

# SUBMENTAL INTUBATION IN PATIENTS WITH MAXILLOFACIAL FRACTURES: CASE REPORT AND LITERATURE REVIEW

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## ABSTRACT

**Background:** Conventional orotracheal and nasotracheal intubation can be challenging in patients requiring fixation of fractures of the maxillofacial skeleton. The proximity of the surgical site for maxillofacial procedures to the airway predisposes patients with maxillofacial pathologies to anaesthetic complications like dislodged endotracheal (ET) tubes and inadvertent extubation. The need for maxillomandibular fixation (MMF) as part of fracture management precludes the use of orotracheal intubation. In patients with nasal bone fractures, nasotracheal intubation may not be feasible, and the complications associated with tracheostomy make it a last resort for securing access to the airway. The purpose of this article is to highlight the usefulness of submental intubation in the management of patients with maxillofacial fractures.

**Case presentation:** We present our initial experience with the submental route of intubation and illustrate the procedure with a case of a patient with midface fractures successfully managed using submental intubation. A literature review of alternative airway routes to conventional orotracheal and nasotracheal intubation is also included.

**Discussion:** Edentulous spaces, retromolar intubation, submental intubation, submandibular intubation, and tracheostomy have been used as alternatives to conventional endotracheal intubation. Each route has its associated advantages, disadvantages, and limitations. The submental approach is fast, easy to learn, and associated with minimal complications.

**Conclusion:** Submental intubation is a safe option for airway management in patients with maxillofacial fractures.

**Keywords:** Submental, Retromolar, Tracheostomy, Maxillofacial.

## INTRODUCTION

Oral and maxillofacial surgical procedures pose a challenge to the anaesthetist due to the proximity of the surgical manoeuvres to the airway apparatus. The need to provide adequate oxygenation and ventilation has to be balanced with possible interference of ET tubes with the surgical procedure and the risk of accidental extubation of the patient. The main goal in the management of patients with maxillofacial fractures is the restoration of function and aesthetics<sup>1</sup>. This often involves the reduction and immobilization of the jaws via MMF. The use of MMF precludes orotracheal intubation as an option for airway access.

The maxilla is usually displaced inferio-posteriorly in patients with maxillary fractures necessitating disimpaction to enable successful reduction of the fractures. The instruments for maxillary disimpaction are placed in the nostrils, and the presence of a nasotracheal tube may pose a challenge to the success of this procedure. Moreover, the nose is frequently fractured in maxillofacial trauma patients<sup>2</sup>, and a nasotracheal tube can impede the reduction of such fractures. Nasal bone fractures may occur in isolation or as part of Le Fort and Naso-Orbito-Ethmoidal (NOE) fractures. Le Fort II and III fractures are often associated with skull base fractures, creating a communication between the nasal cavity and anterior cranial fossa<sup>3</sup>. Nasotracheal intubation in such cases is contraindicated due to the possibility of inadvertent entry of the nasotracheal tube into the cranium with attendant life-threatening complications<sup>4</sup>.

Submental intubation offers a viable alternative in administering general anaesthesia in patients with panfacial or complex maxillofacial fractures. The submental intubation approach has been employed in the administration of anaesthesia for patients with

maxillofacial trauma for over 30 years<sup>5</sup>. Aside from maxillofacial trauma, submental intubation has also been used during maxillomandibular advancement for patients with obstructive sleep apnoea<sup>6</sup>, orthognathic procedures, especially when combined with rhinoplasty, and transmaxillary approach for resection of giant pituitary tumours<sup>7</sup>. However, the technique is rarely used in hospitals in Ghana. Thus, this report emphasizes the practicality of submental intubation in patients with maxillofacial trauma.

## CASE PRESENTATION

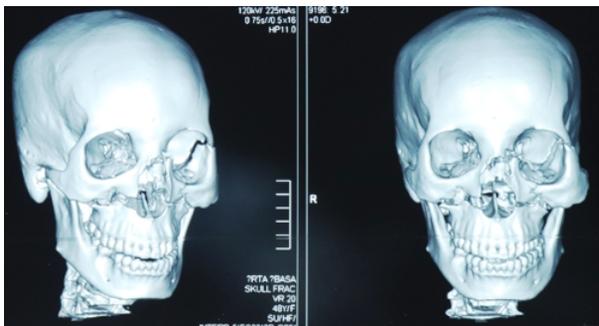
A 46-year-old female was referred to the 37 Military Hospital on account of maxillofacial fractures sustained during a Road Traffic Crash. A diagnosis of fractures of the left zygomatic complex, naso-orbito-ethmoidal (NOE) complex, and maxillary bones were arrived at after examination and investigations (Figure 1). An open reduction and internal fixation of the midface fractures was done under general anaesthesia administered via submental intubation.

## SUBMENTAL INTUBATION PROCEDURE

Following induction of general anaesthesia, conventional orotracheal intubation by direct laryngoscopy was done using a reinforced ET tube. A 2cm median skin incision was made parallel to the lower border of the mandible in the submental area. Blunt dissection with curved artery forceps proceeded to access the anterior floor of the mouth and create a tunnel for the ET tube. The dissection was done close to the mandible to avoid injuring the submandibular duct and lingual nerve. The ET tube was briefly disconnected from the breathing circuit, the

connector was removed, and the pilot balloon deflated. The ET tube was firmly held with McGill's forceps to secure it in place. The artery forceps were used to redirect the pilot balloon to the submental region, followed by the ET tube. The connector was replaced, the pilot balloon inflated, and the ET tube reconnected to achieve submental intubation (Figure 2).

The submental intubation allowed for the placement of the patient in MMF (Figure 3), unimpeded access to the NOE fractures, and subsequent direct fixation of the midface fractures using titanium mini plates and screws. At the end of the procedure, the intubation was converted back to orotracheal intubation, and the patient was successfully extubated. The post-operative period was uneventful, with satisfactory healing of the site of submental intubation (Figure 4). In other patients, the extubation has been done through the submental region without converting it to oral intubation.



**Fig 1: 3-D reconstructed ct scan showing midface fractures**



**Fig 2: Submental Intubation**



**Fig3: Maxillomandibular fixation**



**Fig 4: Incision site at 1-week post-op**

## DISCUSSION

Several airway options have been suggested for patients in whom conventional orotracheal, and nasotracheal intubation poses a challenge. These include placing the tube in edentulous areas, retro tuberosity intubation, retromolar intubation, conversion from orotracheal to nasotracheal intubation, tracheostomy, and submental intubation. The presence of an ET tube in an edentulous space may hinder MMF. Conversion from oral to nasal intubation intraoperatively may require extubation and will be difficult due to oedema and bleeding<sup>8</sup>. The presence of lower third molars and bulbous tuberosities may prevent retro tuberosity intubation<sup>4</sup>. Retromolar intubation involves placing the ET tube in the retromolar trigone and securing it to the second molar tooth. Retromolar intubation often requires an osteotomy to create the required space, increasing operation time and morbidity<sup>3,9</sup>. Tracheostomy is also associated with several complications, such as loss of airway and damage to important cervicothoracic structures<sup>10</sup>.

In 1986, Francisco Hernandez Altemir introduced the submental route as an alternative to tracheostomy for endotracheal intubation. The original approach utilized a 2cm submental paramedian incision parallel to the lower border of the mandible<sup>11</sup>. The risk of lingual nerve and submandibular duct damage lead Stoll and colleagues to describe a submental route variant involving an anterior submandibular incision similar to the approach for draining submandibular abscess<sup>12</sup>. Other modifications include using a median submental incision, double endotracheal tube, nasal speculum, and supra-periosteal dissection.

Submental intubation can be performed quickly (average duration of 9 minutes) and has a short learning curve making it extremely useful for trainee surgeons<sup>13</sup>. The submental incision is small (2 cm) and placed in a hidden area of the face to reduce concerns about scarring. It is associated with very few complications<sup>5</sup> compared with tracheostomy<sup>10</sup>. The commonly reported complications include superficial wound infection, partial extubation, dislodgement of the ET tubes<sup>13</sup>, and damage to the pilot balloon<sup>14</sup>. These complications can be prevented by using reinforced tubes, careful handling of the pilot balloon, and ensuring that the ET tube is firmly secured with sutures to the submental skin.

In our experience, the combination of a paramedian submental incision, supra-periosteal dissection close to

the mandible, careful handling of the pilot balloon and ET tube, and the use of a reinforced tube prevented most of the reported complications. Disconnection of the ET tube and transient cyanosis of the tongue were observed in one of our patients. Tight fixation of the connector to the ET tube after externalization and placing the ET tube in the para lingual groove circumvents these complications. A major limitation of submental intubation is the requirement for orotracheal intubation which implies that it cannot be employed in instances where orotracheal intubation is not feasible. It is advisable to limit its use to patients who require a brief period of assisted ventilation<sup>3</sup>. Tracheostomy should be done for cases that require prolonged intubation.

### CONCLUSION

Submental intubation offers a practical approach to achieving anaesthesia in patients with complex maxillofacial fractures, especially in cases requiring intraoperative occlusion and simultaneous access to the nasal bones. The procedure is fast, easy to perform, and relatively less invasive compared to tracheostomy.

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