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Retromolar intubation: An alternative to invasive intubation techniques in multiple facial injuries

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Abstract
To evaluate the success and complications of retromolar intubation technique in multiple facial fractures which require maxillo-mandibular fixation (MMF) during the surgical procedure. 11 patients who require treatment for facial fractures which need MMF intra-operatively were included. Routine oro-tracheal intubation was done and the tube was then shifted into the retro-molar space and tied with the last standing tooth. The following parameters were assessed: need for third molar extraction, intraoperative complication, difficulty encountered by operator, difficulty encountered by the anaesthesiologists and accidental extubation. There was a sufficient space for placing the tube in 9 individuals. Mild hindrance by the tube in achieving the occlusion and tube displacement was observed in one case. Neither the anaesthesiologists had difficulty in managing the airway nor was there an accidental extubation during the surgery. Retromolar intubation is simple, quick to perform, low morbidity without need for any extra-oral procedures. Tube patency can be easily monitored and above all optimal intraoperative dental occlusion can be achieved.

Keywords: retromolar intubation, panfacial trauma, maxilla-mandibular fixation

Introduction
Management of facial injuries is one of the most challenging issue, clinicians are facing worldwide. According to WHO published data, trauma continues to rank among the leading causes of mortality and morbidity throughout the globe, affecting people of all ages and income groups [1]. Airway management during surgery in patients with complex cranio-maxillofacial trauma has always been a challenge for the anaesthesiologist, as the surgeon and the anaesthesiologist share the same limited space [2].

Various methods of intubation have been reported, including orotracheal intubation, nasotracheal intubation, fibre optic nasotracheal intubation, laryngeal mask airway and submental endotracheal intubation, tracheotomy [3]. Each and every method has its own disadvantages and limitations.

In maxillofacial injuries the oral endotracheal tube may thwart the accuracy of dental occlusion and nasotracheal intubation is not advisable when the facial fractures possibly involve the skull base. Additionally, both tracheotomy and sub-mental intubation are invasive procedures and each of them carries their own risk and complications [3].

In 1998, Martinez et al introduced the retromolar technique as an alternative to invasive intubation procedures [4]. The aim of the study was to analyse the role of retro-molar intubation for securing the airway in trauma to maxillofacial region which requires inter-maxillary fixation (IMF) intra-operatively, its success and complications.

Materials and Methods
The patients who reported with multiple facial fractures during the period from December 2010 to November 2011 were included in the study. Institutional review board approval was obtained. Physical examination and radiographic studies were performed and definitive individualized treatment plan were made for each patient. All the cases were planned to be operated under general anaesthesia with retromolar (Oro-tracheal) intubation. The surgical procedure was explained to the patients and a written consent was obtained.

Retromolar space is bounded superiorly by the maxillary tuberosity and the retrotuberosity area, inferiorly by the retromolar trigone area, anteriorly by the last erupted molar teeth, posteriorly by the anterior border of ascending ramus of the mandible. The retromolar space was examined for adequacy by placing the gloved right index finger in the retromolar space and patients were asked to close the mouth. If there was no compression on finger then retromolar space was considered sufficient for intubation [3]. There is often room to position an armoured tube behind the last standing molars. If the space is unavailable, then partially or fully erupted, third molar was removed to make room for the oral armoured tube [4].

The preparation procedure for this method was the same as for the standard oral route endotracheal intubation, with a flexometallic tracheal tube using standard general anaesthesia technique. Once the anaesthesiologist had finished the

intubation procedure, the surgeon pushed the tube to the retro-molar space (Fig 1). The tube was tied to the molar tooth in a "figure of eight" fashion by a ligature wire [5] and adhesive tape at the corner of mouth. The maximum intercuspation of teeth was attempted by closing the mandible and centric occlusion was achieved by maxillo-mandible fixation (MMF) (Fig 2).

At the end of the surgical procedure wire ligature around the reinforced tracheal tube is removed using a wire cutter. Subsequently, trachea is extubated by the standard methods. However, it is mandatory to remove MMF for immediate access to airway in case of any emergency.

The efficiency and ease of the intubation technique was evaluated qualitatively by the following parameter: 1. Need for third molar extraction, 2. Intra-operative complication, 3. Difficulty encountered by the surgeon, 4. Difficulty encountered by anaesthetist and 5. The chances of accidental extubation.

Fig 1: Patient after orotracheal intubation and tube shifted to retromolar space

Fig 2: Flexomatalic tube positioned in the retromolar region at the time of MMF.

Results

Eleven adult male patients in the age group of 20- 40 years with multiple facial injuries were operated under retromolar intubation. All the cases required MMF during surgery. Out of 11 cases, 9 patients (81.8%) had adequate room in the retromolar region for placing the tube whereas in two patients the space was inadequate and required third molar extraction (18.2%). Intra-operatively tube displacement was noticed in one case, no other consequences like tube kinking or leak was recorded**.** There was a mild hindrance by the tube in achieving the occlusion in one case. Neither the anaesthesiologist had difficulty in managing the airway nor was there an accidental extubation during the surgery.

Discussion

As evident from the literature, retromolar intubation is an attractive option for maintaining the airway in maxillofacial trauma[1]. However, there are limited literatures on the use of the retromolar route for orotracheal intubation of difficult airway especially for those requiring panfacial surgeries [1]. Awareness on the availability of retromolar route for intubation among anesthetists and surgeons seems to be low. The aim of the study is to add the existing body of evidence about the option of retromolar orotracheal intubation in those cases which require MMF intra-operatively and nasotracheal intubation was contraindicated.

In the current study 9 patients (81.8%) had adequate retromolar space for placing the tube which is confirmed by Dutta et al on his study in 42 patients underwent a variety of maxillofacial procedures [6]. Arora et al proved that there was enough space in children for endotracheal intubation through retromolar route [2]. Third molar extraction was advised in case of insufficient space. In majority of population third molars are malpositioned, impacted and are cause of periodontal disease and dental caries. Therefore, these are otherwise indicated for extraction and do not require replacement. Gibbons et al. reported a case where retromolar placement of the endotracheal tube was used in complex craniofacial trauma after extracting the nonfunctional third molar [7]. In our study we observed the need for third molar extraction only in 2 cases (18.2%) for proper positioning of the tube. Martinez et al who first described retromolar intubation in complex craniomaxillofacial surgeries performed ostectomy at the ascending ramus of mandible to create space for endotracheal tube. But in our study we didn't require any ostectomy procedures [4].

The literature shows that too aggressive fixation can cause kinking of the tube, [1, 5] the bending of tube may also occur during intraoperative period when achievement of dental occlusion is done by intermaxillary fixation [1,6]. In our study we found that out of 11 cases, only in one case (9.09%) the tube got displaced which might be due to inadequate fixation of the endotracheal tube.

In literature the main disadvantage of this technique is that the tracheal tube can take up the space of main surgical area and application of surgical instruments may be difficult, especially in patients with bilateral maxillary/ mandibular fractures [1, 5]. In our study there was a mild hindrance by the tube in achieving the occlusion in one case (9.09%), which might be due to the large sized armoured tube (8.5FG was used for this particular case).

In the current study the anaesthesiologist didn't have any difficulty in airway management. Although it has been recommended that the flow of oxygen should be kept below 6 L/min to prevent cervical and facial subcutaneous emphysema [1]. In few article, the accidental extubation was reported which was due to lack of adequate retromolar space [1, 7]. No accidental extubation was observed in the current study.

According to our preliminary experience, the retromolar space could be taken up by the endotracheal tube. However, the anaesthesiologist had to monitor the peak airway pressure during the operation procedure, especially when the temporary maxillary-mandibular fixation was applied.

This technique is easy to perform, non-traumatic and less time consuming, tube patency can be easily monitored and most important with the retromolar intubation is optimal intraoperative dental occlusion can be achieved [8]. This technique does not impede while operating on the nasal pyramid and allows intraoperative assessment of the new surgical profile, while permitting establishment of normal occlusion. The draw backs is retromolar intubation is questionable in case of bilateral angle fracture. Other potential complications could be adjoining soft tissue and mucosal trauma, long buccal nerve palsy (loss of sensation on buccal mucosa) and inadequacy in attaining dental occlusion [1, 4]. Variation in the dimensions of retromolar space with various occlusion types, skeletal profiles and the minimum dimension required for successful intubation through the retromolar route in the normal population further need to be evaluated.

Conclusion

Retromolar intubation offers a clear advantage over the surgical procedures like submental intubation and tracheostomy, especially in craniofacial, orthognathic, and trauma surgeries involving dental occlusion or nasal bone fracture. Finally, it presents a low incidence of operative and postoperative complications and eliminates the risks and side effects of surgical technique. A good communication is always required between surgeon and anaesthesiologist.

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