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Case Report

Submental Orotracheal Intubation: An Alternative to Open Tracheotomy in Maxillofacial Surgery Patients

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Abstract: Submental orotracheal intubation is a safe, efficient and predictable means of establishing a short term airway in maxillofacial surgery patients requiring maxillo-mandibular fixation (MMF) and dental occlusal references when nasal intubation is contraindicated. Submental orotracheal intubation allows for the placement of an airway through the soft tissues of the submental triangle, while circumventing the oral and nasal cavity. Submental orotracheal intubation should not be viewed as an alternative to open tracheotomy in patients requiring long-term ventilation.

Keywords: Submental Intubation; Tracheotomy; Panfacial Fractures; Orotracheal Intubation; Surgical Airway.

Introduction: The submental orotracheal intubation was first described by Hernandez Altemir in 1986 as an alternative to open tracheotomy. [1] Submental orotracheal intubation is a safe, efficient and predictable alternative to open tracheotomy when short-term ventilation is required. Submental orotracheal intubation allows for the passage of a flexible metal reinforced endotracheal tube through the soft tissues of the submental region in cases where traditional oral and nasal intubation is contraindicated and open tracheostomy is unwarranted. Indications for submental orotracheal intubation include adult and pediatric maxillofacial and craniofacial surgery patients that require maxillomandibular fixation and dental occlusal references when nasal intubation is contraindicated and postoperative mechanical ventilation is not necessary or will be of short duration. [2,3] Examples include panfacial fractures with contaminant mandible fractures, patients requiring a short-term definitive airway for elective craniomaxillofacial reconstructive surgery where a reference to the dental occlusion is required with a desire to avoid the complications of tracheotomy (i.e. orthognathic surgery where nasal intubation is not possible, cleft lip-palate patients and maxillo-mandibular advancement with concurrent nasal surgery for sleep apnea) and in instances where nasal intubation cannot be achieved (lack of operator experience, lack of fiber optic equipment, intranasal pathology) [4].

Case report: A 41 year old male was involved in a high speed motor vehicle accident where his automobile struck a light pole. The patient sustained extensive maxillofacial injuries to include a Le Fort I fracture, a Le Fort II fracture, a left sided zygomaticomaxillary complex (ZMC) fracture, fractures of the nasal bones, a large septal hematoma, a left sided comminuted vertical ramus fracture of the mandible and the avulsion of an anterior maxillary tooth into his nasal cavity (Figure 1-1). The

patient also sustained multiple orthopedic injuries, however, the patient sustained no pulmonary injuries or intracranial injuries and thus, did not require long-term ventillary support. The patient was orally intubated in the field. The patient was taken urgently to the operating room for the reduction of his orthopedic and facial injures. Due to the degree of displacement of the patient's midface fractures, nasal trauma (Figure 1-2), epistaxis, septal hematoma, nasal mucosal edema and the need to place the patient within MMF for the reduction of his associated panfacial fractures and mandible fracture, the decision was made submentally intubate the patient.

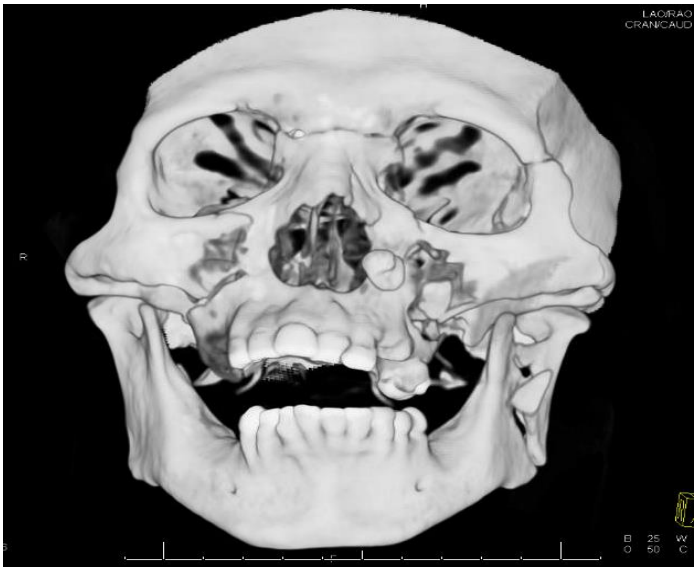

Figure 1-1. Pre-reduction 3-D reconstruction demonstrating displaced panfacial and mandibular fractures.

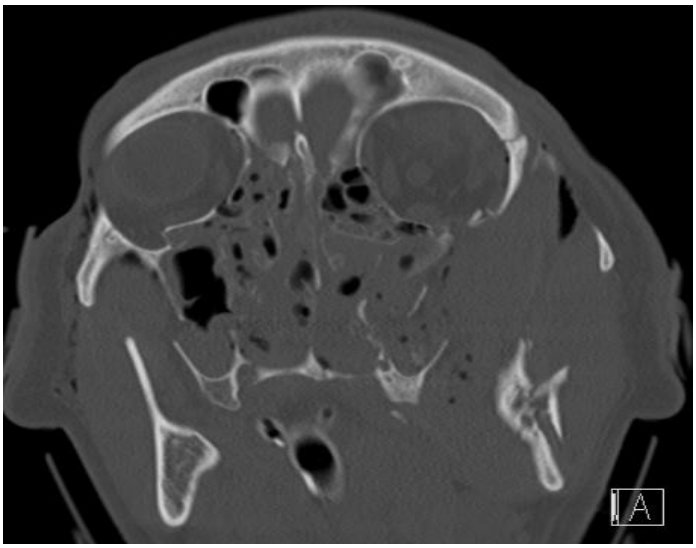

Figure 1-2. Coronal computed tomography scan depicting gross trauma and edema to the nasal cavity.

Figure 1-3. A flexible metal reinforced oral tube is placed and the midline submental crease is identified and marked.

Figure 1-4. A finger is used to palpate the floor of the mouth as a hemostat is used to bluntly dissect from the submental incision to the base of the tongue.

Figure 1-5. The hemostat is passed through the submental incision to the oral cavity. The pilot cuff of the endotracheal tube is placed within the beaks of the hemostat.

Figure 1-6. The pilot cuff is passed from the oral cavity through the submental incision.

Figure 1-7. The tube connector is removed from the endotracheal tube and a glove finger is placed over the open end of the endotracheal tube to prevent fluid from entering the tube.

Figure 1-8. The flexible metal reinforced oral tube is passed from the oral cavity through the submental incision.

Figure 1-9. The tube connector is placed, the anesthesia circuit is connected and the endotracheal tube is secured to the tissues adjacent to the submental incision with 2-0 silk sutures.

Figure 1-10. The patient is submentally intubated and prepped, draped and marked for the repair of indicated panfacial and mandibular fractures.

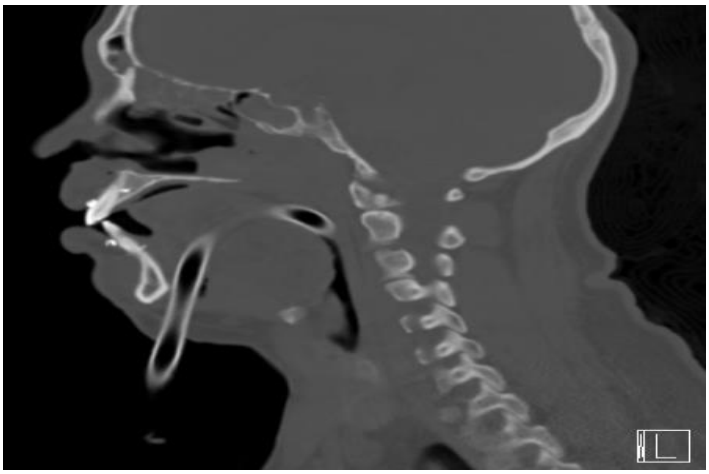

Figure 1-11. Post-reduction sagittal computed tomography scan demonstrating appropriate placement of the submental tube.

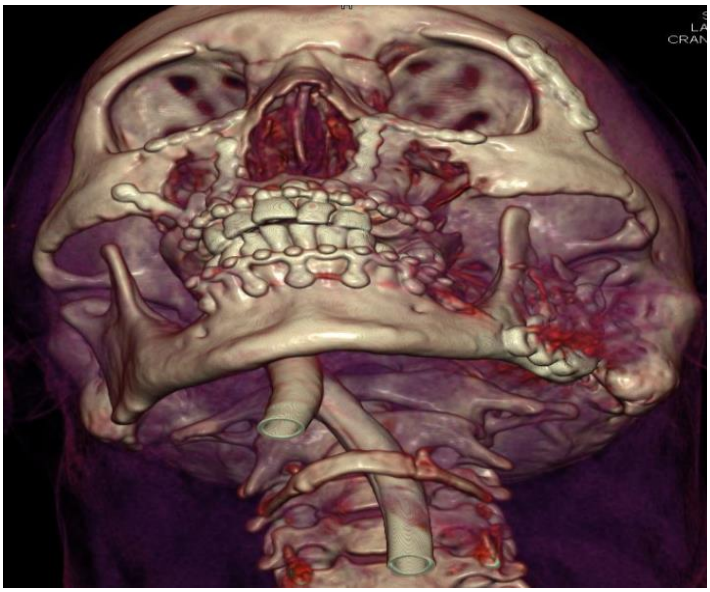

Figure 1-12. Post-reduction 3-D reconstruction depicting reduction of panfacial and mandibular fractures, the placement of maxillo.

The oral ray tube was removed and a flexible metal reinforced oral tube was placed over a tube exchanger (Figure 1-3). The submental triangle was prepped and local anesthesia containing a vasoconstrictor was placed within the midline submental crease. A 2 cm incision was placed with a blade within the midline submental crease, transecting the skin, subcutaneous tissue and the platysma muscle. A Kelley clamp was used to bluntly dissect from the skin incision through the deep cervical fascia and muscle of the floor of the mouth into the midline of the oral cavity under the ventral portion of the tongue (Figure 1-4). The pilot cuff was inserted into the beaks of a hemostat (Figure 1-5) and passed through the oral cavity to exit the submental incision (Figure 1-6). The connector was removed from the endotracheal tube and a glove finger was placed over the open end of the oral endotracheal tube (Figure 1-7). A hemostat was reinserted from the submental incision into the oral cavity and the oral endotracheal tube was directed from the oral cavity through the midline skin incision (Figure 1-8). The connector was reattached and the anesthesia circuit was reconnected. The flexible metal reinforced endotracheal tube was secured to the skin adjacent to the submental incision with 2-0 silk sutures (Figure 1-9).

The patient was prepped and draped in standard operating room fashion (Figure 1-10) and placed into maxillofacial fixation (MMF) in order to establish dental occlusal references to reduce his displaced mandible, maxillary and panfacial fractures and to re-establish the vertical and horizontal dimensions of the face prior to applying rigid internal fixation. At the end of the procedure, the patient remained submentally intubated until post-operative reduction films (Figures 1-11 and 1-12) were obtained. The midline submental orotracheal intubation was then converted to an oral intubation and the patient was extubated and placed into MMF via elastics. The patient tolerated the procedure well and had no complications associated with the midline submental orotracheal intubation procedure.

Discussion: Midline submental orotracheal intubation is a quick and safe procedure associated with fewer complications than open tracheostomy.[5] Complications associated with midline submental orotracheal intubation are rare and include floor of mouth edema, floor of mouth hematoma, infection of the surgical site from oral contamination, accidental extubation, oral cutaneous fistula formation, abscess formation and salivary fistula formation.[6,7] The lack of significant complications associated with the midline submental orotracheal intubation is a result of the lack of vital structures located within the submental triangle. The submental triangle is a division of the anterior triangle of the neck. The boundaries of the submental triangle include the anterior belly of the digastric muscle (lateral boundaries), the lingual aspect of the anterior mandible (anterior boundary), the body of the hyoid bone (posterior boundary) and the mylohyoid muscles (superior boundary). Although a paramedian approach that passes through the submandibular triangle has been reported within the literature, it is associated with a higher complication rate due to the vital structures within this area. Key structures within the submandibular triangle include the facial artery and vein, the lingual nerve, the lingual artery, the hypoglossal nerve, the submandibular and sublingual glands and the submandibular duct.

Although submental intubation is a secure airway, it is not indicated for prolonged periods of intubation.[5-8] Submental intubations are typically converted to oral intubations immediately after surgery. The use of a flexible metal reinforced endotracheal tube is recommended to prevent kinking of the tube as it is manipulated through the submental triangle after oral intubation.[6] Compared to open tracheotomy, the midline submental orotracheal intubation procedure is associated with shorter operating times and fewer complications. However, the submental orotracheal intubation is contraindicated in patients requiring long-term mechanical ventilation and in patients with significant airway compromise [9].

Conclusion: Midline submental orotracheal intubation is a quick, simple and predictable procedure that is associated with fewer complications when compared to open tracheostomy. Submental orotracheal intubation is not meant to be a replacement for open tracheotomy. Submental orotracheal intubation is indicated in select cases of maxillofacial trauma and craniomaxillofacial reconstructive surgery when post-operative mechanical ventilation is not required or will be of short duration. Midline submental orotracheal intubation is associated with fewer complications and shorter operating

times compared to open tracheostomy procedures.

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