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Original Research Article

# Comparing Submental Intubation to Tracheostomy for Maxillofacial Fractures: A Comparative Analysis

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**Abstract:**

**Background:** In patients with maxillofacial fractures undergoing general anesthesia, the purpose of this study was to assess the safety and efficacy of two techniques: tracheostomy and submental intubation. Thirty patients scheduled for maxillofacial surgery were the subject of this prospective comparative study. Each of these individuals suffered from panfacial trauma, Two groups of patients were selected at random to receive submental intubation and elective tracheostomy, respectively. The length of time needed to complete either elective tracheostomy or submental intubation, the problems and comorbidities associated with the surgical procedures, and the visibility of postoperative scars were all evaluated in this study.

**Findings:** The average time needed for submental intubation was 8.36 minutes, according to the study, which was substantially less than the 30.76 minutes needed for an elective tracheostomy ($p < 0.0001$). Submental intubation was reported to have no problems. Conversely, two patients in the elective tracheostomy group developed surgical emphysema. As far as scarring goes, the submental scar was considered acceptable in all patients, , whereas four instances ($p = 0.0325$) required scar revision for the tracheostomy scar. The study concludes that for patients undergoing surgical reconstruction of certain cases of craniofacial fractures, submental endotracheal intubation is a straightforward, safe, and noticeably faster option than tracheostomy

**Keywords** : Tracheostomy. broken maxillofacial bones. Submental, asphyxia

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## Introduction

Achieving a class 1 occlusion during surgery is crucial in patients with significant maxillofacial injuries, especially those with panfacial fractures, naso-ethmoidal orbital fractures with mandibular fractures [1]. When it comes to endotracheal intubation, these intricate conditions can provide difficulties. It is frequently impractical to do orotracheal intubation when maintaining a healthy interdental occlusion. Nasotracheal intubation (NTI) should not be performed. Because of these variables, airway control is very important for these individuals. usually involves these two primary choices:

Tracheostomy: To create a safe airway, a surgical incision is made in the neck to access the trachea. Tracheostomy is frequently used when oral or nasal intubation is not feasible or contraindicated The condition of the individual patient, the severity of the maxillofacial injuries, and the need for surgery will all influence which of these solutions is best.

Tracheostomy is frequently used as the main technique in cases of craniofacial fractures, especially when postoperative ventilator assistance is necessary [2]. However, it's crucial to understand that tracheostomy can result in a number of complications, including wound infections, unsightly scars, pneumothorax, pneumomediastinum, and intraoperative bleeding caused by injury to the thyroid gland or cervical blood vessels. In order to avoid any potential interference with oral and maxillofacial surgical procedures, Altemir invented the submental approach to endotracheal intubation, which removed the need for tracheostomy [3]. This study aimed to compare the use of tracheostomy versus submental intubation for patients who needed surgery to correct maxillofacial fractures, especially when nasotracheal intubation (NTI) was considered inappropriate or contraindicated.

**Materials and Methods:** Between August 2021 and August 2022, 30 patients with maxillofacial trauma were admitted to GRMC Gwalior. Those who could be put under anesthesia by nasotracheal endotracheal intubation were not allowed to participate in the study. Thus, the study's focus was on thirty individuals who had suffered panfacial trauma. These panfacial trauma patients were split into two equal groups at random: Group B received a tracheostomy, and Group A received submental intubation. The study's main objective was to evaluate and analyze a number of factors, such as scarring, comorbidities, complications, and operating time. All of these factors were painstakingly documented, totaled, and thoroughly examined. To guarantee optimal patient safety and procedural effectiveness, a thorough preoperative assessment was carefully completed prior to the surgical procedures. As part of this evaluation, a thorough examination was conducted using computed tomography (CT).

**Technique:** Group A patients who were undergoing submental intubation underwent a methodical and well-planned procedure. To establish a stable airway, the anesthesiologist first intubated the patient orally using an appropriate cuffed endotracheal tube. The surgical team then prepared the patient by draping and cleaning the area around the neck to create a sterile field. A paramedian submental incision of about 1 cm was made with a scalpel on one side of the neck. In order to reduce scarring and optimize the procedure's efficacy, the incision was carefully placed. After making the incision, a careful and mild blunt dissection was performed, passing through the mylohyoid muscle, the platysma muscle, the deep fascia, and the superficial fascia before coming to rest on the floor of the mouth. A curved artery forceps helped to facilitate this delicate dissection. This was the precise moment when the mandibular lingual cortex was in close proximity to the extra-periosteal exit from the floor of the mouth. The endotracheal tube and the cuff valve were then carefully inserted through the submental incision to guarantee correct positioning. The head of the oral endotracheal tube was removed, and it was skillfully guided out through the submental incision after being momentarily disconnected from the ventilator circuit-5. After that, it was quickly reconnected to the circuit, guaranteeing continuous ventilation. [4]

After making the incision, the patient was given a precise and gentle blunt dissection that went through the mylohyoid muscle, the deep fascia, the platysma muscle, and the superficial fascia before ending at the floor of the mouth. A pair of curved artery forceps made this delicate dissection easier. The mandibular lingual cortex was situated in close proximity to the extra-periosteal exit from the floor of the mouth at this point, which was done with caution. Next, to ensure correct placement, the cuff valve and endotracheal tube were carefully inserted through the submental incision. After being momentarily disconnected from the ventilator circuit, the oral endotracheal tube's head was carefully removed and skillfully guided out through the submental incision [5]. The circuit was then quickly reconnected, guaranteeing continuous ventilation and the upkeep of a secure airway during the entirety of the surgical procedure. [6,7]

The tracheostomy group underwent surgery using the standard protocol described by Jackson, which included a transverse neck incision. All patients were first admitted to the Intensive Care Unit (ICU) for a 24-hour postoperative monitoring period after surgery. They were later moved to ordinary hospital rooms. 48 hours after surgery, tracheostomy patients usually underwent decannulation. In order to guarantee thorough postoperative care, all patients were scheduled for routine follow-up evaluations at the one-, three-, and six-month marks.[8]

**Figure 1: Clinical photograph showing submental intubation**

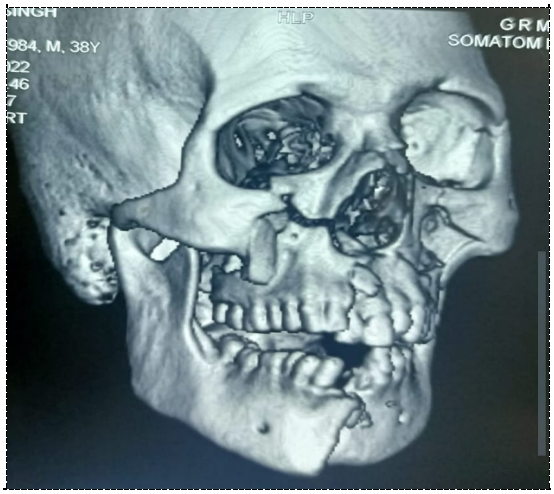


**Figure 2: 3D CT Face showing PanFacial fracture**

**Results:**

Thirty patients in all were diagnosed with panfacial fractures in the current study. There were five female patients (25%) and ten male patients (75%) in the submental intubation group. These patients ranged in age from twenty to sixty years.

Three patients (19%) presented with a combination of Le Forte II fractures, naso-orbital ethmoidal fractures, and parasymphyseal mandibular fractures. These patients accounted for seven patients (50%) who had naso-ethmoidal fractures along with mandibular fractures, four patients (31%) who had Le Forte II fractures along with condylar and mandibular fractures, and three patients (31%) who had any combination of these three types of facial fractures. The fractures were caused by a variety of incidents; motor vehicle accidents accounted for the majority of the causes in 10 patients (87.5%), while falls and occupational accidents caused injuries in 2 patients (12.5%).

The surgical procedures were performed at various points in time after the injury. In particular, 7 patients, or 44% of the cases, had their surgeries done six days following the traumatic event. Three patients (19%) had their surgeries eight days after the initial traumatic events, whereas six patients (37%), had their surgeries seven days after the trauma.

There were four female patients (19%) and eleven male patients (81%) in the tracheostomy group. These patients ranged in age from eighteen to fifty-five. In addition to mandibular fractures (parasymphyseal, body, and condylar), three patients (25%) also had Le Forte II fractures (symphyseal and condylar). These patients' facial fracture distributions revealed that ten (69%) of the patients had naso-ethmoidal fractures7. Furthermore, one patient (6%) had a combination of mandibular (parasymphyseal), naso-orbital-ethmoidal, and Le Forte III fractures. Motor vehicle accidents were the main cause of these injuries, accounting for 11 patients (81%), with falls and occupational injuries accounting for the remaining patients (19%).

Following the traumatic events, surgical interventions were carried out at various times. In particular, 3 patients (56%) had their surgeries 6 days after the trauma, and the remaining cases had their surgeries 7 days after the traumatic events. These timelines were established in accordance with a number of criteria, such as patient stability and the resolution of CSF rhinorrhea, to guarantee that each patient's surgery was carried out at the most appropriate time. In terms of gender ($p = 0.6688$), age ($p = 0.3653$), fracture type ($p = 0.794$), trauma cause ($p = 0.62638$), related comorbidities ($p = 0.97$), and the time interval between the traumatic event and the surgical procedure ($p = 0.7225$), both groups in the study were effectively matched across a number of critical parameters. A standardized protocol was used in the submental intubation group, utilizing a single endotracheal tube and the conventional latero-submental technique9. It took an average of 8.35 minutes with a standard deviation of 1.4 minutes to finish submental intubation, ranging from 5 to 10 minutes. Notably, this time was substantially less ($p < 0.0001$) than what was needed to complete a tracheostomy. This study demonstrates the effectiveness and speed of the submental intubation technique over tracheostomy, which is clinically significant in the context of maxillofacial surgical procedures. Following submental intubation, a single case (10%) reported tube kinking as a complication. Nevertheless, none of the patients who had submental intubation had any appreciable cases of bleeding, infection, salivary fistula, lingual nerve damage, hematoma, ranula formation, or orocutaneous fistula. This suggests that the method has a comparatively low rate of complications.

On the other hand, 4 patients (15%) developed surgical emphysema following tracheostomy. On the other hand, there were no noteworthy reports of bleeding, infection, pneumothorax, or trachea-esophageal fistula. Every patient in the group with tracheostomy underwent a successful decannulation procedure. Additionally, the two groups' perspectives on the cosmetic aspect of scarring varied10. Individuals in the submental intubation cohort displayed scars that were subtly situated beneath the mandible and inside a skin crease, and all of the patients accepted these scars. Four of the tracheostomy group's patients required revision due to scarring that resulted from the procedure, which involved horizontal skin incisions. Notably, all of the submental intubation cases did not require scar revision, indicating a statistically significant difference ($p = 0.0325$). This highlights the benefit of submental intubation with regard to cosmetic outcomes and the potential reduction in the need for scar revision procedures.

Distribution of genders

Sexuality Submental the intubation team Group Tracheostomy

10 (75%) and 11 (81%) men

5 (25%) females and 4 (19%)

Fracture types-Broken bones: mandibular fracture combined with a Naso-ethmoidal fracture7 (half)Ten (65%)-Le forte II with a fractured mandible3 (20%) · 4 (35%)-Naso-orbital-ethmoid 3 (15%) in Le forte IIIOne (15%)

**Discussion:**

In order to guarantee the appropriate reduction of mandibular and, typically, maxillofacial fractures, it

is essential to employ either manual or rigid maxillomandibular fixation (MMF) during the surgical procedure. The stabilization and alignment of the fractured bone segments made possible by this fixation method is essential for facilitating successful surgical repair and the restoration of normal anatomical alignment. The standard procedure for securing the airway during surgical procedures, orotracheal intubation, presents difficulties for many patients with maxillofacial trauma. Because it makes it possible to use rigid maxillomandibular fixation (MMF) safely and unhindered and makes surgery easier, nasotracheal intubation (NTI) is the recommended course of action in most cases involving maxillofacial fractures. [9] It is imperative to acknowledge that NTI may give rise to complications like kinking, blockage, or displacement in the course of the surgical repair. Furthermore, because accidental tube passage into the cranial cavity can have disastrous results, NTI is nearly always contraindicated in cases of associated skull base fractures. [10] Tracheostomy becomes the preferred procedure in situations where nasal intubation is not feasible or appropriate. [1, 11, 12] It is noteworthy that tracheostomy, although a beneficial substitute, however, is not without its own difficulties. Because of the possibility of late effects on the trachea, its use should be carefully considered. Its complication rate ranges from 14% to 45%. Because there are distinct anatomical and clinical factors at play, selecting the best course of action for airway management in patients with maxillofacial trauma demands careful consideration.

Submental intubation was a novel technique that Altemir [13] introduced to avoid problems related to the interference of the endotracheal tube during surgery and to avoid the need for a tracheostomy.

Different writers have added changes to this method over time. The current study's methodology involved cutting a hole in the submento-submandibular region and performing extraperiosteal dissection as near to the mandible's lingual surface as feasible [14]. This method was developed to prevent damage to the salivary glands, their ducts, and the lingual nerve. This method's ability to prevent the need for intraoperative reintubation during maxillofacial surgeries is one of its noteworthy advantages. This improves efficiency and patient safety during these procedures. [15]

There are a number of significant factors that support the avoidance of the midline approach during submental intubation. Bypassing the possibility of damaging Wharton's ducts—which are essential for salivary drainage—this technique also avoids interfering with the genioglossi and geniohyoid muscles' attachment points. Moreover, using the midline approach may jeopardize the tube's snug placement in the paralingual groove. Furthermore, bleeding may occur from damage to the mandibular lingual perforating vessels, which are 98% of the time situated in the midline. [16]

Surprisingly, no cases of substantial bleeding during submental intubation procedures were reported in the current study.

Submental intubation patients typically have an acceptable scar, easy extubation, and satisfactory postoperative comfort [17]. Furthermore, this method successfully avoids late-onset problems and other possible tracheostomy-related complications. Furthermore, because neck extension can make tracheostomy more complicated and dangerous, submental intubation becomes especially important in situations where it is either contraindicated or difficult. [18]

**Conclusion:**

When it comes to surgical reconstruction for specific cases of maxillofacial fractures, submental endotracheal intubation stands out as a simple, safe, and noticeably faster option than tracheostomy. This approach is especially useful for patients who do not require continuous ventilation support after surgery.When the surgical technique and patient status permit it, submental intubation may be the best option in some maxillofacial trauma cases. It has benefits like not requiring a tracheostomy and not interfering with surgical access. However, a patient's unique circumstances should be taken into consideration when deciding between submental intubation and alternative techniques like nasotracheal intubation or tracheostomy. should be determined by taking into account the unique characteristics of each patient, the type of facial fractures, and the surgical and anesthesia teams' preferences. To choose the best airway management strategy, it is crucial to take into account the particulars of each case.

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