Case Report

Submental intubation: A useful adjunct in panfacial trauma

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ABSTRACT

Complex maxillofacial trauma requires a modification of intubation as it precludes both oral and nasal intubation. Tracheostomy is not preferred due to its associated complications. Submental intubation comes as a rescue in such situations as it provides an uninterrupted access to the operative field with due control over airway and minimal side effects.

Key words: Difficult intubation, submental intubation, Maxillofacial injury

INTRODUCTION

Treatment of complex panfacial trauma cases presents a certain difficulty as not only the fracture fragments need to be aligned but also the teeth have to be kept in proper occlusion as well. To achieve a proper pre-traumatic occlusion, the occlusion has to be maintained and checked at all times during the surgery. This precludes the use of oral endotracheal intubation in such cases. Nasal endotracheal intubation is often contraindicated in the presence of fracture of base of the skull, cerebrospinal fluid rhinorrhea and comminuted midfacial fractures. Any attempt toward nasotracheal intubation in such cases can lead to passage of tube into the cranium, meningitis, sepsis, sinusitis and epistaxis. Further, the presence of nasotracheal tube can interfere with surgical reconstruction of fractures of the naso-orbital ethmoid (NOE) complex. Thus, airway management of these fractures is complicated and requires modification of the standard anesthesia technique.

Different methods of intubation and surgical airways are described for such situations in the literature. No consensus exists to date on the best way of controlling the airway when orotracheal or nasotracheal intubations are contraindicated. In these conditions, tracheostomy may be indicated but it carries a significant morbidity. Submental endotracheal intubation has been described as an useful alternative to tracheostomy with minimal complications in these conditions. The technique consists of diverting the proximal end of an orotracheal tube through the floor of the mouth and submental region. This allows free intraoperative access to the dental occlusion and nasal pyramid without endangering patients with skull base trauma, and at the same time avoids transtracheal dissection.

This report discusses the use of submental intubation in complicated maxillofacial trauma.

CASE REPORT

A 32-year-old male presented to the emergency room with history of road traffic accident. On admission, the patient was conscious, with a Glasgow coma score of 15. The patient had sustained trauma to the face and the left lower limb. Examination of face revealed facial swelling, epistaxis, bilateral periorbital edema and bilateral subconjunctival hemorrhage. Cerebrospinal fluid rhinorrhea was also present which settled itself in 5 days. There was midface mobility with palatal split and the occlusion was impaired. Mouth opening was restricted. Clinical examination did not reveal any neurologic deficit or cardiorespiratory instability. Radiologic examination confirmed the presence of Lefort II fracture on the right side and zygomaticomaxillary, with Lefort I and palatal split on left side with fracture of nasal bone.

Technique

The technique used for submental intubation was an
adaptation of the general principles published by Hernandez Altemir [Figure 1-4]. Oral endotracheal intubation was performed with a cuffed flexometallic endotracheal tube. A 2-cm incision was made in paramedian submental region parallel and medial to the inferior border of mandible. It was extended intraorally through the mylohyoid muscle by blunt dissection. The muscular layers (platysma and mylohyoid muscles) were traversed by blunt dissection using a Kelly forceps that was always in contact with the lingual cortex of the mandible. The mucosal layer on the floor of the mouth was incised over the distal end of the forceps located in front of the sublingual caruncle and the forceps were then opened, creating a tunnel. The endotracheal tube was briefly disconnected from the breathing circuit and the tube connector was removed from the tube. The pilot balloon, followed by endotracheal tube, were gently pulled out through the incision. The tube connector was reattached and the endotracheal tube reconnected to anesthesia breathing circuit. Bilateral air entry was rechecked and found to be equal and the tube was fixed with 1’0 silk suture. At the end of the surgery, submental intubation was converted to oral intubation.

**DISCUSSION**

Nasotracheal intubation precludes the treatment of nasal fractures and, an orotracheal tube interferes with maxillomandibular fixation, compromising the reduction and stabilization of maxillary and mandibular fractures. In conditions precluding oral and nasal intubation tracheostomy, an alternate technique can be used but is associated with complications like hemorrhage, subcutaneous emphysema, pneumomediastinum, pneumothorax, recurrent laryngeal nerve damage, stomal and respiratory tract infection, tracheal stenosis, tracheal erosions, dysphagia, problems with decanulation and excessive scarring.

Different solutions have been proposed as an alternative to tracheostomy. Switching an endotracheal tube from the nasal route to the oral route without extubation can be a good option. This maneuver can be completed in less than 10 minutes. The conversion can also be completed more rapidly by using tube exchangers. Nevertheless, in patients with frontobasilar fractures associated with maxillofacial trauma, the nasotracheal intubation can lead to major complications.
In contrast, the submental route for endotracheal intubation represents a fast and low-morbidity alternative to tracheostomy. The Altemir intubation procedure requires no more than 5 minutes to perform. In Altemir’s original report, he suggested creating a subperiosteal passage for the tube in the lingual surface of the mandible. However, the passage can be created safely with an easier extraperiosteal blunt dissection near the lingual surface of the mandible. This dissection avoids lesions to the floor of the mouth structures and ensures good mobility of the mandibular segments.

According to some authors, the standard technique as described by Altemir was less than satisfactory because of bleeding, difficult tube passage and sublingual gland involvement. Instead of making exit wound slightly lateral, some prefer strict midline approach approach for two reasons: first, in this area only a few anatomic structures are present and there is a minimum risk of nerve or vascular damage; second, the scar is less visible behind the symphyseal region.

The technique is very easy, and the risk of damage to structures such as the sublingual and submaxillary glands, Wharton’s duct and the lingual nerve is very low. In fact, these major complications have never been reported. Our experience confirms that careful blunt dissection close to the medial border of the mandible and good knowledge of anatomy can help avoid damage to the structures of the floor of the mouth. This result seems to confirm the experiences of other authors who have reported a low morbidity associated with submental intubation in the treatment of maxillofacial trauma. No episodes of accidental extubation, leaking cuff, submental orotracheal fistulae or anomalous scars have been reported.

Some technical refinements can help minimize morbidity. After the normal orotracheal intubation, the tube must be firmly secured intraorally to prevent accidental extubation during the submental procedure.

Choosing material and equipment can represent a technical problem. For example, some reinforced tracheal tubes are manufactured with no detachable connectors. To use these tubes, a modification of Altemir’s technique was proposed by Green and Moore in 1996. They described the insertion of a reinforced endotracheal tube from outside the submental incision after orotracheal intubation with a non-reinforced tube. The initial orotracheal tube is then removed, and the reinforced tube is introduced into trachea during direct laryngoscopy. In 1997, Cooper proposed the use of tube exchangers.

We had no difficulty in passing the tube through the incision, the endotracheal tube connector could be easily detached and reattached and there was no bleeding. There was no episode of arterial desaturation while converting oral intubation to submental intubation and vice versa. Care was taken not to damage the pilot balloon. Endotracheal suction could be easily done through the submental route.

Submental intubation combines the advantages of nasotracheal intubation, which allows the mobilization of the dental occlusion, and those of orotracheal intubation, which allows access to frontonasal fractures. It also avoids the risks of iatrogenic meningitis or trauma of the anterior skull base after nasotracheal intubation as well as complications such as tracheal stenosis, injury to cervical vessels or the thyroid gland, related to tracheotomy. Submental endotracheal intubation is not free of adverse events and complications. This method of intubation is contraindicated for patients who require a long period of assisted ventilation, i.e. multi-trauma patients presenting with severe neurologic damage or major thoracic trauma, and patients expected to need repeated operations.

Adverse events can occur while the endotracheal tube is passed through the incision from interior to exterior. It may be difficult to pass the tube through the incision or reattaching the connector to endotracheal tube. These adverse events can be overcome by Green and Moore’s modification to the original technique. They used two endotracheal tubes in their technique. This technique is also useful when manufacturer’s design specifically prevents the removal of tube connector. However, grasping and drawing in the tracheal end of the endotracheal tube can damage the cuff.

Accidental extubation, tube obstruction and damaged tube (leaking cuff) are more difficult to manage in submental route. Other potential complications are superficial infection of the submental wound, trauma to submandibular and sublingual glands or ducts, damage to lingual nerve, orocutaneous fistula and hypertrophic scar. However, no complication occurred in our patient. Perioperative antibiotic cover, good oral hygiene and not so tight closure of submental incision resulted in prevention of infectious complications.

**Conclusion**

Submental intubation is an interesting alternative to tracheotomy, especially when short-term postoperative control of the airway is foreseeable, and as control of the dental occlusion is complete, and access to the nose and mouth is undisturbed. Finally, it presents a low
incidence of operative and postoperative complications and eliminates the risks and side effects of tracheostomy.

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