

Comparative Evaluation Between Midline Submental Intubation Technique And Lateral Submental Intubation Technique In Airway Management Of Severe Cranio- Maxillofacial Trauma

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Abstract: -

Successful outcomes of any surgical procedure are dependent upon unobstructed access. Management of patients with multiple traumas of the face or those undergoing multiple/complex facial osteotomies has always been challenging, not only to maxillofacial surgeons but also to the anesthetists, as both specialists struggle for the same anatomic territory. Hernandez in 1986 published the first article on the submental route for endotracheal intubation. He developed this technique to avoid tracheotomy particularly in maxillofacial trauma where short-term maxillomandibular fixation was required. This technique allowed intraoperative access to perform dental occlusion and reconstruction of the nasal pyramid in patients with skull base fractures. Submental endotracheal intubation is a simple technique with very low morbidity, and may be used as an alternative to tracheostomy in selected cases of maxillofacial trauma.

In this study we have compared midline submental intubation technique and lateral submental intubation technique in 30 patients of maxillofacial trauma on the basis of several parameters like bleeding, time taken to intubate, complications and scarring.

Key Words: Intubation, nasal, panfacial fracture, submental, tracheotomy, craniomaxillofacial surgery, lateral submental intubation, airway

Introduction:

Management of patients with multiple fractures of the face or the patients who are undergoing multiple facial osteotomies always present with a challenge to oral and maxillofacial surgeons but also to the respective anaesthetists. In most of these situations, neither the oral nor nasal route for intubation is appropriate during the surgical procedure. Conventional oro-tracheal intubation is unsuitable as it hinders and interferes with the surgical procedure. Temporary intraoperative maxillo-mandibular fixation is needed to ensure the correct alignment of fracture fragments, making oro-tracheal intubation unsuitable.

Naso-tracheal intubation is also not recommended in typical cases of pan facial fracture, injury associated with cervical spine, skull base fracture with or without cerebrospinal fluid rhinorrhea, systemic coagulation disorders, distorted nasal anatomy and cases in which continued nasal packing is indicated. Most of the patients may also suffer with associated nasal fractures which preclude the use of nasal route for intubation.

Tracheostomy in such cases has been the conventional technique used for airway management. However it may be associated with life threatening complications, needs special post-operative care, it may also increase the hospital stay and adds to the expenses. Among the many alternative techniques proposed, this study will be assessing the comparative

evaluation between MIDLINE SUBMENTAL INTUBATION TECHNIQUE AND LATERAL SUBMENTAL INTUBATION TECHNIQUE.

Aim of the study:

To evaluate and compare midline submental intubation technique and lateral submental intubation technique in maxillofacial fractures.

SAMPLE COLLECTION

INCLUSION CRITERIA

- 1.) Patients with American Society of Anaesthesiologists grade (ASA) I, ASA II or ASA III.
- 2.) Patients willing to participate in the study.
- 3.) Patients aged 18 years and above.
- 4.) Maxillary or mandibular fracture where nasal intubation is not possible.
- 5.) In case of nasal fracture and deviated nasal septum
- 6.) Fracture reduction and fixation requiring intra op maxillo-mandibular fixation.
- 7.) Patients with CSF leak.
- 8.) Patient with follow up of minimum 3 months.

EXCLUSION CRITERIA

- 1.) Fracture involving maxilla where nasal intubation is possible.
- 2.) Patients younger than 18 years.
- 3.) Patients not willing to participate in the study.
- 4.) Patient with systemic disorder who cannot withstand GA.
- 5.) Large mandibular tori.
- 6.) Presence of extensive sublingual hematoma.
- 7.) Patients requiring extended period of airway support.
- 8.) Patient with extensive bleeding.

MATERIALS:

Flexo-metallic endotracheal tube Other armamentarium: Patient drape, BP blade with Handle, Disposable gloves, Disposable mouth masks, Disposable head caps, Kidney tray, Disposable syringe Sterile gauze, Povidone Iodine, Disposable 27-gauge needles, Curved artery forceps, 3-0 silk Sutures, Pilot balloon cuff

METHODS:

Midline Submental intubation-

The preparation of perioral and sub mental region was performed The midline of face and chin will be marked with a skin marking pencil.

The proposed line of incision in the submental crease will then be marked bisecting the midline of face approximately 1.5 cm in length or slightly greater than the diameter of the number 7 or 8 armored tube.

The mouth was opened and opening was maintained with a suitable mouth prop.

The tongue was elevated in supero-posterior direction with a tongue-stich exposing the ventral surface of tongue and floor of mouth Local anesthetic agent was administered at both intraoral and extra oral sites

A 1.5 mm midline mucosal incision was made intra-orally with a Bard Parker no. 15 blade, posterior to the opening of Wharton's duct. The incision was developed in an inferior and anterior direction between the genioglossus, geniohyoid and anterior belly of digastric muscles parallel to mandible in lingual gingivae The target point was the previously placed sub mental skin incision marking.

The entire dissection was carried out in a blunt fashion using curved hemostat A strict midline dissection plane was maintained

The submental skin was incised and the curved hemostat was exited through the opening The hemostat beaks were opened to widen the opening such as to allow unrestricted passage of the endotracheal tube.

One end of ribbon was grasped into the curved hemostat and the other end will be grasped by another hemostat The first hemostat was retracted back through the sub mental incision guiding the second hemostat attached to further end of ribbon gauze through the sub mental incision into theoral cavity.

While leaving the gauze in place through the incision intra orally the endotracheal pilot tube syringe connector will be grasped by the hemostat first and pulled through the submental incision. A second pass from the submental path was guided with the ribbon gauze. The intraoral part of ET tube was fixed against the palate of the patient with finger pressure to ensure no accidental intubation was occurred.

The endotracheal tube with connector removed was grasped by the hemostat and will readily be delivered through submental incision and the gauze piece will be pulled out. The tube was secured with 3-0 back silk suture. At the termination of surgical procedure, the endotracheal and the pilot tube will be passed back through incision into the mouth reversing the original path. They were then extubated through the mouth and secured. Submental incision was closed utilizing 2-0 black ethilon sutures.



Figure-1 Oro-tracheal intubation is done in the patient



Figure-2 Bulge is seen in submental region through artery forcep



Figure-3 ETT TAKEN OUT FROM FLOOR OF THE MOUTH TO SUBMENTAL INCISION



Figure-4 MIDLINE SUBMENTAL INTUBATION

Lateral sub mental intubation technique: -

- The first step in the procedure is to intubate the patient by oral route in the conventional manner with an armored tracheal tube.
- An ordinary PVC tube should not be used as it kinks very often.
- Tube will be taken out externally via a lateral submental incision.
- Taking all aseptic precautions, a 1.5-2 cm-long incision is made in the submental region parallel and just medial to the inferior border of the mandible.
- Incision is approximately 3mm lateral to mandibular midline sufficient to take out the endotracheal tube comfortably.
- After making the skin incision, long, curved artery forceps is introduced through it.
- A tunnel was made keeping the direction toward the floor of the mouth.
- One must be careful not to injure submandibular or sublingual salivary gland, salivary duct, or lingual nerve.
- To avoid injury to these structures, it was necessary to keep the forceps close to the inner surface of mandible. An incision was made in the oral mucosa of the floor of the mouth tented over the tip of the forceps.
- The endotracheal tube is now disconnected and taken out along with the tube cuff through the tunnel by holding it together with the artery forceps.
- It was now reconnected with the ventilator, the cuff is reinflated, and it is secured with suture with the skin
- We will use a lateral incision (4-5 cm from the midline) and will usually prefer to bring out the tube through the right side.



Figure-5 LATERAL SUBMENTAL INTUBATION



Figure-6 Scar at the day of Suture Removal

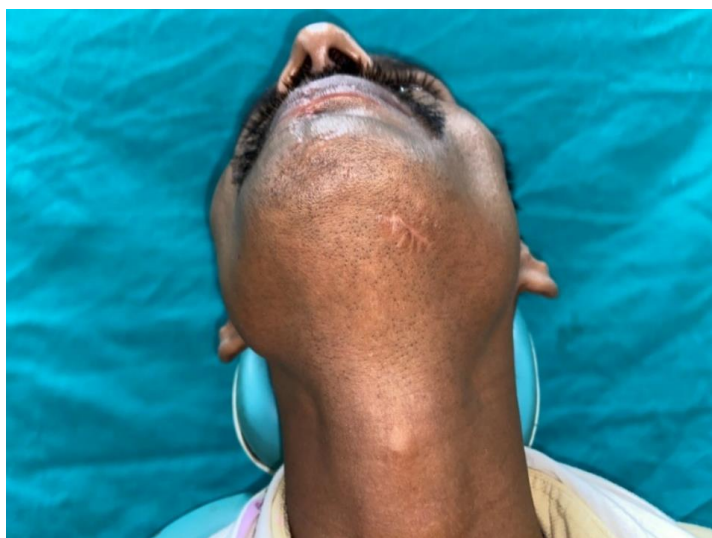


Figure 7- Scar at 3 month post-op Follow-up

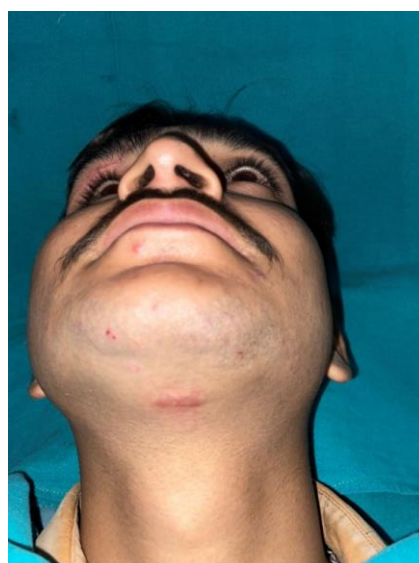


Figure 8-Delayed wound healing seen at 3rd follow-up month



Figure 9- Submental Scar not Visible in straight facial profile

CLINICAL PARAMETERS FOR ASSESSMENT

1.) TIME TAKEN:-

Time required for midline submental intubation technique and lateral submental intubation technique will be calculated starting from the incision given to the time when airway has been established.

2.) BLEEDING:-

Bleeding will be compared through Gauze Visual Analogue.

3.) SCAR ASSESSMENT:-

Scar assessment will be done by patient and observer scar assessment scale.

4.) COMPLICATIONS:-

Intra-operative and Post-operative complications (such as sublingual mucocele, lingual nerve paraesthesia, dual passage formation in submental and sublingual area, bleeding from lingual artery, tube pushed into the bronchus, stitch abscess) will be noted and evaluated.

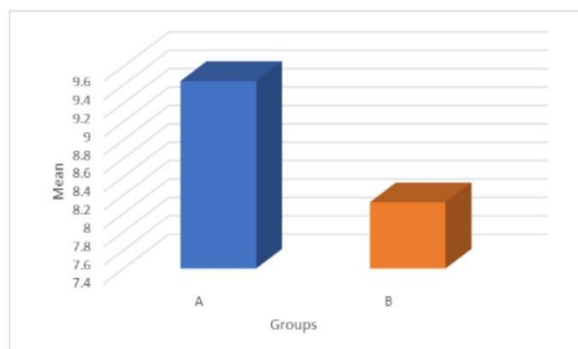
Results

Study was divided in 2 groups:-

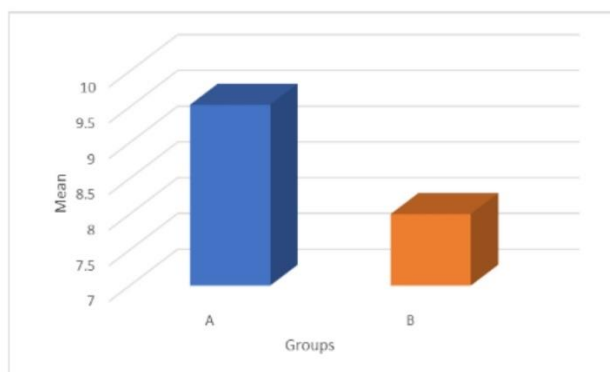
Group A – Patients who underwent Midline Submental Intubation.

Group B - Patients who underwent Lateral Submental Intubation.

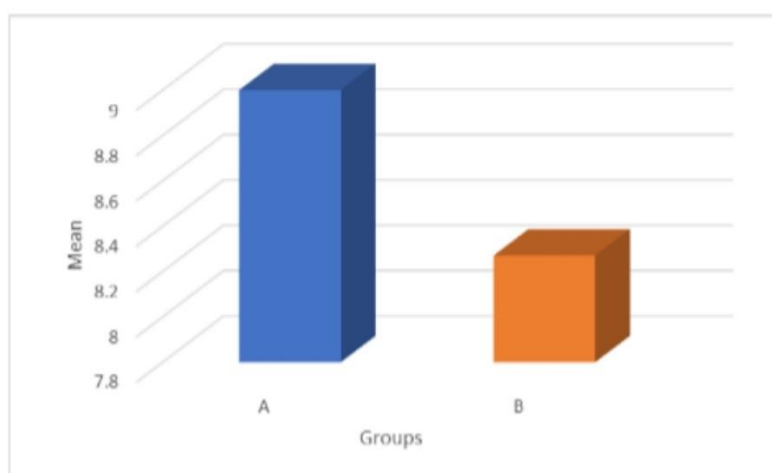
Comparative Evaluation of Time Taken to complete Submental Intubation



Comparative evaluation of mean Amount of Bleeding (ml) among two study groups



Comparative evaluation of mean patient scar assessment score among two study groups



Discussion

The study included 30 patients who were managed with sub mental intubation (15 with midline submental intubation and 15 patents with lateral submental intubation respectively) for airway management during various maxillofacial surgeries. Midline sub mental intubations were successful and performed within an Average Time of 9.4 ± 2 minutes and Lateral Submental intubations with an average time of 8.4 ± 2 minutes. Time taken was evaluated from the time when incision was given to the time when airway was completely established.

Indications for the technique, included pan-facial trauma associated with nasal fractures/nasal 62 bleeding, patients with nasal packing in situ, patients with inferior nasal turbinate hypertrophy, patients with naso-orbito-ethmoidal fractures, patient with failed attempts of nasal intubation. The only contra indication is sublingual hematoma formation.

Comparative evaluation of Bleeding among the 2 study groups were done with the Gauze Visual Analogue Scale stated that in Lateral submental intubation technique the bleeding seen was less than Midline Submental intubation i.e. an average of 8.2ml and 9.0 ml respectively.

Discussing about the Scar Assessment Comparison done with Patient and Observer Scar Assessment Scale of mean patient overall opinion score among two study groups Patients Overall Opinion Score was better in Lateral Submental intubation technique than midline submental intubation technique which was 2.20 and 2.40 respectively.

Comparison of mean Observer Overall Opinion Score among two study groups shows score of 2.93 in Midline submental intubation technique and 2.27 in Lateral submental intubation technique.

Minor post-operative complications of stitch abscesses were present in 2 patients. The intubation tube connector could not be detached intra operatively in one case. Both complications were easily managed with no associated morbidities. The scar assessment

scores from both patient and observer assessment was satisfactory and the surgical scars were well tolerated by all patients. All attempted sub mental intubations in our study were successful and maintained throughout the indicated surgical procedure. The anatomical landmarks described by Macinnis and Baig were accurate and no variations to the described anatomy were encountered. All patients were extubated in the operation theatre and the mean operating time was about 3.08 hours. Duration of disconnection from the ventilator was less than a minute and no drop in oxygen saturation was encountered. We prefer the use of a flexo- metallic endotracheal tube as it reduces the chances of kinking of the intubation tube when passed through the sub mental area. The passing of the intubation tube through the sub mental region proved useful as it allowed unimpeded manipulation of fractured fragments, satisfactory achievement of occlusion, establishment of maxillo-mandibular fixation. It also allowed control of the dental occlusion and concomitant surgery of the nasal pyramid in major maxillofacial traumas and avoided the risk of iatrogenic placement of the tube in the skull base in cases of nasal fractures that involved the base of the skull.

The intubation tube was firmly secured out of the surgical field of the surgeon and therefore provided it protection from any accidental injuries to the tube.

A literature review by Judnt et al. in 2012 [42] included 842 cases of sub mental intubation, and had documented success in all intubations performed. They concluded that, "Sub mental intubation is a safe, effective and time efficient method of securing an airway when increased surgical exposure or restoration of occlusion is a priority." Our study concluded with similar results, as no adverse effects were added to the surgical procedure by the use of this technique and having the tube out of the surgical field drastically improved accessibility to the facial structures. Performing sub mental intubation was simple, time efficient and devoid of any complications.

In reference to the contraindications to the use of this technique, Macinnis and Baig had proposed that the technique should not be used in patients with complicated neurological deficit, patients with multi-systemic trauma where long-extended airway support and special maintenance is important and expected severe keloid formers. In many following studies such patients were excluded. Christophe Meyer et. al in 2003 also stated that "In our view the contraindications to this method of intubation are the likelihood that patients will require a long period of assisted ventilation, i.e. multi-trauma patients presenting with severe neurological damage, major thoracic trauma or patients for whom repeated operations can be anticipated.

When Compared and Evaluated to tracheostomy, sub mental intubation presents with fewer postoperative complications and also demands less postoperative care which may result in shorter duration of hospitalization. This procedure can be conducted out even in a limited resources set up but despite several articles claiming prolonged sub mental intubation without any complicated effects and no reports on the contrary, prolonged sub mental intubation more than 72 hours has never been conventionally practiced due to elevated risk of laryngeal damage and even pneumonia. Therefore tracheostomy is the feasible choice in cases where long period of assisted ventilation is required or in patients that require multiple surgeries.

Conclusion

The Results of our study confirmed Lateral Submental Intubation technique demands lesser time; bleeding encountered intra-operatively is comparatively less; the scar is more acceptable to the patient and observer as compared to Midline Submental Intubation technique when evaluated among 30 patients of Maxillofacial Fractures.

Submental intubation is a successful method of managing the airway in cases of maxillofacial fractures. The technique is rapid and provides a good surgical access without any distortion to the oro-nasal distortion, it also provides access to intra-operative manipulation of occlusion moreover the technique is cost effective and doesn't demand any extended postoperative care.

Concluding about the scar, the scar is well accepted by the patient as it is not seen in straight profile of the patient and is hidden under the mandible.

So the patients in whom naso-tracheal intubation could not be conducted Submental Intubation is the reliable choice of intubation in maxillofacial fractures.

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