



COMPARATIVE EVALUATION OF VARIOUS TECHNIQUES OF INTUBATION IN MAXILLOFACIAL SURGERY.

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ABSTRACT

Background Patients with maxillofacial trauma have an anticipated difficult air way. Various modalities for securing airway in maxillofacial surgeries are nasotracheal, retrograde, submental, fiberoptic intubation. The present study was planned to assess the efficacy, utility, duration and complications of various techniques of intubation in maxillofacial surgeries. **Methods.** Patients were divided into 4 groups (NT, RG, FB, SM) of 50 each according to the beforehand criteria of choosing the patients into the respective group. After confirmation of endotracheal intubation; success and duration of intubation by above mentioned techniques and incidence of complication were recorded. **Results** From this study we interpret that successful first attempt intubation was accomplished via fiberoptic in 96% cases and submental in 88% cases as compared to retrograde 84% and nasotracheal in 76%. potential complications were least with fiberoptic technique. **Conclusion** We believe that training and practice of different modalities of airway management in maxillofacial trauma could increase the success rate of the technique as well as decrease the complications associated with it. Mastering various techniques of intubation can help to excel airway management in maxillofacial surgeries.

KEYWORDS: fiberoptic, submental, retrograde, nasotracheal.

INTRODUCTION

Maxillofacial trauma and surgery presents a complex problem due to the disturbance of normal anatomy. Maxillofacial trauma requires special attention as it is potentially life-threatening and has long morbidity for the patient.^[1] In such cases, it is expected to face difficulty in oral intubation that may hinder intraoperative intermaxillary fixation or surgical procedure. Maxillofacial trauma is unique in posing challenges for airway management.^[2]

There are various techniques of airway management have been described that include oral intubation, nasal intubation under direct vision, blind nasal intubation, fiberoptic guided nasal intubation, submental intubation and tracheostomy.^[3] Each technique has its own merits and demerits.

Nasal intubation is preferred over oral intubation in cases of panfacial trauma where intermaxillary fixation in normal dental occlusion is required to do accurate plating of various mandibular and maxillary fractures [saraswat v]. If nasal bone reduction is also needed along with maxillary and mandibular plating then submental intubation or tracheostomy is preferred as the possible methods of airway management.^[1]

Aim of this study was to compare success rate of various intubation techniques in maxillofacial surgery and to evaluate the technique associated with least number of complications.

MATERIALS AND METHOD

200 patients posted for elective maxillofacial surgery under general anaesthesia were included in the study and divided into four groups (n=50) for each type of intubation. Patients belonging to American Society of Anesthesiologists (ASA) grade I and II scheduled for maxillofacial surgeries like panfacial fractures, mandibular fractures, fractures of Le-Fort type I, II and III, ankylosis of temporomandibular joint, submucous fibrosis and oral malignancies aged between 6 to 55 years of either sex were included in the study. Patients with ASA grade III/IV and requiring emergency surgeries were excluded from the study. 50 individuals were selected for each type of intubation.

Beforehand Criteria for choosing the technique of airway management were as follows:

Nasotracheal intubation

Patient with adequate/limited mouth opening requiring dental occlusion for maxillomandibular fixation (oro-tracheal intubation not feasible).

Retrograde/Fibreoptic intubation

Patients with inadequate/ no mouth opening.

Submental intubation

Patients where both oral & nasal intubation deemed unsuitable.

Patients were premedicated with injection glycopyrrolate 10mcg/kg, injection midazolam 0.03mg/kg; injection ondansetron 30mcg/kg and injection dexamethasone 0.4mg/kg body weight. Patients in which nasal route was chosen, additional 4% topical xylometazoline nasal drops night before surgery and 30 minutes before induction was given.

Nasotracheal Intubation: Patients were induced with injection propofol 2mg/kg and relaxed with succinylcholine 2mg/kg. Endotracheal tube advanced till nasopharynx via nasal route and guided further through vocal cords under direct laryngoscopic vision.

Submental Intubation

After induction of general anaesthesia oral intubation was performed with a reinforced (spiral embedded) flexometallic tube (Rush Germany). The connector was checked beforehand for proper fit into tube, so that it can be easily removed and reattached in next step. After intubation throat packing was done. Under sterile precautions a 1.5cm skin crease incision was made in submental region just medial to lower border of mandible, 1/3rd of the way from symphysis to the angle of mandible. The site used for incision was as far as possible from fracture site of mandible to reduce tube manipulation. Floor of mouth was exposed by retracting the tongue. A curved artery forceps was introduced and by using blunt dissection a tunnel was created close to the lingual aspect of mandible in order to avoid injury to submandibular duct and lingual nerve. Endotracheal tube was then disconnected from breathing circuit and connector of tube was removed. While stabilizing tracheal end of tube with Magill's forceps/ thumb and index finger the proximal end of tube was pulled out through the tunnel. The pilot balloon is then grasped with an artery forceps and pulled out gently. The connector of tube and breathing circuit were reattached. After ensuring bilateral air entry and confirmation by capnography tube was secured with skin sutures.

Retrograde Intubation

Induction was done with propofol slowly till the patient went to sleep. Nasopharyngeal airway was passed through one nostril and fixed properly. Anesthesia circuit was attached and O₂ + N₂O 50% along with inhalational

agent continued to deepen the plane of anesthesia. Patient was maintained on spontaneous ventilation with max concentration of inhalational agent. 18 G angiocatheter was passed carefully between 2nd and 3rd tracheal rings at 45 degree angle. The entry into trachea was confirmed by aspiration of air. 2ml of 2% lidocaine injected intratracheally at end inspiration. The J tipped PTFE coated fixed core guide wire of diameter 0.035, length = 150 cm (Devon Innovation P. Ltd) was introduced through angio catheter till retrieved through nostril, as guide wire usually follows the path of least resistance. Endotracheal tube was rail roaded over the guide wire with beveled end of the endotracheal tube facing posterior to facilitate entry through glottis. Guide wire was removed after confirmation of endotracheal tube position by capnography and auscultation.

Fibreoptic Intubation

After preparation of patients airway "spray as you go" technique was followed to anesthetize the upper and lower airway. The insertion shaft of bronchoscope was lubricated and endotracheal tube was preloaded over the scope. The tip of tube dipped in warm saline to soften up for easy passage. Airway was navigated easily by spraying Xylocaine 2% when glottic opening was seen. Fibroscope was aimed for black holes which are open spaces. After the glottis is passed and tracheal rings were visible preloaded Endotracheal tube was rail roaded over the scope gently and position of tube was confirmed by auscultation and capnography.

OBSERVATIONS AND RESULTS

Time taken for intubation was noted in all patients (in seconds) and when compared were found to be significant statistically ($p < 0.0001$) (Table 1). Honest statistical difference was found to be significant for all the procedures ($p < 0.01$, table 2). Attempt of successful intubation was recorded in all individuals. First attempt success was found to be maximum in fibreoptic group ($n=48$, 96%) while nasotracheal intubation recorded 38 (76%) cases (Table 3). Incidences of complications were recorded in all four groups. Complications were assessed for bleeding, accidental extubation, esophageal intubation, infection and subcutaneous emphysema. Cases with nasotracheal intubation exhibited highest number of complications (bleeding- 08, accidental extubation- 01 and esophageal intubation- 01). Four cases in retrograde intubation showed bleeding while 1 case each of accidental extubation and subcutaneous emphysema were recorded. Complications like infection ($n= 03$) and accidental extubation ($n= 02$) were noted in submental intubation. Fibreoptic intubation was found to be the technique with least complications (table 3).

Table 1: Mean time for intubation in various techniques.

Parameter	Nasotracheal	Submental	Retrograde	Fiberoptic
Mean Time	14.66	354.24	160.96	84.36
SD	2.88	51.3	34.1	14
P	0.0001			
Inference	Statistically highly significant			

Table 2: Tukey's HSD Test for mean time for intubation

Parameter	Submental	Retrograde	Fiberoptic
Nasotracheal	P<.01	P<.01	P<.01
Submental	-	P<.01	P<.01
Retrograde	-	-	P<.01
Inference	Statistically significant between groups		

Table 3: Success of intubation.

Mode of Intubation	Nasotracheal (50)	Retrograde (50)	Sub-mental (50)	Fibreoptic (50)
No. successful first attempt	38	42	44	48
Success (%)	76%	84%	88%	96%

Table 4: Complications in various modes of intubations.

Mode of Intubation	Nasotracheal	Retrograde	Submental	Fibreoptic
Bleeding	08	04	00	01
Infection	00	00	03	00
Accidental Extubation	01	01	02	00
Esophageal Intubation	01	00	00	00
Subcutaneous emphysema	00	01	00	00

STATISTICAL ANALYSIS

Means for time recorded for intubations were calculated and compared by Analysis of variance (ANOVA). Tukey's post-hoc analysis for Honest Statistical Difference was performed after ANOVA. The percentages of first attempt success were also calculated. Complications in various techniques were also recorded.

DISCUSSION

Anesthesiology is an integral part of every surgical procedure. Nasotracheal intubation is the commonest method used to induce anesthesia in oral surgery. It has an advantage of providing good accessibility for oral surgical procedures. Nasotracheal intubation involves the tracheal tube to pass through nose and allows better isolation and good surgical access for intraoral procedures.^[4] In maxillofacial surgery, the proximity of the operative site to the natural airway creates a special anesthetic problem. Maxillofacial trauma is a fitting example of a difficult airway. The anesthesiologist faces challenges in their management at every step from access of airway, maintenance of anesthesia, extubation and postoperative care of patient.^[5,6] The present study was designed to compare different intubation techniques for time taken, occurrence of complications and first attempt success of intubation. In this retrospective study 200 individuals were included and divided into four groups of 50 each.

Time recorded in all variants of intubation was found to be statistically significant between and within the groups. Time required for fiberoptic intubation was least between

all procedures (84.36 seconds). This was in accordance with the study conducted by Smith et al^[7] where 2 trainee groups took 70.8 seconds and 84.4 seconds to perform the procedure. Further, Lee et al^[8], while comparing fiberoptic intubation with Trachway found that average time required for the former procedure was 71.8 seconds. In the present study maximum time was taken by submental intubation. Vidya et al² recorded mean time of 8 minutes for submental intubation. Study on retrograde intubation by Barriot et al^[9] took less than 5 minutes to complete the procedure.

Maximum first attempt intubation was achieved in fiberoptic variant followed by submental retrograde and nasotracheal intubation (table 3). Various complications have been reported resulting from nasal passage of the tube, such as turbinectomy or retropharyngeal dissection. The most common complication of nasotracheal intubation is epistaxis/bleeding, which occurs with an incidence of 18–66%.^[10] Submental intubation may pose complications reported in the literature, like infection, fistula, bleeding, hypertrophic scarring, and mucocele formation, ranging between 0.24 to 7.13 percent.^[11] In the present study very few complications like bleeding; accidental extubation and esophageal intubation were recorded (table 4).

CONCLUSION

Science of anesthesia has emerged from its early days of trial and error to modern day techniques and equipment. An experienced anesthetist while working for maxillofacial surgeries may come across challenges to

achieve successful intubation due to complications like limited mouth opening or panfacial trauma. All variants of intubation techniques have their advantages and disadvantages. Nevertheless, it is responsibility of the anesthetist to choose the correct technique to facilitate the ease of operation to the maxillofacial surgeon.

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