

Submental Intubation for Panfacial Fractures- Review of Techniques and Outcome in 34 Patients

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Abstract

Aim: To study the results and outcomes of submental intubation in 34 cases of multiple facial fractures.

Material and methods: 34 cases of panfacial fractures were operated between 2014 to 2016. All of them were managed intraoperatively with submental intubation. We review the literature and compare the outcome of submental intubation in our series of cases.

Results: All the cases except two were extubated immediately post operatively and had very good outcome. There were minor complications in only 2 of the patients.

Conclusion: Submental intubation is a safe, effective and appropriate method for panfacial fractures and avoids the need for tracheostomy in such patients.

Keywords: Submental intubation, panfacial fractures, tracheostomy.

I. Introduction

First time in 1986, Altamir [1], described the submental route for endotracheal intubation. Submental approach provided a secure airway, an unobstructed intraoral surgical field and allowed maxillomandibular fixation [2,3] where dental occlusion needed (precludes the use of oral intubation) while avoiding the drawbacks and complications of tracheostomy. Nasotracheal intubation is not possible in the presence of fractures of nasal bone fracture, skull base fractures and cerebrospinal fluid rhinorrhoea. In such cases any attempt towards nasotracheal intubation can lead to passage of tube into the cranium, meningitis, sepsis, sinusitis etc.

In situations where maxillomandibular fixation is required and nasoendotracheal intubation is contraindicated, a cricothyrotomy or tracheostomy has been the traditional method of airway control.[4] Submental intubation technique consists of passing the tube through the anterior floor of mouth, allowing free intraoperative access to oral cavity and nasal pyramid without endangering patients with skull base trauma.

The purpose of this study was to describe the outcome of a series of 34 patients who had submental intubation for surgical correction of panfacial trauma [5]. We have also added some modifications in the original technique described.

II. Materials And Method

From 2014 to 2016, 34 patients benefited from submental intubation. 29 patients were male and 5 were females with the age range from 18 to 57 years. All patients were victims of facial trauma due to road traffic accident. Most of the facial injuries were a combination of fractures affecting the dental occlusion (maxillary fractures of Le Fort I type, mandibular fractures or alveolar fractures) and associated with another fracture dislocating either the anterior skull base (Le Fort II or III fractures) or the nasal pyramid (nasoorbitomaxillary fractures).

III. Operative Procedure

All the subjects had their trachea intubated orally by standard direct laryngoscopy after induction of general anaesthesia with a reinforced (spiral-embedded) tracheal tube having an internal diameter of 7.5 or 8.5 mm. The orotracheal intubation was then converted to a submental endotracheal intubation by using the following procedure.

Under sterile conditions 2% with 1:20000 adrenaline was infiltrated at the incision site. We modified the standard incision by taking it 2 cms lateral to midline on the side opposite the fracture of mandible. A curved haemostat was passed from the submental incision through the subcutaneous layer, platysma, mylohyoid muscle, submucosal layer and mucosa. The haemostat was opened to create a soft tissue passage for the endotracheal tube. With the curved haemostat, the deflated pilot tube cuff was passed extraorally. Before intubating, we used to cut the wings of the connector of endotracheal tube to facilitate its passage. Then the endotracheal tube was disconnected from the breathing circuit, the tube was then manually stabilized and the tip of the endotracheal tube gently pulled out through the submental incision with the help of a curved haemostat. The tube was reconnected and secured to the skin of the submental area with 3-0 Silk.

Anatomical reduction and rigid internal fixation of the maxillofacial fractures were achieved by using miniplates osteosynthesis. Temporary maxillomandibular fixation was used in all cases.

At the end of the surgery, the maxillomandibular fixation was released and the tube was pulled out from the same submental incision. The submental skin incision was closed with interrupted nylon sutures and the intraoral incision closed with vicryl sutures.

The tube was left in place only in two patients who had Head Injury associated with these fractures and was removed after 2 days.

IV. Results

Table 1- Patient's demographical and clinical data

AGE	Sex	Type of fracture	Intraop complication	Post op complication	Post op ventilation
26	M	Mandible and maxilla	None	None	No
34	M	Lefort II and mandible	None	None	No
55	M	NOE and mandible	None	Hematoma	No
32	F	Lefort III and mandible	None	None	Yes
57	M	Skull base and mandible	None	None	No
42	M	Nasal and mandible and zygoma	None	None	No
31	M	Lefort II and mandible	None	None	No
41	M	Lefort I and mandible	None	None	No
32	M	Lefort I and mandible	None	None	No
41	F	NOE and Mandible	None	None	No
18	M	Lefort III and Mandible and zygoma	None	Hypertrophic Scar	No
26	F	Lefort I with dentoalvolar and zygoma	None	None	No
36	M	Lefort I and Mandible	none	None	No
28	M	Lefort I and Mandible	None	None	No
53	M	Skullbase and Mandible	None	None	Yes
27	M	Lefort I and Mandible	None	None	None
19	M	Lefort I and Mandible	None	None	No
43	M	NOE and Mandible	None	None	None
51	F	Lefort I and Mandible	None	None	No
23	M	Panfacial	None	None	None
33	M	Lefort I and Mandible	None	None	None
21	M	Lefort I and Mandible and Nasal	None	None	No
40	M	NOE and mandible	None	None	No
27	M	Panfacial	None	None	No
33	M	Lefort I and Mandible	None	None	No
26	M	Nasal and Mandible	None	None	No
38	F	Condylar and Palate	None	None	No
46	M	Panfacial	None	None	No
19	M	Lefort I and	None	None	No

		Mandible			
30	M	NOE and Mandible	None	None	No
22	M	Lefort II and Mandible	None	None	No
23	M	Lefort III and Mandible	None	None	No
37	M	Mandible and Zygoma	None	None	No
31	M	Panfacial	None	None	No

There was no difficulty in passing the tube through the floor of mouth, and the total duration of submental intubation procedure ranged from 6 to 10 minutes. We used to cut the wings of the standard connector before doing intubation because connector removal is associated with loosening and exposure of wires of the tube. Time period for disconnection from the ventilator ranged from 60 to 90 seconds, and there was no significant oxygen desaturation in any subject during the procedure.

Placing the tube lateral to the midline and opposite to the direction of fracture has helped us to manipulate the fracture segments easily to obtain good results. Only two patients in the present study required postoperative ventilation. These two patients had an associated head injury and where not fully oriented at the time of surgery, but because of multiple displaced fractures, they were taken for surgery under due risk and kept intubated for two days and later the tube was removed via submental route only. The recovery was uneventful. Rest of the 32 patients were extubated in the operating room itself. The extubation was from submental route only.

Subjects were evaluated in the postoperative period at 1 week, 1 month and 6 months. No motor or sensory salivation deficit was found. We routinely close the defect of floor of the mouth to decrease the risk of bleeding and hematoma formation. Only one patient developed a hematoma – it was drained after 2 days and the recovery was uneventful.

The scar has been well accepted by all the patients with only one patient developing hypertrophic scarring, who had a keloidal tendency all over his body. There was no incidence of superficial skin infection, damage to the tube apparatus, fistula formation, right mainstem bronchus tube dislodgement/obstruction, accidental extubation or mucocoele formation.

V. Discussion

Management of the airway is always a primary concern during any maxillofacial surgery. Implementing a safe and acceptable alternative to tracheostomy for short-term airway management is a desirable objective for optimal management of complex craniofacial injuries. Nasotracheal intubation may best be avoided in these groups of patients because of reported dangers of nasotracheal intubation in the presence of midfacial and basilar skull fractures, such as cranial intubation, epistaxis, trauma to the pharynx, pressure necrosis of external nares, otitis media, sinusitis, sepsis and inability to pass a tube through nasal passages.[6–8]

The alternative of orotracheal intubation significantly facilitates manoeuvres for reduction and stabilization of the jaws, which often requires immobilization with arch bars and wires. Doing oral intubation will never give optimal results in these patients because of the requirement of intermaxillary fixation.

Tracheostomy may cause many general, local, early and late complications like cardiac arrest, air embolism, subcutaneous or mediastinal emphysema and recurrent laryngeal nerve damage with all its consequences.[7,9,10] Late complications include laryngeal or tracheal stricture, haemorrhage from large blood vessels caused by decubitus of vessel walls, tracheo-oesophageal fistula, extensive granulation and inflammatory complications.[11] Due to these potential complications, tracheostomy for airway management was avoided.

Both retromolar intubation [12] and nasal tube switch techniques [13] have its own set of complications and difficulties. Since the first description, submental intubation has undergone various modifications and found new indications.[14] It could be safely used in patients with midfacial or panfacial fractures with possible base of skull fractures, as well as in patients undergoing elective Le Fort osteotomies or simultaneous elective mandibular orthognathic surgery and rhinoplasty procedure.[15,16] In our present series, submental intubation was possible in all the patients without any major complication, allowing proper manipulation of the fracture fragments, satisfactory achievement of occlusion, establishment of maxillomandibular fixation and complete assessment of facial symmetry. Moreover, extubation was found to be simple and the cosmetic results were acceptable, with no long-term morbidity.

We have done two modifications in the original technique:

First, we always cut the wings of the connector of the armoured tube. It not only helps in easy passage of the tube, but also reduces the chances of tube damage on removal of snugly fit connector. On forceful removal, the wires of the tube can easily get damaged.

The second modification we do is to place the incision and tube far laterally, opposite to the site of fracture of mandible. Even in cases of comminuted fractures, placing the tube laterally helps in proper alignment of the mandible segments, optimal reduction and occlusion. And we believe that because we take an oblique route, the chances of fistula formation is also reduced to minimal.

In our series, no episodes of compromised airway or arterial desaturation occurred during the procedure. Other possible potential complications such as orocutaneous fistula, trauma to the submandibular and sublingual glands or canals, damage to the lingual nerve, were also not observed. Only one patient developed hematoma at the tube site, which was recognised early and drained. One patient developed hypertrophic scar over the incision site, but he had a tendency of keloid formation all over his body.

So here we conclude that, this study shows good results with the use of submental endotracheal intubation for surgical treatment of 34 patients with panfacial fractures. In all cases, the planned surgery was completed without interference from the artificial airway and, most importantly, without compromising the airway with two modifications to avoid major complications.

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