



Three Points of Anchoring Technique For Securing Nasal Endotracheal Intubation in Maxillofacial And Oral Surgeries

KEYWORDS

Three Points of anchoring, Nasal Endotracheal Intubation, Occipital Protuberance, Forehead, Corrugated Extension Tube, sturdily secured, Non-Invasive technique.

Dr. Banerjee Shamol

Associate Professor and Head, Department of Plastic Surgery, Grant Government Medical College and Sir J.J. Group of Hospitals, Mumbai.

* Dr. Chandrakant R. Gharwade

Assistant Professor Plastic Surgery, Department of Plastic Surgery, Grant Government Medical College and Sir J.J. Group of Hospitals, Mumbai. * Corresponding Author

Dr. Mukund Parchandekar

Associate Professor Anaesthesia, Department of Anaesthesiology, Grant Government Medical College and Sir J.J. Group of Hospitals, Mumbai.

Dr. Ameya Bindu

Senior Resident, Dept of Plastic Surgery, Grant Government Medical College and Sir J.J. Group of Hospitals, Mumbai.

Dr. Fidvi Al-Iquan J

Senior Resident, Dept of Plastic Surgery, Grant Government Medical College and Sir J.J. Group of Hospitals, Mumbai.

ABSTRACT

Context: Vista of facial surgeries done on face requiring frequent change of the head in different positions by plastic & Maxillofacial surgeons mandate safe and secured fixing of the ET Tube.

Aim: This study was aimed at assessing the effectiveness of securing nasal tube by Three points of Fixations practiced by us and its advantages over other popularly followed methods of ET tube fixation in maxillofacial surgeries.

Material Methods: A prospective observational study was done over a period of ten years which included all maxillofacial surgeries requiring Nasal endotracheal intubation done in our institutes. Locally available materials in the form of tape gauze & corrugated extension tube were used to secure the nasal ETT. Effectiveness was assessed in terms of ease and reproducibility of the procedure, frequency of slippage of the tube on head movement, obstruction and difficulty in assessing facial symmetry caused to the operating surgeon. The integrity of the connection was assessed physically and monitored throughout the course of the anaesthesia.

Result: Of all the 560 patients included in the study over a period of 10 years, there was no incidence of kinking, dislodgments or Accidental Extubation of the ET tube.

Conclusion: Three points of anchoring for Securing Nasal ET tube was easy & followed in all cases. It is a non-invasive, quick, sturdily secured technique, reliable, minimal time consuming, Giving good exposure for assessment of facial symmetry and at a low cost with readily available material, useful for intraoperative & perioperative anaesthesia & in ICU patients.

Introduction

Facial surgery of any type is associated with problems in securing of the ET Nasal Tube. Many methods and devices have been attempted for fixation of these for various types of surgical procedures on the face. Blood, saliva, and disinfectant solutions interfere with tape adhesion¹. Requirement for different surgical exposures in maxillofacial surgeries mandates minimal area to be utilized in fixation of these tubes. We have devised a simple non tedious method using locally available bandage to secure the nasal endotracheal tube for maxillofacial surgery requiring intra-operative maneuvering of head position. The main goal of reliable fixation in patients with facial trauma is to eliminate the possibility of the tracheal tube being kinked² or accidental extubation^{3,4} due to intra-operative different manoeuvring for facial Fracture reduction and change of head position and as these patients are often very difficult to reintubate once surgery has started.

Significance of the study

Nasal endotracheal tube securement is a daily and vital part in all surgeries especially maxillofacial surgery and for unincidental practice in ICUs. A myriad of methods that

are designed to secure the ETT vary from straps of tape or cotton string, to mechanical devices with integrated securing mechanisms. All of these methods and techniques have similar goals which keep the artificial airway secure with patient safety by maintaining an intact airway and minimize the chance of ETT slippage, unplanned extubation or other complications. The most effective method of ETT securement must include certain key elements to be successful that provide maximum stability against inadvertent movement, good exposure of face, it should provide a resistance to oral secretions without becoming loose, hold the ETT securely without slippage, also easy to manipulate and easily applied with relatively little time involvement.

Material and Methods

We used this technique with ease for Maxillofacial surgeries including TMJ Ankylosis, Facial Trauma with Fractures & CLW,s, Onco-plastic Reconstruction of Face. We also included some patients who were Nasally intubated in ICU setting. After nasal intubation with a standard endotracheal tube, the tube is connected to a corrugated plastic connection extension (gooseneck adapter) to allow better

accessibility and exposure of the entire operative field. It is taken over the nose over the scalp of the patient. In addition The tube may be fixed over the nose with a usual adhesive Opsite dressing .

A roller bandage preferably a tape gauze is tied caudal to the occiput taking advantage of the occipital protuberance (Fig B, Arrow 1), bringing the tape behind the ear and tied over the forehead superior to the Supraciliary Prominence, glabella & caudal to the frontal bossing with a cotton pad as cushion between the knot and the skin (Fig A & Fig B Arrow 2). Once the tape is securely tied to the skull, then it is now looped over the corrugated extension tube and fixed over it's one of the corrugations (Fig B, Arrow 3). It is imperative the knots be not tight so as to kink the tube and increase airway pressure (Fig C). A sterile mop is kept wrapped around the tube from nostril, as far behind as possible till the securing the knot over the extension tube. Draping done so as to cover the ET tube along with the corrugated tube and thus secluding the area out of the sterile field. The integrity of the connection was assessed physically and monitored throughout the course of the anaesthesia by an independent anaesthesiologist or a house surgeon as an independent assessor and it has been observed that intra-operative different manoeuvring for facial Fracture reduction and change of head position does not dislodge the ETT position as it is firmly secured with the skull. This was a prospective study and evaluated 560 patients over a 10-year period & we did not come across any inadvertent accidental extubation.



Fig A- The tape gauze initially fixed over the Occipital Protuberance and brought over the forehead.

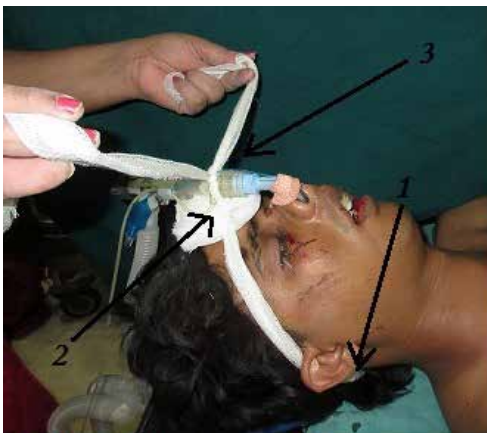


Fig B- 3 points of fixation of tape gauze. Occipital Protuberance (1), Forehead (2) and Corrugated Tube (3)



Fig C Showing the tube fixed completely over the forehead

Discussion

The method of safely and sturdily securing an endotracheal tube is of utmost importance in maxillofacial surgeries. Tube disconnection (6%), Tube compression (2%), Accidental extubation (2%) were complications⁴ frequently reported after tube fixation and during course of the procedure.

The most widely done method is by using a dynaplast tape and wrapping it around the tube and sticking it over the face. This is more disadvantageous than advantageous as the tape hinders & make it difficult to take some facial incisions and also it pulls on facial structures which make surgeons difficult to assess the proper facial symmetry for its important structures like eyelids, eyebrows, lip, Ear, malar prominence etc. The tape is painful to remove on tube removal. Like every other method our method does not require frequent monitoring by anesthetists and this lessened anesthetist intervention which may thus decrease manpower and also operating time. Kupas et al.⁵ explained that the pressure on the lips created by the unsupported weight of ETT done with adhesive tape may compromise the micro-circulation of the lips and lead to a pressure area on the oral mucosa even though for a short period of time. In our method the tube is fixed in such a manner that the pressure is more on skull rather than on the lips.

Various tapes have been described for fixation of ET tube. But this may carry the risk of slippage of tube, tape or ligature knot. There is a distinct advantage in our method where the tube is fixed at a site away from the oral cavity and hence does not interfere during surgery or maneuver of the head in various positions. Where may also be allergy to the adhesive material on the tape⁶.

The use of dental wire^{7,8} to the upper incisors is a dated, simple, yet not well-known procedure which can be performed in approximately five to ten minutes in the operating room. With the wire fixation method, the wire can be easily removed prior to reversal of anesthesia. Removal may be accomplished utilizing either plain wire-cutters or unraveling the ends simultaneously with two needle holders. But there are many follies which can be pointed out in this method of tube fixation. Firstly it is invasive as contrary to our procedure for fixation of the tube. Also our method has an advantage of being able to use in edentulous patients. It does not requires presence of intact teeth which may be frequent in maxillofacial fracture patients. Following wire removal or cutting, chances of slippage of small wire segments in to the upper airway are present.

Also presence of dental wire may interfere with arch bar and IMF which are a *sine qua non* in maxillofacial surgeries. Wire can cause damage to teeth. Wires around the tracheal tube are difficult to adjust after they are placed and require wire cutters. Wires around the front incisors may damage the dental enamel and interfere with dental hygiene.

The external cranial fixation device of Hansen,' adapted from the apparatus devised by Georgiade for external fixation of facial fractures, is more complex and cumbersome, involving insertion and removal of multiple cranial bone screws. This is a time-consuming and invasive procedure. It appears applicable only for extensive facial burns requiring long-postoperative intubation with little use in maxillofacial fracture surgery. The technique introduced by Galvis⁹ is one where a thin-walled polyvinyl endotracheal tube is split down the middle after insertion, and an endotracheal tube adapter placed where the tube was split. Utilizing the flanged ends of the cut tube, they are then tied around the neck with twill tape to secure the tube. This method only secures the endotracheal tube prior to surgery and is not applicable intra-operatively or postoperatively and appears to be a procedure for ICU settings.

Another method consists of securing the tube to the lower lip after intubation by passing a 2-0 non-absorbable suture most commonly braided silk¹⁰ through the lower lip mucosa anteriorly and tying the suture. This method can induce soft tissue damage as well as bleeding, with the possibility of the suture pulling through the mucosal tissue and dislodging the tube, resulting in a possible accidental extubation. Jensen' proposes tying a 0 silk suture circumferentially around the lingual base of the tooth and securing the endotracheal tube to a knot tied 2 cm above the initial knot. The endotracheal tube is further secured with an inferiorly-based 0 silk. A suture secured in this fashion may break with intraoral manipulation, as well as slide down the silastic ET tube, predisposing to unplanned extubation. As no suturing is required in the technique followed by us, such complications are not seen.

Techniques like hose stabilizer, nasotracheal splint use of saline bottles¹¹ interfere with exposure of the face and hence assessment of symmetry while operating on the face. The use dental rubber dam clamp¹² though is effective in holding the ET in a fixed position is not easily available and is also not cost effective. It also requires a special equipment for its placement over the teeth. An important prerequisite is presence of a stable dental architecture. In our method of tube fixation no special equipment is required for fixation or for its effective placement. Also can also be done in edentulous patients

Fixation of the ETT has long been a concern particularly when the patient needs to be intubated for a long period¹³. The effective method of endotracheal tube stabilization, in patient which would reduce the rate of accidental extubation, requires infrequent re-stabilization to maintain ETT stability and would reduce ETT slippage¹⁴.

Conclusions and Recommendations

So far, we have used this method on many Patients for facial surgeries. Our results have been gratifying, with no displacement, dislodging or Kinking of the endotracheal tube. We have not encountered any problems such as inadvertent extubation, septal damage, or pressure necrosis. Most major maxillofacial reconstructions are electively ventilated postoperatively, and we have found that patients

tolerate this technique of Securing ETT well in the post-operative period required after supra-major surgeries like complex onco-plastic facial reconstruction with free tissue transfer & Complicated Pan-facial fractures in the post-anesthesia care unit.

We recommend the use of our Three points of anchoring technique for securing Nasal ETT which is non-invasive, inexpensive, quick, easy, sturdily secured technique using locally available material at no extra cost to any surgeon contemplating a maxillofacial surgery in any patient intra-operatively, postoperatively and in intensive care unit.

References

- Honig JF, Merten HA, Braun U. Intraoral dental fixation of endotracheal tube using a cofferdam clamp. *Anaesthetists* 1990; 39:422-3.
- Hübler M, Petrasch F. Intraoperative kinking of polyvinyl endotracheal tubes. *Anesth Analg* 2006;103:1601-2.
- Szekely SM, Webb RK, Williamson JA, Russell WJ. The Australian Incident Monitoring Study. Problems related to the endotracheal tube: An analysis of 2000 incident reports. *Anaesth Intensive Care* 1993;21:611-6
- Desalu I , Adeyemo W, Akintimoye M, Adepoju A. Airway and respiratory complications in children undergoing cleft lip and palate repair. *Ghana Med J*. 2010 Mar;44(1):1620
- D.F. Kupas, K.F. Kauffman, H.E. Wang, Effect of airwaysecuring method on prehospital endotracheal tube dislodgment, *Prehosp. Emerg. Care* 14 (1) (2010) 26-30, Matched ISSN: 1090-3127 (View via PubMed) Linked
- Widman TJ¹, Oostman H, Storrs FJ. Allergic Contact Dermatitis from Medical Adhesive Bandages in Patients Who Report Having a Reaction to Medical Bandages Dermatitis:
- Botts J., Srivastava K.A., Matsuda T, Hanumadass M.L. INTERDENTAL WIRE FIXATION OF ENDOTRACHEAL TUBE FOR SURGERY OF SEVERE FACIAL BURNS. *Annals of Burns and Fire Disasters - vol. X1 - n. 3 - September 1998*
- Wingate G, Stevenson GW, Pensler JM. Rigid endotracheal tube stabilization during craniomaxillofacial surgery. *Ann Plast Surg* 1989;23:459-60
- Galvis A.G., Mestad P.H.: Modified endotracheal tube for airway management of children with facial burns. *Anes. Analg.*, 60: 116-7, 1981
- Jensen NF, Kealey GP. Securing an Endotracheal Tube in the Presence of Facial Burns or Instability. *Anesth Analg*. 1992;75:641-2.
- Sadawarte PS, Gadkari CP, Bhure AR, Lande S. Non conventional way of securing endotracheal tube in a case of facial burns. *J Anaesthesiol Clin Pharmacol* 2013;29:267-8
- G, Chan DN. Intraoral stabilization of the endotracheal tube using a dental rubber-dam clamp. *Plast Reconstr Surg* 1982;70:96-7.
- H. Levy, L. Griego, A comparative study of oral endotracheal tube securing methods, *Chest* 104 (5) (1993) 1537-1540, Matched ISSN: 0012-3692 (View via PubMed) Linked
- M. Jarachovic, M. Mason, K. Kerber, et al, The role of standardized protocols in unplanned extubation in a medical intensive care unit, *Am. J. Crit. Care* 20 (4) (2011) 304-315, Matched ISSN: 1062-3264 (View via PubMed) Linked.