Original Research Article

Airway management and anaesthesia in maxillofacial trauma

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Abstract

Maxillofacial trauma forms a major part of patients attending emergency department because of the frequency and abundant occurrence. Management of airway is pivotal due to distorted anatomy, urgency of establishing airway and proximity of surgical field. This prospective longitudinal clinical study was done in AJ Institute Of Medical Sciences and Research Centre between January 2017 and December 2017. 100 between the age group of 20 to 60years of both the sexes were included in this study. The patients were intubated considering the distorted anatomy of the airway, oropharyngeal bleeding, stability of the cervical spine and the results were tabulated. The techniques included oral and nasal intubation, fibreoptic and rapid sequence induction. This study gives an insight towards the importance to the techniques of securing the airway in maxillofacial trauma cases.

Key Word: Airway, intubation, maxillofacial trauma

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INTRODUCTION

Maxillofacial injuries create a particular interest due to their diversity and abundance of occurrence. They form a majority of the patients requiring emergency attention and utmost care. Maxillofacial fractures are often associated with significant morbidity, loss of function and impairment of quality of life. Airway management in these cases is of significance owing to distortion of normal anatomy, urgency of establishing a secure airway and proximity of surgical field. Airway management problems are not confined to the early stages of 'triage' or to the resuscitation of the patient. Morbidity and mortality of in hospital trauma patients often result from critical care errors. The most common critical care errors are related to airway and respiratory management[1]. Hutchinson *et al* addressed six specific situations associated with maxillofacial trauma, which may adversely affect the airway

1. Posteroinferior displacement of a fractured maxilla parallel to the inclined plane of the skull base may block the nasopharyngeal airway.
2. A bilateral fracture of the anterior mandible may cause the fractured symphysis to slide posteriorly along with the tongue attached to it via its anterior insertion. In the supine patient, the base of the tongue may drop back, thus blocking the oropharynx.
3. Fractured or exfoliated teeth, bone fragments, vomitus and blood as well as foreign bodies – dentures, debris, shrapnel etc may block the airway anywhere along the upper aerodigestive tract.
4. Haemorrhage, either from distinct vessels in open wounds or severe nasal bleeding from

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complex blood supply of the nose, may also contribute to airway obstruction.

5. Soft tissue swelling and edema resulting from trauma to the head and neck may cause delayed airway compromise.
6. Trauma to the larynx and trachea may cause swelling and displacement of the structures, such as the epiglottis, arytenoids cartilages and vocal cords, thereby increasing the risk of cervical airway obstruction[1]. Immediate airway management is absolutely necessary in such situations for immediate fixation of fractures and reconstruction. This study was initiated to study the patterns of maxillofacial fractures, the efficacy of airway management in the casualty and during subsequent fracture fixation.

MATERIALS AND METHODS

This was a prospective longitudinal clinical study of patients presenting to the emergency department of AJ Institute of Medical Sciences and Research Centre between January 2017 to December 2017. Ethical clearance was obtained before the commencement of the study from the Ethical Committee. 100 patients were included in this study. Epidemiological data regarding the age, sex, etiology and patterns of the injury were analysed.

Inclusion Criteria

All patients with maxillofacial injuries irrespective of the etiology between 20 to 60 years of age, both the sexes without significant comorbidities

Exclusion criteria

Patients with head injuries

Patients less than 20 and more than 60 years of age

All the patients were administered general anaesthesia for closed or open reduction, fixation and reconstruction. The study was conducted after proper informed consent. The patients were subjected to a detailed pre-anaesthetic examination. The intubation technique was determined based on Mallampatti classification, ASA scale, thyromental distance and assessment of cervical spine. Routine monitoring in the form of NIBP, pulse oximetry and ECG was instituted upon arrival to the operation theatre. All patients were premedicated with Glycopyrrolate 0.2mg and Fentanyl 1 – 1.5 mcg/kg, Midazolam 0.05 -0.1mcg/kg. For patients with an uncompromised airway, induction was achieved with Propofol 1.5 – 2mg /kg and Etomidate 0.1 -0.2mg /kg after effective preoxygenation. Extubation was done after the surgical procedure when the patients were fully awake, breathing spontaneously with return of muscle tone and obeying of verbal commands. In patients with a difficult airway, nasal intubation was done using a bougie and Difficult intubation was facilitated by way of flexion of neck and extension at atlantoaxial joint and stabilisation of larynx by cricoid pressure.

RESULTS

The mean age of the patients was with a range of 36+/- 2.4 yrs. The patients were in the age group of 20 – 60. There were 76 male and 24 female patients. The mean period of hospitalisation among male patients was 5.1 days and females 5.4 days.59% of the study group had soft tissue facial injuries and 35% had concurrent corporeal injury.

Table 1: Types of maxillofacial injuries

Nasal bone fracture	**36**
Zygoma	22
Zygomatic body	16
Body plus arch	06
Maxilla Lefort I	04

Table 2: Various techniques of intubation

Oral Intubation	**61**
Blind awake Intubation	16
Fibreoptic endoscopy	03
Nasal intubation	18
Rapid sequence intubation technique	02

Open reduction and internal fixation was done in all the patients with zygoma fractures. Closed reduction was done in nasal bone fractures.

DISCUSSION

Maxillofacial injuries can cause enough anatomical distortion to prevent an adequate mask seal and so make mask ventilation impossible. On account of its location in the “crumple zone“ of the face, even minor injuries can result in significant casualty of the airway. Basic airway adjuncts such as oral and nasal airways may actually cause further trauma or be contra indicated and so be lost as an aid to airway management[2].Similarly in our study emphasis was given mainly to immediate establishment of the airway along with control of or onasal bleeding study. According to the study done by Krauz AA, Naajany maxillofacial trauma patient, as every trauma patient, is considered to have a full stomach, since there was no time for stomach emptying prior to intubation. Rapid sequence induction intends to reduce the risk of aspiration[1]. In our study we noticed that maxillofacial trauma patients have an increased risk of regurgitation and aspiration. Rapid Sequence Induction was done to achieve rapid control of the airway while minimising the risk of aspiration of gastric contents. Intravenous induction of anaesthesia was followed by application of cricoid pressure with swift introduction of endotracheal intubation. Study of Barak M, Bahouth H *et al* concluded that maxillofacial trauma presents a problem of difficult

mask ventilation and difficult intubation. The mask cannot be properly close fitted to the face, to enable effective mask ventilation. Furthermore an injured airway may prevent efficient air transferring from the mask to the lungs[3].In our studynasal bone fractures were more complicated by epistaxis and oropharyngeal bleeding from the fracture sites. The airway in maxillary fractures were less often associated with direct airway obstructionbut may compromisethe airway by causing severe bleeding from the fracture sites or from laceration of ethmoidal arteries. Sometimes life threatening bleeding may occur during maxillofacial trauma. In our cases adequate care was given towards volume control and haemostasis.

Factors determining technique of securing airway

1. Anticipated difficult airway
2. Patient's ability to open the mouth
3. Possibility of cervical spine fracture

Difficulty in intubation can be classified according to the view obtained during direct laryngoscopy into four grades. These four grades of laryngoscopic views were defined by Cormack and Lehane in 1984[(4)].

- Grade I – Visualisation of entire laryngeal aperture
- Grade II – Visualisation of only posterior commissure of laryngeal aperture
- Grade III – Visualisation of only epiglottis
- Grade IV – Visualisation of only soft palate

All our patients were evaluated according to Mallampatti, ASA Scale, thyromental distance, LEMON criteria. The score with a maximum of 10 points was calculated by assigning 1 point for

- L – Look externally (Facial trauma, large incisors, beard or moustacheand large tongue)
- E – Evaluate the 3-3-2 rule (incisor distance <3 fingerbreadth ,hyoid / mental distance, <3 fingerbreadths, thyroid to mouth distance <2 fingerbreadths)
- M – Mallampati (Mallampati score >-3)
- O – Obstruction (presence of any condition that could cause an obstructed airway)
- N – Neck mobility (limited neck mobility)

Following surgery, the mucous membranes were edematous, the soft tissues were swollen, and the airway could be compressed as observed by Barak M *et al* .Extubationwas deferred until the edema subsided. The patient was monitored closely and the care providers were prepared for the possibility of reintubation[3].The findings in mid facial injuries observed by Jain U *et al* were skull base fractures, leakage of cerebrospinal fluid from the nose, epistaxis, soft tissue swelling, oropharyngeal haemorrhage, separation of maxillary alveolus and palate, or separation of entire maxilla from the rest of the face. Zygomatic and orbital fractures cause retrobulbar haemorrhage visual disturbance, vision loss, traumatic mydriasis and increased intraocular pressure[5]. Significant findings associated with maxillofacial trauma are bleeding, bruising haematoma, disruption of bony and soft tissues, edema, air leak and subcutaneous emphysema. 100% oxygen is, administered, the airway is cleared of material (e.g. dentures, loose teeth, tissue, blood and vomitus) and basic manoeuvres are done: suction, chin lift, jaw trust, oral airway and bag mask ventilation may all be necessary[5]. In patients with facial fractures, positive pressure face mask ventilation may displace the facial bone fragments, worsen airway obstruction and aggravate subcutaneous emphysema, pneumocephalus, pneumomediastinum and pneumothorax. In some instances, the face mask will improve the situation because it serves as a splint to stabilise facial fractures that have resulted in unwanted motion of facial structures[5]. A third of the intubations were performed in the operating room, indicating that they were not emergent. Spontaneous ventilation is desirable in difficult airway situations in co operative patients and can be facilitated by topical anaesthesia, judicious sedation, patient co operation and removal of vomitus, blood and debris. Rapid sequence induction (RSI) and intubation utilising manual in line axial stabilisation of the head and neck(if indicated) is the alternative[5]. RSI is usually faster and more suitable for uncooperative or haemodynamically unstable patients with major injuries to other organs. Nasal intubation is primarily used for non emergent oral and maxillofacial injury. Mallampati classification provides good assessment of airway but may not be accurate in presence of disrupted anatomy, muscle spasm, tissue edema and presence of arch bars[6]. This was not relevant in our study as other criteria was considered. According to the study done by Singh S, Kumar S *et al*[7] oral endotracheal intubation was the quickest way of securing airway and was employed in nasal bone fractures. Fibreoptic guided nasal endotracheal intubation was noninvasive and safely used in nasal, maxillary and mandibular fractures. Likewise in our study oral intubation was carried in majority of the cases followed by fibreoptic guided endonasal intubation. Oral intubation was rapid in securing the airway and preferred in nasal bone fractures. Fibreoptic nasal intubation helped in real time imaging of the airway but restriced in cases of nasal bleeding.

CONCLUSION

Trauma has been labelled as the neglected disease of modern society. It accounts for thousands of deaths in developed and developing countries[8]. Maxillofacial trauma invariably presents with difficult airway and

demands special attention. Time of surgery should be carefully planned allowing reduction of tissue edema and avoiding development of malunion[5]. Thorough knowledge of the specific attributes of the difficult airway, expertise in managing and prompt recognition of complications are essential for the management.

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