially life-threatening.

Besides the obvious difficulty with oral intubation, severe trismus also causes serious problems with airway management. After induction of general anesthesia, bag and mask ventilation may be challenging. Difficulty in ventilation is further compounded by the inability to insert an oropharyngeal airway or a laryngeal mask airway. Furthermore, the patient cannot spit efficiently, and it is difficult to suction the mouth quickly and effectively. Consequently, vomiting or profuse bleeding from nasotracheal intubation attempts may lead to massive aspiration of blood. Utmost caution should be maintained to prevent airway trauma during intubation attempts. Due to the inability to brush their teeth properly, the oral cavity, dentition, and gingiva of these patients are more susceptible to infection. Severe gingivitis and loose teeth are commonly encountered.

In patients with a restricted mouth opening, fiberoptic stylets have been used for orotracheal intubation. Even though these small stylets can be introduced through narrowed openings, such as the retromolar space, and may be helpful in occasional cases, they have not achieved widespread popularity because of technical limitations. These stainless steel rods do not offer the flexibility and maneuverability of the fiberoptic bronchoscope. Fogging is a major issue when these cold metallic instruments are inserted inside the warm human body cavity.⁵ Thus, the rigid fibrescopes cannot compete with their flexible counterparts.⁶

Therefore, in cases of restricted mouth opening, nasotracheal intubation constitutes the technique of choice. Unfortunately, some patients with severe trismus also present contraindications to nasotracheal intubation. Thus, the nasal route may not be the ideal choice because the surgical procedure involves the nose or immediate vicinity, such as the paranasal sinus, maxilla, transphenoidal pituitary, or nasolacrimal duct as in this case. Finally, nasotracheal intubation may be contraindicated because of intranasal pathology, such as septal deviation or nasal deformity, tumour, and infection. Patients with basal skull fractures or extensive facial fractures are at risk for accidental intubation of the brain or the orbital floor,

Fig. 3 Anatomy of retromolar space

respectively. Intracranial placement of nasotracheal tubes has been reported after transphenoidal surgery⁷ and in a patient with an undiagnosed congenital absence of the cribriform plate.⁸ Hemorrhage occurs more frequently with a nasotracheal intubation than with the orotracheal route.⁹ Finally, because trauma to the nasal mucosa, septum, and turbinates is common, nasal intubation is relatively contraindicated in the presence of coagulopathy.

In these challenging circumstances, the customary approach to secure the airway is to perform a tracheostomy, a surgical procedure with numerous risks and potential complications. Hoping to avoid the need for tracheostomy, we present a novel technique using the retromolar space as an entry to perform flexible orotracheal intubation.

The retromolar space is located between the back of the last molar and the anterior edge of the ascending ramus of the mandible where it crosses the alveolar margin (Fig. 3). Present even with complete mandibular occlusion, the retromolar space has been used as a passage for pharyngeal suctioning in patients emerging from general anesthesia with their teeth clenched. This space has also been used by maxillofacial surgeons to anchor the ETT to achieve optimal approximation of the teeth before wiring the jaws together.¹⁰ Even with very severe trismus, the retromolar space is almost invariably large enough to accommodate a size 7.0 mm ETT.

While awake retromolar intubation using the Bonfils fibrescope has been well described, we chose to avoid an awake version using the flexible fiberoptic bronchoscope for this case since it is our view that oral airway topicalization would have been extremely difficult due to the patient's limited mouth opening. In our rationale for choosing asleep retromolar fiberoptic intubation, we also took into account the fact that the patient was extremely anxious and apprehensive about undergoing a second

awake intubation within one week. Our plan was to awaken the patient if we encountered any difficulty with ventilation after giving an induction dose of propofol. We proceeded only when the ability to ventilate was assured. Our back-up plan in case of unsuccessful retromolar intubation was to perform fibreoptic left nasal intubation with extra caution not to dislodge the *in situ* nasolacrimal silicone tube.

The skills required to perform retromolar fibreoptic intubation successfully are essentially those needed for conventional fibreoptic intubation. The decision to perform this procedure with the patient asleep *vs* awake should be individualized to each particular case. Factors to consider include the ability to provide and maintain satisfactory ventilation and the skills of the operator in fibreoptic techniques. If there is any doubt, awake fibreoptic intubation should be chosen to ensure patient safety. Expertise achieved previously in fibreoptic bronchoscopy can be applied conveniently to retromolar fibreoptic intubation with minimal adjustment. Furthermore, to improve skills in this technique, trismus can be simulated by keeping the patient's mouth closed and attempting fibreoptic intubation from the retromolar space. We found no mention of retromolar fibreoptic intubation in the two major textbooks concerning airway management.^{11,12} Perhaps the reasons the retromolar space may have been overlooked can be explained by its hidden location behind the last molar, which cannot be seen readily without pulling the corner of mouth, and by the misconception that it is impossible to perform successful orotracheal intubation from this point of entry.

Patients with concomitant severe trismus and contraindications to nasotracheal intubation are encountered occasionally in anesthetic practice. Traditionally, this difficult combination requires tracheostomy for airway control. To avoid the risks and complications related to tracheostomy, the retromolar space offers a ready access to perform fibreoptic orotracheal intubation. With practice, the expertise achieved in performing this technique will

confer a novel and much needed option in securing the airway for this challenging situation.

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