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SUBMENTAL INTUBATION: A CASE REPORT WITH LITERATURE REVIEW

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ABSTRACT Managing the airway in patients with faciomaxillary injuries poses challenges due to upper airway disruption. Anesthesiologists must navigate shared airways with surgeons, making oral and nasal intubation often impractical. Nasal fractures commonly accompany these injuries, ruling out nasal intubation. Additionally, intraoperative dental occlusion for fracture alignment prohibits orotracheal intubation. While tracheostomy is conventional, it carries risks, requires specialized postoperative care, prolongs hospitalization, and increases costs. Retromolar intubation is an option, but space limitations in adults may pose problems. Submental intubation offers airway control, bypasses oral and nasal routes, and allows dental occlusion. It's a viable option, especially when prolonged postoperative ventilation isn't needed, with minimal complications and high acceptance by patients and surgeons. Though requiring longer preparation and lacking familiarity, it's an acceptable alternative to tracheostomy for optimal per-operative airway management. We report a case of submental orotracheal intubation for the management of perioperative upper airway in a 35-year-old patient with extensive midfacial fractures requiring jaw immobilization. No complications occurred during the procedure.

KEYWORDS : Submental, intubation, intratracheal methods, maxillofacial injuries/surgery, oral/methods

INTRODUCTION

Plastic surgery procedures are rising, including rehabilitation for traumatic facial emergencies, prosthetic rehabilitation for auricle, maxillo-facial and mandibular malformations, rhinoplasty, orthognathic surgery, orbito-facial fractures, facial nerve rehabilitation, cleft lip and palate, and oncological rehabilitation of the face. [1-5]. Advancements in technology and pre-operative planning have created new challenges in post-operative adjustments, requiring sensitivity to meet patient expectations. [1][3] This study presents a case where submental intubation was performed to facilitate surgical access to the oral and nasal cavities. The patient had sustained multiple traumatic injuries, including nasolabial discontinuity and loss of the middle third of the upper lip, as well as a nose injury, following a road accident. The use of submental intubation has been found to be an advantageous technique for maintaining airway patency during such procedures, eliminating the necessity to reposition the patient or interrupt the anesthesia monitoring. [3-5] The surgical procedure has low risk, with the concern being subcutaneous emphysema and harm to nearby structures. Maintaining the airway during oral and maxillofacial surgery can be challenging. Oral intubation is often not recommended for certain procedures. [6-8] Submental intubation is an effective technique for maintaining the airway during surgery without patient repositioning or disrupting anesthesia monitoring. This article outlines the step-by-step introduction of this method and presents a case that addresses specific considerations such as visual and positional requirements, as well as professional safety. The surgical procedure in this case did not involve buccal, interdental, or osteo-cartilaginous areas. [9]

Case Presentation

We present the case of a 35-year-old patient with no significant medical history who was involved in a car accident and admitted with severe trauma, primarily craniofacial impact. On clinical examination at admission, the patient was stable hemodynamically and respiratorily, with an initial GCS of 13/15, primarily due to motor response issues. There were periorbital bruises, a lip and nasofrontal wound with nasal septum deformity. A CT-scan was performed in the emergency department, with reconstructions of the facial bones revealing a displaced nasal fracture, a midline mandibular fracture was observed, with damage starting from the anterior margin of the angular and traveling to the opposite side due to secondary fractures. Additionally, several fractures were detected in the left zygoma at the level of the articular eminence at the level of the articular (glenoid) cavity on the anterior wall, bitemporal skull fractures further complicated the case. (figure1) while, the brain scan revealed a few limited cerebral contusion foci. Following the confirmation of maxillofacial trauma, the patient was hospitalized in the Maxillofacial Surgery department and was admitted to the operating room 1 days after admission for fixation of the nasal and mandibular fractures.

Due to concerns about potential airway obstruction, the patient was promptly evaluated, and intubation was planned under optimal relaxation. After general anesthesia induction, the patient underwent a one-stage surgical treatment with orotracheal intubation via a standard video-laryngoscope technique using an appropriate size of armed orotracheal tube converted subsequently to submental intubation as follows. After application of disinfectant solution followed by 15 mL of 1% Lidocaine, in the midline of the submental area, a sublabial sulcular incision and a skin incision of 2 cm in the mental region made on the right side, 2 cm from the jawbone were made, followed by subcutaneous delicate digital dissection through the lingual vestibule, fibrovascular tissue, and muscle, between the symphysis and a lower lateral incisor, to expose the mandibular alveolar process to establish direct communication with the submental skin. Once the path was slightly widened, a guide wire was passed through the communication from outside the oral cavity and directed through the submental mucosa. The patient was disconnected from the respirator, the tube was introduced through the anterior midline submental incision, advanced forward into the sublingual area and the tip of the forceps was introduced into the mouth and the tube was passed into the submental orifice.An assistant held the tube in place while the connector was replaced and the patient was ventilated again. (figure2) The entire procedure took 6 minutes and the patient was disconnected from the ventilator for 50 seconds, without any drop in oxygen levels. Afterward, the anesthesiologist suctioned the oral cavity and pharynx, and after verification of the appropriate position of the tracheal tube by auscultation and capnography, although the position of the tube was not checked using a fiberscope. After completing the submental intubation, the patient underwent intermaxillary blocking, mandibular osteosynthesis, and reduction of nasal bone fractures. The patient was then unblocked and the tube was returned orally for ventilation. A tonsillar hemostat was inserted, pushed towards the lateral region, and

then anteriorly. Afterward, the corresponding incisors and the submental region were checked for perforating injuries. The submental incision was closed with sutures. (figure3) The patient was extubated without any complications and the intermaxillary blockade was maintained for a month in the recovery room, the wound healed well, with a postoperative recovery of five weeks. The management of the fractures was successful, facial symmetry was achieved, and the patient's appearance was good, submandibular scars were not relevant, and the sublabial sulcus scars were well camouflaged. Furthermore, there were no complications: no surgical, wound healing, or postoperative airway-related problems were encountered.

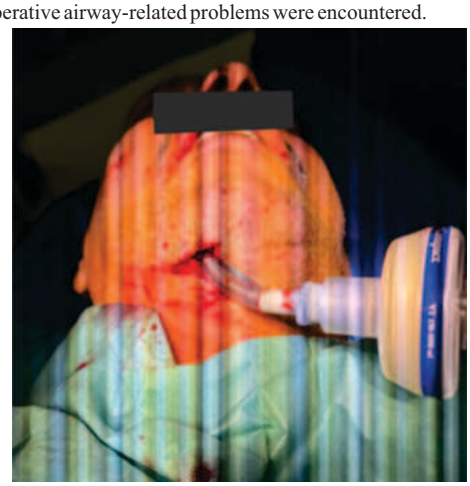

Fig 1. An armed endotracheal introduced through the anterior midline submental incision, and the tip of the forceps introduced into the mouth forward the submental orifice then a 2 cm submental surgical approach was performed, with a skin incision made on the right side, 2 cm from the jawbone

Fig 2. The tube was returned orally for ventilation, after undergoing an intermaxillary blocking, mandibular osteosynthesis, and reduction of nasal bone fractures.

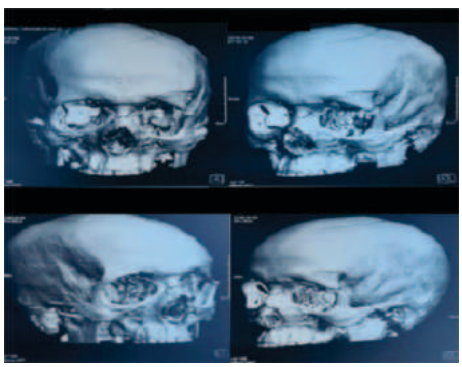

Fig 3. 3D facial CT showing complex fractures of jaw and a displaced nasal Fracture.

DISCUSSION

Advancements in knowledge and technology have improved airway management. Intubation, although supported by anecdotes, still faces apprehension. The SFAR revised its guidelines in 2017 to adapt to changes and promote patient safety. SFAR prioritizes the latest research and technology for optimal outcomes in airway management. [9]. Tracheal intubation and extubation are important procedures in anesthesia and resuscitation. They can be challenging and can cause illness and death. In 2006, SFAR discussed "difficult intubation" and ways to manage risks and prevent hypoxemia. New techniques like video laryngoscopes may change clinical practices. [9] The facial region has many blood vessels and sensitive tissues. Managing the airway is vital when caring for critically ill patients, trauma victims, and those undergoing anesthesia for surgery. Anesthesiologists use techniques like bag-mask ventilation, airway insertion into the mouth or nose, supraglottic airway devices, and intubation. Methods like supraglottic airway devices or orotracheal intubation are preferred, but nasotracheal intubation is used in specific cases for head and neck surgery, oral surgery, or trauma to protect the airway and prevent more harm. [10]

A nasotracheal intubation can be beneficial in creating an optimal surgical field, specifically for maxillary or mid-face fractures. However, it may not be suitable in certain cases due to anatomical variations, including septal deviation, nasal bleeding, abnormal nasal cavity shape, or nasal bone fracture. [11] Special attention is given to the nasal bone's anatomy. Understanding the structure is vital in medical procedures like nasotracheal intubation. Tube bending or sudden direction changes can cause swelling, pain, and nasal tissue damage. Long-term cosmetic damage may occur after oral maxillofacial surgery, especially in those with cartilage issues. Prevention is essential to minimize risks and ensure successful outcomes. Nasotracheal intubation is a challenge in this type of surgery, increasing the likelihood of malocclusion and mouth injuries. Healthcare professionals must possess expertise and exercise caution. Proactive measures and preventive strategies can mitigate risks, enhancing patient safety and preserving aesthetics in the long term. [12] The utilization of specialized equipment is crucial and indispensable in order to effectively minimize risks and achieve optimal and desirable outcomes. To sufficiently and effectively prevent any form of deformation and the likelihood of increased resistance to ventilation within the floor of the mouth, it is highly advisable and recommended to utilize an armed probe. However, it is worth noting that there have been well-documented instances and cases where successful submental intubation (SMI) procedures were carried out using a non-reinforced tube. It is imperative that the chosen tube must possess the appropriate and suitable length, while ensuring that the connector is easily detachable. Among the various available options, the renowned and highly regarded Fastrach® probe is widely considered as the most ideal and appropriate choice for this specific purpose. Nevertheless, it should be acknowledged that an armed Mallinckrodt® tube (Safety-Flex, Mallinckrodt Medical, Athlone, Ireland) can also be a viable and feasible alternative, although it may require a more intricate approach due to the crimping of the connector. [13] Such is the case with our patient, who had a nasal fracture that prevented any nasotracheal intubation and required intermaxillary fixation, which necessitates access to the oral cavity. This led us to favor submental intubation with long armed tube over tracheostomy due to the morbidity associated with tracheostomy and the lack of need for long-term ventilation in our patient.

In some instances, submental intubation has been performed using a laryngeal mask or combitube. [14] Tracheostomy is an alternative treatment for fractures in the upper jaw and nose, but it carries risks of severe illness and death. Complications include tracheal narrowing, neck and thyroid vessel injuries, trapped air, nerve damage, esophagus and trachea connections, weakened trachea, and visible scarring. Open tracheostomy takes about 40 minutes, while a quicker alternative called SMI only takes 5 minutes. [15-16]

Frequent difficulties faced during SMI practice include tube displacement causing blockage in the bronchial passages, damage to the tube or connector, unintended removal of the tube, as well as issues with the administration of medication and the occurrence of respiratory infections. A high level of expertise and attention to detail in the procedure is essential for preventing these potential challenges. In cases where there is uncertainty about the proper positioning of the tube, a fiberoptic examination can be conducted to ensure accurate placement. It is also worth noting that complications arise in

approximately 7% of SMI instances, with factors such as patient anatomy and underlying health conditions playing a role in the likelihood of encountering these complications. Therefore, healthcare professionals must remain vigilant and continuously monitor patients undergoing SMI to promptly identify and address any issues that may arise, thereby maintaining optimal patient safety and well-being. [15] Prompt medical attention is required for infected scars, whereas other harmless issues encompass orostoma, hypertrophic scar, temporary lingual nerve paresthesia, and mucocele. In research carried out by Chandu et al., 2 out of 44 cases resulted in patients being extubated during probe passage through the submental orifice. [17] An alternative treatment option is nasal intubation, especially in case of advanced midfacial trauma, an invasive nasotracheal intubation and an application of a rigid external fixation system have to be performed. which allows for oral surgery followed by nasal reduction after the removal of the tube. The recommendation for this type of intubation is the usage of a transnasal flexible fiberoptic endotracheal tube. Insertion of the endotracheal tube may damage nasal mucosa, respiratory epithelium, and concha bullosa, which can lead to secondary hemorrhage or pneumonia. However, nasal reduction poses potential risks such as inhaling mucus from the back of the nose after the tube is removed, and there are also theoretical risks of breathing in or iatrogenic meningitis in patients with fractures at the base of the skull and leakage of cerebrospinal fluid. To avoid these complications, our recommendation was the use of submental intubation. Endotracheal intubation was performed by the treating anesthesiologist through the oral route. It is important to note that the patient fully accepted the scars resulting from submental intubation.

Furthermore, for surgeons, the conditions for performing nasal reduction upon waking were not considered favorable. Additionally, submental intubation has various other applications, including its use in oncological surgery of the base of the skull through the endo-oral route for neurosurgeons. [18] It has also been utilized in orthognathic surgery (specifically bimaxillary or sagittal osteotomy with accompanying rhinoplasty) in order to offer the surgeon a more comprehensive understanding of the soft tissues of the lip and nose, free from the limitations of nasal intubation. [16] Finally, it proves beneficial in cases of oral surgery where nasotracheal intubation is not feasible due to congenital or acquired malformations such as septal deviation, polyposis, or narrow nasal canals. Submental intubation (SMI) was chosen as the preferred method for airway access, due to oral and nasal fractures. Following the preparation of the patient for surgery and the examination of facial bone fractures, procedures were performed in the operating room under general anesthesia. SMI is a useful technique for bypassing the upper airway, particularly when oral or nasal intubation is not suitable. It is preferred due to its shorter application duration and lower complications in selected cases compared to tracheostomy. In this case, the patient was examined and informed about the procedure the next day, and SMI was performed following orotracheal intubation. According to a study by Marx et al., no complications such as tracheal or pharyngeal ischemia, as well as bleeding-related complications, were observed in 49 cases. The follow-up period in this study was 7 ± 6.6 days, and it was determined that compared to tracheostomy procedures, SMI had an earlier end date. Although ancient practices describe performing surgeries without surgical equipment, modern anesthesia requires the use of intubation equipment. In cases of concurrent maxillofacial injuries, alternative methods must be considered for managing the upper airway. [17] The evolution of knowledge and the democratization of the use of certain intubation tools since 2017, such as the video laryngoscope, have greatly contributed to the enhancement of airway management practices. This progress necessitates a thorough reevaluation of the difficult intubation criteria by the SFAR to effectively predict and address potential challenges when using a video laryngoscope. In situations where intubation proves to be challenging, whether it is anticipated or not, the simultaneous utilization of various airway management devices can be considered as a viable approach. In instances where tracheal intubation is unachievable, the utmost importance is placed on maintaining effective oxygenation and ventilation, underscoring the significance of these critical aspects of patient care. [19]

CONCLUSION

Submental intubation is a secure, straightforward, and minimally invasive procedure that enables a safe airway without requiring a tracheostomy for patients undergoing orthognathic and midfacial surgery. The decision to perform submental intubation as a standalone procedure or in combination with other airway control methods depends on personal preference or experience, the specific surgical conditions, and the anatomical variations of the incision site. [20] Effective airway management challenges in patients with various needs include obtaining oral cavity access, controlling airway during surgery, and managing oral and maxillofacial surgery. Close collaboration between anesthesia and maxillofacial teams is necessary. In a recent case, we successfully performed submental orotracheal intubation on a 35-year-old male patient with extensive midfacial comminuted fractures necessitating jaw immobilization during surgery, with no observed complications. Anesthetic management for maxillofacial trauma patients often requires oral intubation, which can be technically challenging due to the loss of airway anatomy landmarks, particularly when oral intubation with fiberoptic assistance, blind submental intubation, and awake intubation techniques are not suitable.

Disclosures

Human Subjects: All authors have confirmed that this study did not involve human participants or tissue.

Animal Subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of Interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from.

REFERENCES

1. E. Matros, M. G. Shamsunder, et al., "Textured and smooth implant use reported in the tracking operations and outcomes for plastic surgeons database: epidemiologic implications for BIA-ALCL," Plastic Surgery–Global Open, vol. 2021. [Online]. Available: journals.lww.com. lww.com
2. R. J. Rohrich, "So you want to be better: the role of evidence-based medicine in plastic surgery," Plastic and reconstructive surgery, 2021. [HTML]
3. P. Humar, M. Asaad, F. B. Bengur, et al., "ChatGPT is equivalent to first-year plastic surgery residents: evaluation of ChatGPT on the plastic surgery in-service examination," Aesthetic Surgery Journal, vol. 2023. academic.oup.com, 2023. [HTML]
4. A.O. Momoh, K.A. Griffith, S.T. Hawley, et al., "Postmastectomy breast reconstruction: exploring plastic surgeon practice patterns and perspectives," Plastic and reconstructive surgery, vol. 145, no. 4, pp. 837e-844e, 2020. nih.gov
5. R. Dorfman, S. Saadat, N. Gupta, et al., "The COVID-19 pandemic and plastic surgery: literature review, ethical analysis, and proposed guidelines," Plastic Surgery, 2020, journals.lww.com. [HTML]
6. E. Mensah, GKD. Ketemepi, M. Alhassan, "SUBMENTAL INTUBATION IN PATIENTS WITH MAXILLOFACIAL FRACTURES: CASE REPORT AND LITERATURE REVIEW," Ghana Dental Journal, vol. 2023. [Online]. Available: gdajournal.org gdajournal.org
7. E. Z. Goh, N. H. W. Loh, and J. S. P. Loh, "Submental intubation in oral and maxillofacial surgery: a systematic review 1986–2018," Journal of Oral and Maxillofacial Surgery, vol. 2020. Elsevier, 2020. medicinaycirugiaoralymaxilofacial.info
8. K. Bhate, S. A. Awate, D. C. Gandhi, U. Londhe, et al., "Pathways to Airways: Review and Considerations of Different Intubation Techniques in Oral and Maxillofacial Surgery," Current Oral Health Reports, vol. 2024. Springer, 2024. [HTML]
9. J. A. Scott, S. O. Heard, M. Zayaruzny, and J. M. Walz, "Airway management in critical illness: an update," Chest, 2020. academia.edu
10. Duncan JA. Intubation of the trachea in the conscious patient. Br J Anaesth 1977; 49: 619-23.
11. D. H. Park, C. A. Lee, C. Y. Jeong, et al., "Nasotracheal intubation for airway management during anesthesia," Anesthesia and Pain Medicine, vol. 16, no. 1, pp. 1-10, 2021. nih.gov
12. M. B. Brodsky, L. M. Akst, E. Jedlanek, et al., "Laryngeal injury and upper airway symptoms after endotracheal intubation during surgery: a systematic review and meta-analysis," Anesthesia & Analgesia, vol. 2021. [Online]. Available: journals.lww.com. nih.gov
13. P. Singh, P. Mishra, T. Tiwari, and G. P. Singh, "Airway consideration in maxillofacial trauma," The Traumaxilla, 2022. sagepub.com
14. Altemir F.H., Montero S.H.: The submental route revisited using the laryngeal mask airway: a technical note. J Craniomaxillofac Surg 2000; 28: pp. 343-344. Voir la source lien référence
15. Jundt J.S., Cattano D., Hagberg C.A., Wilson J.W.: Submental intubation: a litterature review. Int J Oral Maxillofac Surg 2011; 10: pp. 1016-1025. Voir la source
16. Meyer C., Valfrey J., Kjartansdottir T., Wilk A., Barriere P.: Indication for and technical refinements of submental intubation in oral and maxillofacial surgery. J Craniomaxillofac Surg 2003; 31: pp. 383-388. Voir la source lien référence
17. V. Russotto, L. S. Rahmani, M. Parotto, et al., "Tracheal intubation in the critically ill patient," European Journal of ..., vol. 2022. [Online]. Available: journals.lww.com. [HTML]
18. H. Quintard and O. Langeron, "Difficult airway management in the operation room (OR): American and French guidelines discrepancies are they so important?," Annals of Translational Medicine, 2022. nih.gov
19. H. N. Luk and J. Z. Qu, "Styletubation versus Laryngoscopy: A New Paradigm for Routine Tracheal Intubation," Surgeries, 2024. mdpi.com
20. KAD Williams, M Tariq, MV Acharekar, SEG Saldivia, et al., "Submental intubation in maxillofacial procedures: A more desired approach than nasotracheal intubation and tracheostomy," Cureus, 2022. cureus.com