Review Article

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ALTERNATIVE TECHNIQUE FOR NASO-ENDOTRACHEAL INTUBATION IN TREATING FACIAL TRAUMA- THE SUBMENTAL INTUBATION: A COMPHRENSIVE REVIEW

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ABSTRACT:

Oro- tracheal and naso- tracheal, the two most common methods of intubation used in the management of the trauma patients are sometimes contraindicated. In patients with the concomitant need for maxillo- mandibular fixation (MMF) with fractures involving the maxilla at Le-fort II and III level with deranged occlusion, nasal pyramid or cranial base, oro-tracheal and naso- tracheal intubation is contraindicated. Hence, an alternative method of intubation called the sub- mental intubation for these type of fractures had been advocated since many years. With the endotracheal tube out of the field of surgery, the access achieved is good, the scar inconspicuous. Thus concluding that, Submental intubation is a simple, safe and a low morbidity technique for operative airway management in maxillofacial trauma patients when there are fractures involving the nasal region and concomitant dental occlusal disturbances.

Keywords: maxilla, le- fort, nasal, intubation, sub- mental.

INTRODUCTION:

In patients with severe maxillofacial trauma, endotracheal intubation has to be planned to avoid major complications, as well as tube interference at the surgical site (Oral intubation can interfere with assessment of occlusion, and nasal tracheal intubation may lead to complications such as brain damage, leakage of cerebrospinal fluid, and meningitis when there are also fractures of the base of the skull) [11, 12, 13]. On the other hand, tracheostomy is associated with complications such as haemorrhage, pneumo-mediastinum or pneumothorax, injury to the recurrent laryngeal nerve, and tracheal stenosis and should be reserved for severely injured patients who need protracted assistance with ventilation or further operations. Submental intubation is an interesting alternative to tracheostomy, especially when short-term postoperative control of the airway is foreseeable, and as control of the dental occlusion is achieved, and access to the nose and mouth is not disturbed. Hernandez, in 1986, published the first paper, on "The submental route for endotracheal intubation"[1]. The technique was developed to avoid tracheostomy,

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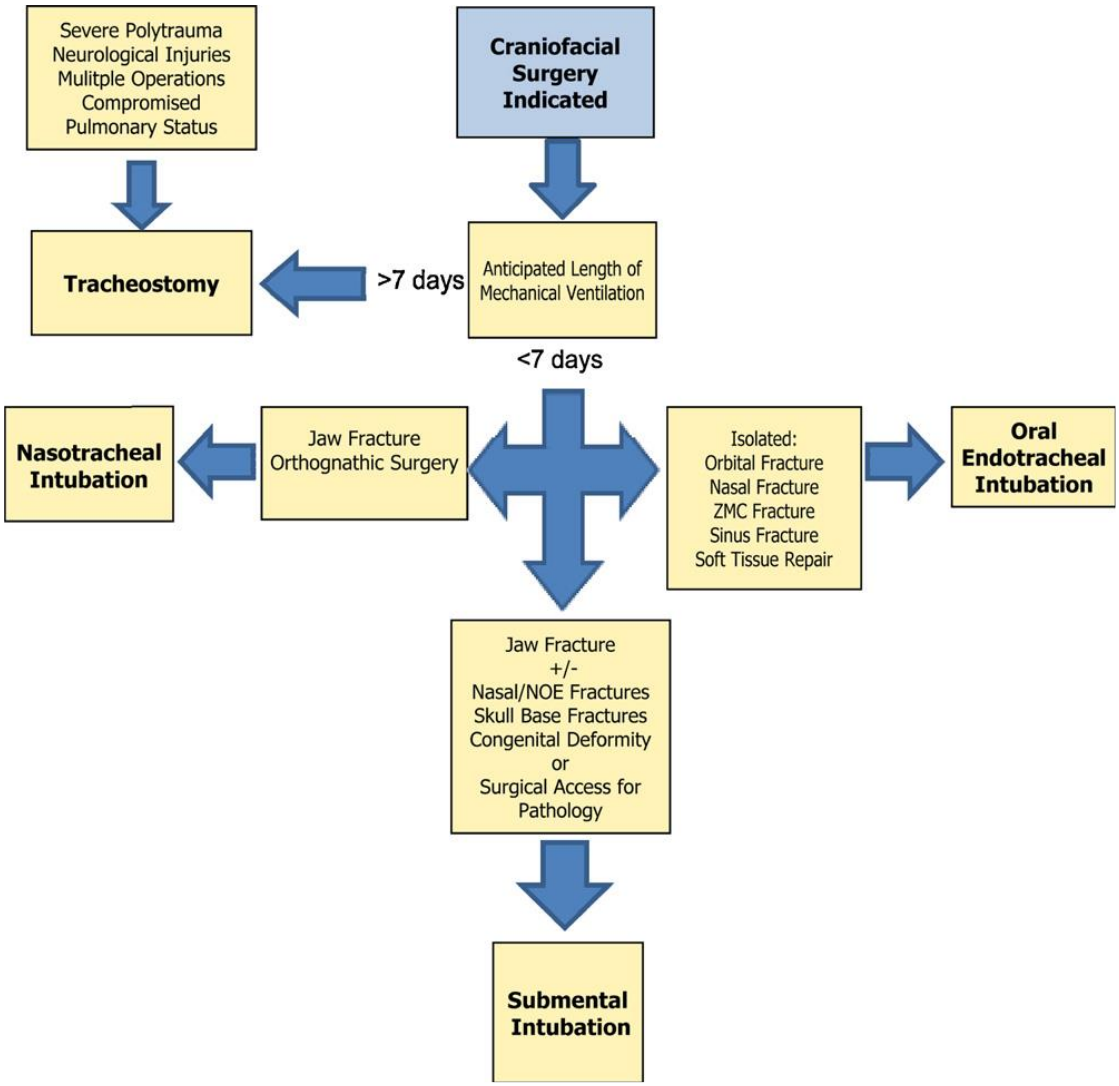
particularly in maxillofacial trauma cases, where short-term intermaxillary fixation (IMF) was required and to allow free intraoperative access to occlusion and maxilla [2, 4, 10]. Many teams have been using this technique with success and low complication rates (Honig and Braun,1993; Stoll et al., 1994; Gordon and Tolstunov 1995; Green and Moore, 1996; Prochno et al., 1996; Labbe et al., 1998; Laplace et al., 1999; Drolet et al., 2000; Paetkau et al., 2000) [7-9]. Hereby we present a review of the literature pertaining to sub- mental intubation technique.

SURGICAL TECHNIQUE:

Requirement for the technique includes standard operating room instrumentation. The patient has to be anesthetized using routine techniques and intubated orally with a number 7 or 8 reinforced (flexo-metallic) tube (Fig 1). Surgical skin preparation of the perioral and submental region has to be performed. The proposed line of incision in the submental crease marked bisecting the midline of the face, approximately 2.0 cm in length, or slightly greater than the diameter of the number 7 or 8 reinforced tube. The skin and subcutaneous connective tissue are then incised (Fig 2). The mouth opened and the opening maintained by a suitable prop. The tongue should be elevated in a superior-posterior direction, exposing its ventral surface and floor of the mouth. A 2 cm midline mucosal incision is then made, with micro-point electro-cautery. The incision is developed in a superior direction between the geniohyoid, genioglossus and anterior bellies of the digastric muscles. The target point being the previously incised mucous membrane. Initial dissection is with Metzenbaum scissors, then blunt finger dissection, until the mylohyoid muscle is encountered. A strict midline dissection plane has to be maintained. A large curved haemostat then placed through the submental incision. Using a palpating finger, the mylohyoid muscle is bluntly breached. Opening the haemostat enlarges the mylohyoid opening. The haemostat is then passed readily into the oral cavity. The endotracheal pilot tube syringe connector is grasped with the haemostat first, and pulled through the submental incision. Then the endotracheal (Flexible- armoured) tube grasped with the connector removed. The tube is readily delivered through the submental incision following these manoeuvres. The anaesthetist reattaches the connector to the reinforced tube and reconnects the anaesthetic equipment. This process takes around seven minutes. The tube is then secured to the skin of the submental region with 2-0 black silk sutures. Intra-orally, the tube lies in the sublingual sulcus. The proposed surgical procedures can then be carried out unhindered. At the termination of the surgical procedure, MMF can be removed to ensure proper extubation; the patient can then be put on MMF post- operatively. The oral incision is easily closed using 3-0 polygalactin 910 sutures. Skin closure performed with nylon/ polypropylene 4-0 sutures. The patient according to protocol should receive perioperative antibiotic coverage for the primary trauma surgery procedure. On the first postoperative day, 0.12% chlorhexidine mouth rinse should be

instituted twice daily to enhance oral hygiene and reduce bacterial load in the presence of a sutured sublingual wound. This should be continued for 1 week, the duration of the MMF period.

In the original description of submental intubation, the patient was intubated orally in the normal manner and following creation of the submental passage, the tube was passed from interior to exterior while the end of the tube remains in the larynx. [1] The technique described here, is a similar one. This technique can also be used in cases with difficult initial oral intubation. Subsequently many modifications have been devised to facilitate ease of intubation (Table 1). Most manufactured endotracheal tubes specifically prohibit removal of the universal connector, which is too large to pass through the submental incision, in such cases a second tube may be introduced later through the incision and then the first tube removed as described in the modification by Green et al. [15]



Flow- Chart 1: Airway Algorithm for Maxillofacial Injury

DISCUSSION:

The most common indication for submental intubation was trauma in 86% of the reported cases followed by elective facial osteotomy. In cases requiring simultaneous surgical access for defects in dental occlusion and of the nasal region, exchanging nasotracheal for orotracheal intubation becomes necessary. This practice has the disadvantage of causing the patient to aspirate at the moment of the tube change, which frequently interferes in the surgical procedure [2, 3, 5]. Tracheotomy has been the standard procedure in cases of such craniofacial trauma but may be tiresome and may lead to many complications [7, 9]. The use of the submental orotracheal method offers an alternative that the surgeon can use successfully. Commonly, when a submental intubation patient does not require long term mechanical ventilation but is not extubated postoperatively, the submental tube is converted to an oral endotracheal which may remain in place for many days or even weeks.

The maxillofacial airway algorithm (Flow Chart 1) begins with the decision to perform a craniofacial surgery. If ventilator support is anticipated for a period greater than 7 days and when combined with multiple anticipated surgeries, neurological deficits, compromised pulmonary status or severe polytrauma a tracheostomy should be considered. If the anticipated duration of mechanical ventilation is less than 7 days in patients who require isolated orbital, nasal, zygomaticomaxillary complex, sinus fractures or soft tissue repair then an oral endotracheal airway should be considered. This time span reflects the potential for significant complications as reported in a prospective study of laryngo-tracheal sequelae associated with intubation longer than 7 days [21, 22]. The submental route does not leave noticeable scars, as the cutaneous incision is made in the submental region, without subsequent occurrence of fistula. Local infection is rare but can easily be treated with little sequelae. A good rapport between the surgeon and the anaesthetist is of paramount importance in maxillo-facial surgery, as this often involves MMF. The surgeon contributes to positive results by applying appropriate techniques and adopting alternative methods to reduce or prevent morbidity. We feel that leaving the tube away from the surgical field facilitates surgery when compared to nasal intubation, but that this is a procedure that should only be used in very exceptional cases. In some cases of simultaneous oral-nasal surgical access, the anaesthesiologist is requested to change from nasal to oral intubation. We believe that this manoeuvre (the change from nasal to oral) represents an aspiration risk to the patient [2, 3, 5]. The submental orotracheal method is very helpful in this kind of surgery. On the other hand, the anaesthesiologist contributes to the success of the treatment, preventing complications and discomfort for the patient by performing extubation at the right moment, not allowing the tube to remain longer than necessary, nor extubating before the patient is fully conscious and with protective reflexes restored.

CONCLUSION:

According to literature reports and our own experience, submental endotracheal intubation is an extremely useful technique though underutilized; it has very low morbidity and is suitable to replace tracheostomy in selected cases of maxillofacial trauma, where nasotracheal intubation is impossible or contraindicated and long term ventilation support is not required.

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TABLE:

Table 1: Modifications of the Submental Route of Intubation

Author	Year	Technique	Reason for Modification
ALTEMIR et al.[1]	1986	2 cm paramedial incision in a subperiosteal plane. Nasal speculum facilitates tube passage through submental region	First report
GREEN & MOORE [15]	1995	1st tube: oral intubation 2nd tube: submental approach. Oral tube is substituted with submental endotracheal tube, patient is reintubated	Allows use of endotracheal tubes with non-detachable universal connectors
MACINNIS & BAIG [16]	1999	2 cm midline incision posterior to Wharton's ducts between geniohyoid, genioglossus and anterior belly of the digastric muscles	Decreases bleeding
ALTEMIR et al [14]	2000	Used a reinforced laryngeal mask airway in the submental approach	Allows use in severe laryngo-tracheal trauma, singers and patients with unstable cervical fractures
MAHMOOD & LELLO [15]	2002	1 cm midline incision between Wharton's duct and the reflection of the lingual gingivae and the floor of the mouth	Decreased bleeding and avoidance of important structures

BALL et al [18]	2003	Flexible tracheal tube with an intubating laryngeal mask	Connector easily removed and refitted and tube tip design eases intubation
NYARADY et al. [19]	2006	A sterile nylon guiding tube is placed over the distal end of the tube incorporating the pilot balloon and tube	Reduction of tube damage complications
BISWAS et al [20]	2006	Percutaneous tracheostomy dilatational kit facilitates exteriorization of the endotracheal tube through the submental route	Reduction of tube damage complications

FIGURES:

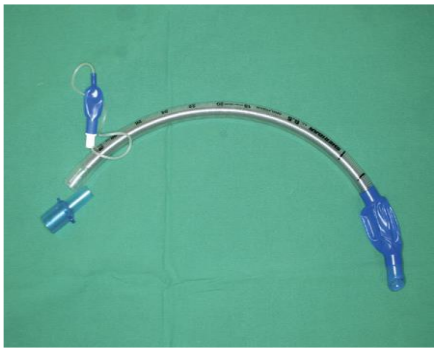

Figure 1: Flexible Armoured Tube with Connector Detached.

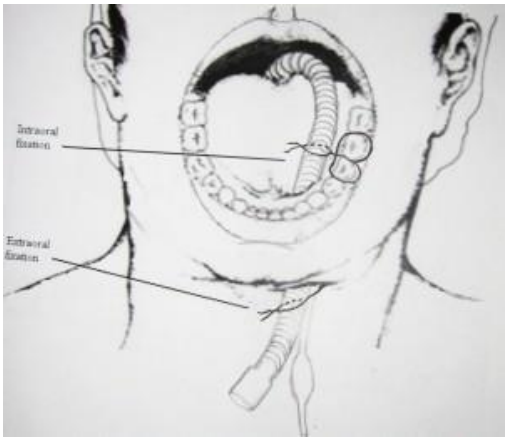

Figure 2: The Incision and passage of the tube through the Lingual Sulcus.

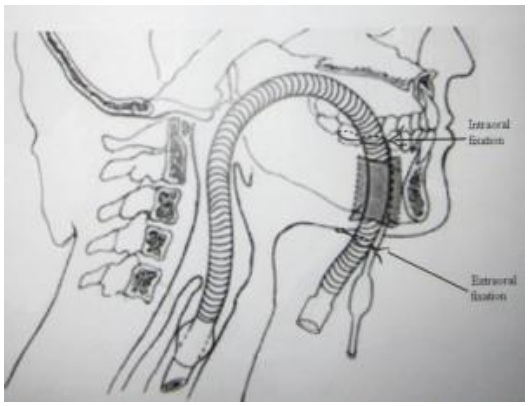

Figure 3: Final Position of the Tube.