

Maxillofacial Trauma – Initial Assessment and Management Guidelines: An Experience from a Tertiary Care Center

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Abstract: Trauma has become a modern day epidemic, with devastating immediate, short & long term consequences. The rise in high-speed motorbike crashes has led to an entirely different subset of patients. Maxillofacial trauma usually takes the back seat in the management of a poly trauma patient, which should not be the norm, owing to the likelihood of associated lethal injuries. The aim of our study was a better understanding of these injuries, in order to enable us to manage them better. Authors did a retrospective epidemiological study of all the patients coming to our level 1 trauma center with maxillofacial trauma from 2007 to 2013. During this period we observed a total of 909 patients with maxillofacial trauma. These patients were treated at our trauma center and data was collected during the process regarding their age and sex distribution, mode of injury, anatomical site of injury, presence of any associated injuries, need of tracheostomy and treatment initiated. Based on our experience and current management of trauma patients as per advanced trauma life support protocol, we follow these guidelines. During the said period, a total of 216,108 patients visited the Emergency Department of our trauma center. Of these 6766 patients needed admission under the ambit of trauma surgery and 909 needed direct care under maxillofacial surgery. Of these 438 underwent Open Reduction and Internal Fixation and 222 underwent intermaxillary wiring. More common in young (21-30) male adults, Road Traffic Accident (455) was the most common mode of injury while two wheeler drivers (240) were the most common victims. Associated injuries were present in 395 patients. Condyles (130) of the mandibles (305) were the most common structure involved. Maxillofacial injuries can be life threatening and can also lead to major complications such as blindness and facial disfigurement. Despite advances in preventive and therapeutic aspects, they continue to cause a heavy burden to our society. To overcome these problems - multidisciplinary team approach along with strict adherence to well set guidelines is desirable.

INTRODUCTION

Trauma has become a modern day epidemic, with devastating immediate, short & long term consequences. The rise in high-speed motorbike crashes has led to an entirely different subset of patients. Maxillofacial trauma usually takes the back seat in the management of a poly trauma patient. India is the 2nd most populous country of the world with a population of over 1.2 billion and trauma cases account for over 10 of all deaths in India. ¹ Despite legislations making seatbelts and helmets compulsory, road traffic accidents have been increasing in our country by 3% annually. ¹ At a level 1 tertiary trauma center like ours, we receive trauma cases of different types and maxillofacial injuries contribute to a major part of our workload.

Maxillofacial injuries are often a result of high-speed road traffic injuries, ^{2,3} presenting with potentially life threatening injuries. Maxillofacial injury can pose a threat during the primary survey, causing derangement of the physiology, like obstructed airway or bleeding. Moreover the substantial trauma needed for these injuries make them a surrogate of other severe injuries notably –head & cervical spine injury. Complexity of these injuries is exemplified by the fact that, not only during primary survey they pose problem, during secondary survey also they are of concern because of the associated ocular and facial nerve trauma. Face is considered to be the ambassador of one's identity and any disfigurement or deformity is of utmost concern in survivors. Our primary aim during the management of such injuries is to maintain airway, breathing and circulation but once that's is achieved, we must strive to bring the patient as close as possible to his pre injury state in terms of both function and aesthetics. (figure 1)

GUIDELINES FOR MANAGEMENT OF A PATIENT WITH MAXILLOFACIAL INJURY

Patient should be managed by the ATLS (advanced trauma life support) protocol, which aims towards the restoration of the physiology in the acute phase. However maxillofacial injury are much more than a

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distracting injury, as in many patients these injuries may obstruct the airway. The obstruction may due to the presence of blood in the airway or due to tongue fall, as Genioglossus muscle is attached to the mandible. Any unstable fracture of the mandible – causes loss of structural integrity of airway. Patients with jaw and zygomatic arch injuries often have trismus. although the trismus gets resolved with the administration of neuromuscular blocking agents, pre-induction assessment of airway anatomy may be difficult Both maxillary and mandibular fractures will probably make mask ventilation more difficult. (figure 2) However, in some cases mandibular fractures will make intubation easier because of loss of skeletal resistance to direct laryngoscopy. (Traumatized Airway) Endotracheal intubation can be made difficult by the presence of maxillofacial injury ^{4,5} and often a surgical airway is needed. Among the 909 patients, admitted in our hospital, 60 patients required some form of surgical airway in the emergency department. Needle cricothyroidotomy followed by surgical cricothyroidotomy was done in 25 patients; in rest of the patients tracheostomy was done. Cricothyroidotomy should be done instead of tracheostomy because it is comparatively easily done, there is less bleeding and time taken is less. Main cause of non-visualization of the cords was bleeding, which got re accumulated even after repeated suctioning. During definitive surgery of maxillofacial fixation difficult airway management can be done with the use of fiber optic bronchoscope. Submental airway is an acceptable procedure as it saves time and takes the tube out of the surgical field.



Fig.1: Severe maxillofacial injury



Fig.2: CT view of Facial fractures

The pediatric patient often presents with gross edema due to high amount of loose connective tissue and gross comminution is rarely seen in this

age group (2-8 years). Care must be taken to avoid damage to cricoid cartilage, which is the only circumferential support for the upper trachea. Therefore surgical cricothyrotomy is not recommended for children below 12 years of age.⁶

In edentulous patients, quality and quantity of mandible is markedly reduced in edentulous thereby probing the mandible and maxilla to fracture. Moreover, other associated disorders (e.g. cardiac disease, hypertension) are more common in this age group. Lack of teeth can interfere with achieving a proper seal on a facemask. Variables that can affect airway are edentulous state, microstomia and cervical arthritis. Broken dentures should be removed. Finally, arthritis can affect the TMJ and the cervical spine, making endotracheal intubation more difficult and increasing the risk and spinal cord injury with manipulation of osteoarthritis spine. These facts should be taken into consideration while managing airway of such a patient.

Bleeding due to maxillofacial injury is not uncommon, and this bleeding is the usual culprit in jeopardizing the airway. Besides this bleed can lead to haemorrhagic shock – though a rarity. Management revolves around fluid resuscitation along with packing. Pressure with Foley's catheter has also been proven to have a role. Angio embolization of the bleeding vessel – most commonly the maxillary artery is done. In our center Twenty one patients had to undergo angioembolisation for control of bleeding, in six cases surgical exploration was done. The concept of damage control surgery⁷ often has to be applied to these injuries as well. The goal is to scoop and run so as to avoid the lethal triad of hypothermia, acidosis and coagulopathy by performing the bare minimum procedures needed to save the patient. Definitive surgery is carried out later. It is important however to ensure that definite correction such as ORIF is not delayed indefinitely though as this may make aesthetic correction impossible due to mal union of facial bones and contracture of soft tissues. However there is still need for further studies to determine the appropriate timing of repair⁸. Surgery for facio maxillary trauma per se is seldom done as a lifesaving procedure, but after managing life threatening injuries sight preserving surgery can take the precedence, followed by contaminated wounds.(figure 3)



Fig.3: Contrast extravasation from maxillary artery following maxillofacial injury before and after Angioembolisation.

Diagnosis of maxillofacial injury can be made clinically on inspection and palpation, because of the superficial location. Non contrast CT face is the diagnostic modality of choice, but it should not take the precedence as long as the patient is stable. Three dimensional reconstruction of the CT image has come like a boon to us. Orbital wall fractures may cause a myriad of injury patterns ranging from diplopia to vision loss. It also results in herniation and entrapment, most commonly of the inferior or medial rectus muscle, restricting extraocular movements. Chemosis, scleral injection, and periorbital ecchymosis, suggest orbital fractures. Malocclusion, facial asymmetry, step off deformities of the dental arch, mobility of the arch with palpation (performed gently), pain, trismus (restricted mandibular movement) all point to maxillofacial injury.

COMPLICATIONS OF MAXILLOFACIAL INJURY

CSF rhinorrhea may result from disruption of the cribriform plate of the ethmoid bone or the roof of the ethmoid air cells. Diagnosis is usually – can be confirmed. Treatment is directed mainly to prevent meningitis. Broad spectrum antibiotics are instituted. Proper positioning is ensured. Failure of this management mandates either placement of lumbar drain or some form of repair⁹.

Facial nerve injury is usually managed non operatively, spontaneous recovery is the rule in majority. Role of steroids is controversial¹⁰.

DEFINITIVE MANAGEMENT

Goal Of Treatment: The goals of treatment are restoration of form, manifested by normal occlusion, maintain vertical height, facial symmetry and restoration of function, or the capacity to bear the load of mastication. While many fractures can heal solely through the application of MMF, but there is increased risk of malunion due to less dependability of maintenance of position and increased risk of nonunion due to lack of adequate stabilization; therefore, most fractures are treated with open reduction and internal fixation (ORIF). After stabilization of life threatening injuries focus is on the definite management – open reduction and internal fixation, timing of which varies in patient to patient depending on the associated injuries. Fixation has evolved such that currently available strategies include maxilla mandibular fixation (MMF, wire fixation of arch bars to the maxillary and mandibular dental or skeletal elements and to each other), interosseous wiring, rigid fixation with compression plates or lag screws, and semi-rigid fixation with miniplates.(figure 4)



Fig.4: MMF(IMF) Maxillomandibular / Intermaxillary fixation

Miniplate screws are placed only through the outer cortex, and compression is not applied. The lack of compression results in less frictional force between fracture plate and screw fixation now represent the primary means of interosseous fixation. The plate provides immobilization and strong, rigid splinting. Multiple plating strategies have been developed^{11,12,13}.

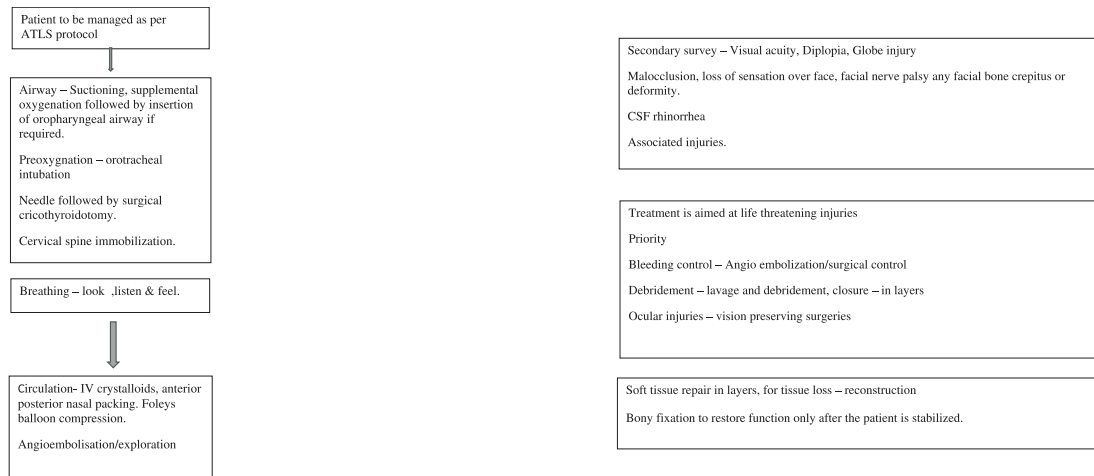
Complications of Conservative Treatment: maxillofacial repair is often started with application of arch bars and wires. Arch bars are often desirable in the postoperative period in case training elastics are required for further adjustment of the muscles to maintain occlusion. MMF will not overcome rigid fixation of the bones in a suboptimal position. In the absence of adequate dentition, the patient's dentures may be wired into position and MMF may be achieved via circummandibular and transnasal wires or MMF screws.

OUR EXPERIENCE

We have a ED footfall of about 50000 patients per year, of those some patients having isolated nasal fractures are treated in the ED and not advised admission. During the said period (Nov 2007- June 2013), a total of 216108 patients visited the Emergency Department of our trauma center. Of these 6766 patients needed admission under the ambit of trauma surgery and 909 needed direct care under maxillofacial surgery. Of these, 583 had isolated maxillofacial injuries while 326 had other associated injuries too.

Of these 438 underwent Open Reduction and Internal Fixation and 222 underwent intermaxillary wiring. The rest were managed non operatively. 60 patients required a surgical airway, of which 25 underwent a needle cricothyrotomy. These injuries were found to be more common in males than females. Only 94 out of our 909 patients were females. The most common age group involved was 21-30 years (363), followed by 31-40 (185), 11-20 (142) and 41-50 (96). Elderly above 50 years age and children below 10 years of age were least commonly involved with the numbers being 88 and 35 respectively. Road traffic injury was the most common mechanism of injury. Mandible was the most commonly injured bone. All of these patients were managed as per the algorithm given below.

Management protocol followed in in Jai Prakash Narayan Apex Trauma center



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