



SUBMENTAL INTUBATION - CASE REPORTS

Balakrishnan R.¹ and S. M. Balaji²

¹Professor, Ph.D (Research Scholar), Department of Oral and Maxillofacial Surgery, Sree Balaji Dental College and Hospitals, Bharath University, Chennai, Tamil Nadu, India.

²Consultant and Director, Balaji Dental and Craniofacial Hospital, Teyampet, Chennai, Tamil Nadu.

***Corresponding Author: Balakrishnan R.**

Professor, Ph.D (Research Scholar), Department of Oral and Maxillofacial Surgery, Sree Balaji Dental College and Hospitals, Bharath University, Chennai, Tamil Nadu, India.

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INTRODUCTION

Surgery is a rapidly evolving specialty imbibing developments in basic medical sciences and such progress has helped largely to improve patient comfort and safety. Surgeries involving the maxillofacial region are traditionally done using nasal or oral endotracheal intubation.^[1] Surgical repair of the maxillofacial region requires modification of the standard anesthetic technique, as these procedures present a unique set of problems both for the anesthetist and for the surgeon. In maxillofacial surgeries, often the surgeon requires manipulation of jaw bones and presence of the nasal and or endo tracheal tube creates a lot of discomfort and may jeopardize the outcome.

Naso-endotracheal intubation is the most frequently favored choice in the management of various cases of maxillofacial trauma and Dentofacial deformities.^[1,2] However it is frequently contraindicated because of coexisting skull base fractures with related risk of passage of tube in to the cranial fossa. In addition, the presence of naso-tracheal tube can interfere with the surgical repair of fractures of the naso-orbito-ethmoidal complex.^[1,3]

The surgeon desires an unobstructed field, and thus in most instances maxillo-mandibular fixation is required intra-operatively for adequate reduction of facial fractures. Achieving optimal occlusion is one of the fundamental aims of the oral and maxillofacial procedures and hence such patients cannot be managed with oro-endotracheal intubation.^[4,5] Considering all the factors, the next ideal choice would be tracheostomy, which has significant number of complications including hemorrhage, subcutaneous emphysema, pneumothorax, tracheal stenosis, respiratory tract infections, decanulation and cosmetic disfigurement with significant morbidity.^[6,7]

An different technique of airway management in craniomaxillofacial trauma, the SUBMENTAL route has been described in 1986 by ALTEMIR.^[9] Over the years the SUBMENTAL route for endotracheal intubation has undergone a variety of modifications and is safely indicated in patients with midface and panfacial trauma with possible skull base fractures.^[9] With conservative nasal intubation, precise intraoperative assessment of the

changes to the nasolabial complex, assessment of midlines, cant and incisor display cannot be made accurately during concomitant orthognathic procedures, elective Lefort osteotomies and Rhinoplasty procedures.^[10] Because of perceived advantages of submental intubation over conservative nasotracheal intubation we have used it in our unit as an alternative in both maxillofacial trauma and elective orthognathic procedures. The aim of this manuscript is to present our experience with Central and Lateral submental intubation approach.

MATERIALS AND METHODS

This prospective clinical study was conducted from September 2012 to December 2014 after obtaining the clearance from the institutional ethical committee. A total of 9 patients reporting with panfacial fractures and electively taken up for fracture reduction formed the study group. Of them, 5 underwent lateral approach while 4 underwent midline approach,

Inclusion criteria

1. All patients between 18-50 yrs of age.
2. Patients with midfacial and naso-ethmoidal fractures.
3. Patients undergoing elective orthognathic surgery.

Exclusion criteria

1. Patients with systemic illness.
2. Those requiring long-term airway support.
3. Patients with multi-organ trauma.
4. Those with a known history of keloid formation.

The technique used for lateral or paramedian submental intubation was an adaptation of the general principles published by Hernandez Altemir.^[8]

Operative procedure for paramedian submental intubation

After normal oral intubation with a cuffed flexometallic tube, an incision measuring 2cms approximately was made in the submental and paramedial region, parallel to the lower border of the mandible and a finger's breadth from the lower border of the mandible (Figure 1). A curved hemostat was then passed from the submental incision through the subcutaneous layer, platysma, mylohyoid muscle, submucosal layer and mucosa (Figure 2). It enters the oral cavity at the junction of the attached lingual alveolar mucosa and the free mucosa of the floor of the mouth. An intraoral incision 1cm in length was made parallel to the gingival soft tissue to create a tunnel for the introduction of the endotracheal tube.

A large curved hemostat was then placed through the submental incision. The pilot tube connector was grasped and pulled through submental incision. Now the connector on the endotracheal tube was removed and the tube was exteriorized via the submental tract and connected to the ventilator. The tube was secured to the skin with 1-0 silk suture. Anesthesia was maintained using nitrous oxide and oxygen at a ratio of 60:40 and intermittent doses of intravenous vecuronium to provide muscle relaxation.

At the end of the surgical procedure, the tube connector was removed. The pilot tube and the endotracheal tube are passed back through the incision in to the mouth, reversing the original path. The submental wound was sutured using 3 - 0 silk sutures. Reversal of anaesthesia was achieved using glycopyrrolate and neostigmine intravenously. The parameters like time taken for the procedure, surgical access, associated hemorrhage, accidental partial extubation of endotracheal tube, complications like salivary fistula, damage to the marginal mandibular branch of facial nerve, damage to lingual nerve, wound infection and post operative scarring were noted.

Operative procedure for median submental intubation

Orotracheal intubation was accomplished and the tube was secured temporarily with help of tissue plaster. Surgical skin preparation of the perioral and submental

region was performed with savlon and betadine and draped with sterile towels.

The midline of face and chin was marked with skin marking pencil. The proposed line of incision in submental crease was marked, approximately 1-1.5 cm in length, or slightly greater than the diameter of tube. Surgical site was infiltrated with local anesthetic solution containing 2% lignocaine with 1:80,000 adrenaline. Skin and subcutaneous connective tissue were incised in median submental region. The muscular layers, that is, platysma and mylohyoid muscles were traversed using curved artery forceps that was always kept in close contact with the lingual cortex of the mandible. Mouth was opened and tongue elevated in superio-posterior direction with tongue depressor, exposing ventral surface of tongue and floor of mouth. A strict midline plane was maintained.

The curved artery forceps was then used to bluntly breach the mylohyoid muscle and forcep was readily passed into oral cavity using a palpating finger as a guide. With the curved hemostat, the armored tube cuff was passed extra-orally. Then, the armored tube was disconnected and connector was removed. The tube was grasped by hemostat and delivered through submental incision and reattached to anesthetic equipment.

The tube was secured to the skin of submental region with 1.0 black silk suture. The proposed surgical procedure was accomplished and at termination of surgical procedure endotracheal tube (ETT) was passed back intra-orally in the reverse order (first the tube, then the tube cuff) through submental incision into mouth and secured back to anesthetic equipment. Now closure was done in layers with 3.0 vicryl suture and skin closure with 4-0 ethylon suture of submental wound and the intra-oral incision left to heal secondarily (figure 3). Extubation was done normally through oral route.

The following were collected

1. Time taken for Intubation
2. Time from incision to intubation
2. Any complication that required immediate attention

RESULTS

In all 9 patients were recruited for this study. Of them 5 underwent paramedian submental intubation while 4 underwent median submental intubation. The demographics are given in Table-1.

	Paramedian submental Intubation	Median submental Intubation
N	5	4
Mean Age in years	28.2±4.1	26.8±3.2
Males	3	2
Females	2	2
Pan-facial Fractures	3	2
Orthognathic cases	2	2
Time taken for intubation alone in seconds	48.7±4.9	72.6±2.1
Time from incision to intubation	6.3 ± 2.6 minutes	7.3 ± 1.8 minutes
Complications	Nil	Nil

RESULTS

Patient's clinical data are presented in Tables 1. In all subjects, submental intubation allowed simultaneous treatment of all fractures or elective orthognathic procedures without changing the method of intubation and without any interference from the tube during the operation. There was no difficulty in passing the tube through the floor of the mouth, no complications noted.

Disconnection of the standard connector from the tube was performed easily. There was no significant oxygen desaturation in any subject during the procedure. The intubation method itself did not lead to any intraoperative complications. Intraoperative assessment of nasolabial complex was found easy in elective orthognathic procedures and widening of Alar base after AMO and Lefort 1 osteotomy were minimized. Significant hemorrhage was not encountered using the paramedian approach in any of the subjects. 1 instance of wound dehiscence was observed in post-operative case of trauma due to superficial infection, sutures breakdown which resolved after using topical application of antibiotics and delayed suturing. None of the patients in the study required postoperative ventilation. All the patients were evaluated 1 week, 1 month and 6 months. No motor or sensory salivation deficit was found. Post operative scar is almost imperceptible and less conspicuous.



Figure 1.



Figure 3.



Figure 2.

DISCUSSION

Injuries to the Head and Maxillofacial areas can easily jeopardize the patient's ability to maintain the airway. Management of the airway is always a primary concern during any maxillofacial surgical procedures. Operating in the field free from intubation is comfortable for a surgeon; while for an anesthesiologist, the safety of the endotracheal tube and efficiency of ventilation are important. Endotracheal intubation by means of submental route was first described by Altemir in 1986.^[8] This technique provides a secure airway, an unobstructed intra oral surgical field and allows maxillo-mandibular fixation avoiding the drawbacks and complications of oral and nasal intubation as well as tracheostomy. Despite the widespread use of submental intubation for other purposes, it was Bogi and Incze in 1996 who recommended the use of submental intubation in elective osteotomies. They advocated paramedian approach so that the geniohyoid and the genioglossus muscles do not have to be crossed and easily sparing the insertion of the anterior belly of digastric muscle.^[11]

In our patients who require correction of dentofacial deformities, conventional endonasal intubation was avoided as it would be difficult to assess precise intra-operative changes to the nasolabial complex, assessment of midlines, cant and incisor display accurately during surgical procedures without changing the tube. Oral intubation in all these patients was not preferred as the endotracheal tube interferes with the intraoperative maneuvers of restoring the occlusion by means of intraoperative maxillomandibular fixation. Of 9 patients, 5 were dealt with Paramedian approach described by Altemir and modified by Biglioli F^[12] and Tagliatela Scafati was adopted in all 60 cases.^[13,14] The endotracheal tube passes close to the anterior belly of digastric muscle, anterior most portion of the mylohyoid muscle and the lower edge of the mandible.

Some factors must be considered to make submental endotracheal intubation a successful technique with minimal morbidity. Good communication between surgeon and anesthetist is mandatory at every step. Initial management of the airway of patient with facial trauma can be challenging. The submental intubation is always a second step and precaution must be taken to firmly secure the endotracheal tube intraorally to prevent accidental extubation. To avoid injury to the glands and ducts, blunt dissection with hemostat must run in close approximation to the medial border of the mandible and once intubated the tube should be secured with sutures. The time taken for the procedure was an average of 7 minutes when compared to other procedures described in the literature. Relatively from the small sample, we could decipher that paramedian approach was faster than the median approach.

The morbidity associated with these techniques are very low, with no episodes of compromised airway or arterial desaturation occurring during the procedure. Only 1 cases

of superficial wound infection occurred that fully resolved after a course of appropriate antibiotics. Other potential complications like oro-cutaneous fistula, trauma to the sublingual and submandibular glands or ducts, damage to the lingual nerve, hypertrophic scar or mucocele as mentioned in literature were not encountered in our study.^[15] Though we identified a minor advantage with the paramedian approach, no.

Submental route is a quick, simple, safe and acceptable alternative to tracheostomy for short term airway management in patients with facial trauma and elective orthognathic surgeries with clear defined advantages. The present study reports good results with use of submental endotracheal intubation for surgical treatment of 60 patients with maxillofacial trauma and orthognathic surgery without interference from the artificial airway and most importantly without compromising the airway.

Our series of 9 cases reestablishes that submental intubation is a useful alternative technique of airway management not only in patients with maxillofacial trauma but also in elective orthognathic surgery. It demands a certain surgical skill without specialized equipments; however, it is safe and quick to execute. It allows intraoperative correction of occlusion and enables surgery for dentofacial deformities and avoids the dangers of classical endotracheal intubation.

CONCLUSION

Based on the limited experience, it can be concluded that Submental intubation – Median and paramedian approaches are beneficial.

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