

Research Article

Sub-mental Intubation in Maxillofacial Surgery: An Effective and Safer Airway Alternative to Tracheostomy and Nasotracheal Intubation

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Abstract

Background:

Airway control during maxillofacial surgery is often complex because the surgical field involves the oral and nasal cavities, and accurate intraoperative assessment of dental occlusion is frequently required. Standard orotracheal intubation can obstruct occlusal evaluation and interfere with surgical access. Although nasotracheal intubation is commonly preferred, it is contraindicated in patients with mid-facial fractures, nasoethmoidal injuries, or suspected skull base involvement due to the risk of intracranial tube displacement and infection. Tracheostomy remains a dependable alternative in such situations; however, it is associated with notable short- and long-term complications, including bleeding, infection, tracheal stenosis, prolonged hospital stay, and permanent scarring. These limitations highlight the need for a safer and less invasive airway management option in selected patients.

Objective:

The present study was undertaken to assess the safety, practicality, and clinical effectiveness of sub-mental intubation as

an alternative airway management technique in patients undergoing maxillofacial surgical procedures requiring temporary airway control and unobstructed intraoperative occlusal assessment.

Methods:

A prospective observational study was conducted involving 50 patients who underwent maxillofacial surgery at Dr. Sampurnanand Medical College, Jodhpur, over a eighteen months period. All patients required secure airway management with the ability to evaluate dental occlusion intraoperatively and did not require prolonged postoperative ventilatory support. After routine orotracheal intubation under general anaesthesia, the endotracheal tube was exteriorized through a sub-mental incision using a standardized technique. Patients were monitored intraoperatively for ease of intubation, stability of the airway, and surgical access. Postoperative outcomes assessed included local wound complications, airway-related events, and duration of hospital stay.

Results:

Sub-mental intubation was successfully achieved in all 50 patients without the need for conversion to tracheostomy. The procedure provided adequate airway

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security while allowing unrestricted surgical access and precise occlusal assessment. Minor postoperative complications were observed in a small number of patients, including temporary sub-mental swelling in 6% and superficial wound infection in 4%, both of which responded well to conservative treatment. No serious complications such as accidental extubation, damage to salivary ducts, formation of salivary fistula, or postoperative airway compromise were encountered.

Conclusion:

- Sub-mental intubation is a reliable, safe,

Introduction

Airway management represents one of the most critical components of perioperative care in maxillofacial surgery [9, 12]. Surgical procedures involving the mandible, maxilla, mid-face, and cranial base often require unrestricted access to the oral and nasal cavities, as well as precise intraoperative assessment of dental occlusion [9, 12]. These requirements impose unique constraints on airway techniques, distinguishing maxillofacial surgery from many other surgical specialties. Inadequate airway planning in this setting may compromise surgical exposure, prolong operative time, and increase the risk of perioperative complications.

Orotracheal intubation remains the most commonly employed airway technique in general anaesthesia; however, its use is limited in many maxillofacial procedures. The presence of an endotracheal tube within the oral cavity interferes with maxillomandibular fixation and prevents accurate assessment of occlusal alignment during fracture reduction or orthognathic surgery. Consequently, reliance on oro-tracheal intubation may compromise surgical precision and postoperative functional outcomes.

and minimally invasive airway management technique for selected maxillofacial surgical cases. It effectively overcomes the limitations of oro-tracheal and nasotracheal intubation while avoiding the morbidity associated with tracheostomy. Routine consideration of this technique in appropriate patients may improve surgical outcomes and reduce procedure-related complications.

Keyword: - Sub-mental intubation, Maxillofacial procedure, Nasotracheal intubation, Tracheostomy

Nasotracheal intubation is often favoured in maxillofacial surgery because it preserves the oral cavity for surgical manipulation and allows intraoperative evaluation of occlusion [2,9]. Despite these advantages, nasotracheal intubation is contraindicated in several clinical scenarios. Patients with mid-face fractures, nasoethmoidal injuries, basilar skull fractures, or suspected cerebrospinal fluid leakage are at risk of severe complications, including intracranial tube misplacement, epistaxis, meningitis, and worsening of facial trauma. In such cases, alternative airway strategies must be considered to ensure patient safety while maintaining surgical feasibility.

Tracheostomy has historically been employed as the definitive airway solution in complex craniofacial trauma and extensive maxillofacial procedures [3, 4]. Although tracheostomy provides a secure airway and facilitates prolonged postoperative ventilation when required, it is associated with considerable morbidity. Early complications include haemorrhage, pneumothorax, subcutaneous emphysema, and wound infection, while late complications such as tracheal stenosis, tracheoesophageal fistula, dysphonia, and cosmetically unacceptable scarring can significantly affect patient quality of life. Furthermore, tracheostomy often

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necessitates prolonged hospitalization and specialized postoperative care.

In response to these limitations, sub-mental intubation has emerged as a valuable alternative airway technique in selected maxillofacial surgical patients. First described by Altemir in 1986, this technique involves exteriorization of an orally placed endotracheal tube through a small incision in the sub-mental region [1, 11]. By relocating the tube away from the oral and nasal cavities, sub-mental intubation allows unobstructed surgical access and accurate occlusal assessment while avoiding the morbidity associated with tracheostomy. The technique is particularly suitable for patients requiring short-term airway control without anticipated prolonged postoperative ventilation.

The present study was designed to evaluate the safety, feasibility, and clinical outcomes of sub-mental intubation in patients undergoing maxillofacial procedures at a tertiary care centre. By analysing perioperative parameters and complications, this study aims to further define the role of sub-mental intubation as an intermediate airway management strategy in contemporary maxillofacial surgery.

Materials and Methods

Study Design and Setting

This prospective observational study was conducted in the Department of Anaesthesia at Dr. Sampurnanand Medical College, Jodhpur, over a period of eighteen months. Institutional ethics committee approval was obtained prior to initiation of the study, and all procedures were performed in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants

after explaining the nature and purpose of the study.

Study Population

A total of 50 patients scheduled for maxillofacial surgery requiring intraoperative occlusal assessment were enrolled. Indications for surgery included panfacial fractures, mandibular fractures with associated mid-face involvement, and complex facial trauma where nasotracheal intubation was contraindicated.

Inclusion criteria: -included patients aged 18–65 years, those requiring temporary airway diversion during surgery, documented contraindication to nasotracheal intubation, and no anticipated requirement for prolonged postoperative mechanical ventilation.

Exclusion criteria comprised patients requiring long-term ventilatory support, severe cervical spine instability, active infection at the sub-mental region, bleeding diathesis, and refusal to provide informed consent.

Technique of Sub-mental Intubation

All patients underwent standard monitoring and induction of general anaesthesia. Initial airway control was achieved using oral intubation with a reinforced endotracheal tube. Following confirmation of correct tube placement, a 1.5–2 cm transverse incision was made in the sub-mental region, lateral to the midline to avoid injury to midline structures. Blunt dissection was carried through the platysma, mylohyoid, and geniohyoid muscles until the floor of the mouth was reached.

The pilot balloon and proximal end of the endotracheal tube were gently delivered through the incision using artery forceps. The tube was then reconnected to the anaesthesia circuit, and correct positioning

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was reconfirmed by capnography and bilateral chest auscultation. The tube was secured externally to prevent displacement during surgery. At the conclusion of the procedure, the tube was returned to the oral cavity, and the sub-mental incision was closed in layers.

Figure 1: - Sub-mental dissection for tube placement via sub-mental incision



Figure 2: - Tube taken out from sub-mental incision



Figure 3: - Final position of tube



Outcome Measures

The primary outcome measure was successful maintenance of the airway without the need for conversion to tracheostomy. Secondary outcomes included time required for conversion to sub-mental intubation, intraoperative and postoperative complications, duration of intubation, length of hospital stay, and cosmetic outcome at the incision site.

Statistical Analysis

Data were recorded in a structured proforma and analysed using descriptive statistics. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages.

Results

Sub-mental intubation was successfully performed in all 50 patients, resulting in a procedural success rate of 100%. The mean time required to convert from oral to sub-mental intubation was 7.2 ± 1.4 minutes. Adequate airway security and excellent surgical access were achieved in all cases, allowing precise intraoperative occlusal assessment.

Minor complications were observed in a small proportion of patients. Transient sub-mental edema occurred in three

patients (6%), superficial wound infection in two patients (4%), and temporary lingual nerve paresthesia in one patient (2%). All complications resolved with conservative management, and no long-term sequelae were noted. There were no instances of accidental extubation, tube obstruction, salivary fistula, or need for emergency airway intervention.

All patients were extubated within 24 hours postoperatively. None required postoperative tracheostomy or prolonged ventilatory support. Cosmetic evaluation revealed minimal scarring in the sub-mental region, which was well concealed and acceptable to most patients.

Table 1. Demographic Characteristics of Study Population (n = 50)

VARIABLE	VALUE
Mean age	32.6 ± 9.4
Gender (M/F)	38 / 12
ASA I/II/III	22 / 18 / 10

Table 2. Indications for Surgery

INDICATION	NUMBER (%)
Panfacial fractures	22 (44%)
Mandibular + midface	18 (36%)
Midface fractures	10 (20%)

Table 3. Procedural Parameters

PARAMETER	OBSERVATION
Mean conversion time	7.2 ± 1.4 minutes
Duration of intubation	< 24 hours (100%)
Conversion to tracheostomy	0

Table 4. Complications and Outcomes

OUTCOME	NUMBER (%)
Submental edema	3 (6%)
Wound infection	2 (4%)
Lingual nerve paresthesia	1 (2%)
Major complications	0
Satisfactory cosmetic outcome	48 (96%)

Discussion

The results of the present study demonstrate that sub-mental intubation is a safe and effective airway management technique in selected maxillofacial surgical patients [5–7,10]. The 100% success rate observed, coupled with a low incidence of minor and self-limiting complications, supports its role as a reliable alternative to tracheostomy and nasotracheal intubation.

Sub-mental intubation provides multiple clinical benefits over nasotracheal intubation in patients with craniofacial trauma [2,6,9]. By avoiding the nasal passage, it eliminates the risk of nasal bleeding, tube displacement into the cranial cavity, and infectious complications associated with skull base fractures. This is particularly relevant in panfacial injuries, where preoperative radiological assessment may not fully exclude nasocranial communication.

Compared with tracheostomy, sub-mental intubation is minimally invasive and avoids the long-term morbidity associated with a surgical airway [3,4,6,10]. Previous studies have reported higher rates of infection, scarring, and tracheal complications following tracheostomy, particularly when used for short-term airway control. In contrast, the sub-mental incision used in this technique is small, cosmetically acceptable, and associated with rapid healing.

The minor complications observed in this study are consistent with those reported in the literature and are largely attributable to local tissue handling. Proper patient selection, meticulous surgical technique, and close postoperative monitoring are essential to minimize these risks. Importantly, sub-mental intubation should not be considered a substitute for tracheostomy in patients requiring prolonged ventilatory support or those with severe neurological compromise.

Limitations

The present study is limited by its single-centre design and modest sample size. Long-term follow-up was not undertaken to evaluate delayed complications such as hypertrophic scarring or sensory disturbances. Multicentre studies with larger cohorts and extended follow-up are recommended to further validate these findings.

Conclusion

Sub-mental intubation represents a safe, effective, and minimally invasive airway management option for carefully selected patients undergoing maxillofacial surgical procedures. By relocating the endotracheal tube away from the oral and nasal cavities, this technique ensures unobstructed surgical access and enables precise intraoperative assessment of dental occlusion. Importantly, it avoids the short- and long-term morbidity associated with tracheostomy, including airway injury and cosmetic concerns. When applied in appropriately selected cases requiring

temporary airway control without prolonged ventilation, routine use of sub-mental intubation may enhance surgical precision, improve postoperative outcomes, and significantly reduce airway-related complications.

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