MILITANCY TRAUMA : MAXILLOFACIAL INJURY, ANAESTHESIA AND CRITICAL CARE

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ABSTRACT

Eighty four out of 2151 militancy trauma patients sustained severe maxillofacial injury from Jan 1990 to March 1993. The resuscitation, stabilisation and intensive care of these patients was based on management priorities of primary resuscitation, care of airway, management of haemodynamics, oxygenation and monitoring. Anaesthesia was administered in a situation when the airway was likely to be compromised and the patients were critically sick. Initial ventilation and oxygenation was the most difficult and could be achieved with satisfactory seal around the face mask by applying water-soaked guaze pieces around the mouth and nose to "fill-in" the defects. Tracheal intubation could be accomplished with intravenous sedation by an experienced anaesthesiologist. Dental occlusion and wiring necessitated the placement of nasotracheal tube for 48-72 hours after surgery.

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KEY WORDS : Trauma; Maxillofacial injury; Trauma anesthesia; Anaesthesia and critical care.

Introduction

Maxillofacial trauma is a most distressing visually impressive injury which may cause bleeding, massive swelling, and facial deformity. It may be life threatening due to associated vascular injuries and compromised airways [1]. Of patients with maxillofacial injuries, 20% will have concurrent cervical spine injury and 50-70% will have closed head injury [2-5] or craniocervicofacial complex trauma [6]. This may be more common with blunt trauma than with penetrating missile injury.

During militancy or war situations most maxillofacial injuries are caused by penetrating missiles [7,8]. In World War I, which consisted primarily of trench warfare, there were injuries to the upper face as a result of the soldiers being shot as they attempted to look over the lip of the trench [9]. During the Vietnam war fragmentation weapons such as artillery rockets, mortars, and grenades caused the majority of injuries [9]. The severity of the injury depends primarily on the amount of energy imparted to the structures. The higher the velocity of the bullet or fragment the greater the

damage [10]. In low intensity warfare such as militancy, the severity of injury may be more as the targets are fired upon at a close proximity. Penetrating missiles or fragments produces fractures of the facial bones, especially the mandible, zygoma, orbit floor and the maxilla.

Material and Methods

Total of 84 patients who sustained severe maxillofacial injury from January 1990 to March 1993 were managed for anaesthesia and critical care. All were males between the age of 18 to 42 years. The anaesthesiologist was directly involved in the resuscitation and stabilisation of the patients. All casualties were managed in an intensive care unit with a standard protocol based on management priorities [11]. Priority I management consisted of primary treatment, resuscitation and airway management. Priority II management consisted of critical management of haemodynamics, oxygenation, stabilisation and monitoring of patients. The ECG, blood pressure, central venous pressure, oxygen saturation of blood, and esophageal (core) temperature were routinely continuously

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monitored. The bladder was catheterized and a Ryles tube passed into the stomach in each case. Priority III management consisted of management of associated medical disorders.

Priority of management in maxillofacial injury

Priority I-Life threatening injuries : Airway obstruction was relieved by aspiration of the oral cavity and removal of tooth and denture fragments. The tongue and soft tissue were anchored with a surgical clamp or strong suture. Haemorrhage into the laryngeal wall, floor of the mouth, or expanding nasopharyngeal haematoma frequently compressed the airway and threatened life. Laryngeal fracture was suspected if stridor, anterior neck crepitations, hoarseness or ecchymosis were identified during examination of the patient. Tracheostomy was done where required.

Encouragement of drainage of blood and secretions away from the airways was essential. Gauze pieces soaked in water were placed around the mouth and the nose. Guedels airway insertion and face mask oxygenation was possible during the initial stages of the management, as distorted facial anatomy prevented endotracheal intubation. The later was possible only in the operation theatre with backup plans such as tracheostomy or cricothyroidectomy.

Initial neurological examination was essential. The maximum Glasgow coma score most patients could achieve was 15 and the minimum 3. Patients with a score of 8 or less were classified as being in a state of coma with high suspicion of intracranial injury and raised intracranial pressure. Prognosis was considered poor in patient with Glasgow coma score 8 or less associated with maxillofacial trauma. Cervical spine injury along with maxillofacial trauma needed special care during transportation and endotracheal intubation.

Priority II - Functional losses : Impaired vision, facial paralysis, lacrimal duct and parotid duct injuries causing epiphora, anosmia, fistula and sialocele were taken care of subsequently during the management.

Priority III - Disfiguring injuries : Injuries that had psychological impact on the patients like skeletal deformities were corrected under general anaesthesia and care was taken to repair even mi-

nor deformities to prevent disruption of facial harmony. Untreated malar fractures on resolution of facial edema could result in marked denting of the cheek. Midface maxillary fractures could result in particularly unattractive "disface" deformity. The eyelid, alar margin, ear, and vermillion border of the lip were important soft tissue free margins to repair.

Anaesthesia

All patients were resuscitated in the intensive care unit prior to surgery. They were administered injection Pentazocine, 30 mg intramuscularly. Patients were wheeled in to the operating suite, usually with two large bore venous cannulae inserted, and ECG leads, noninvasive arterial pressure, pulse oximeter (Sao₂) and urinary catheters already placed. Premedication consisting of atropine 0.6 mg was administered intravenously. Thiopentone in small increment doses, maximum 3 mg/kg or ketamine 2 mg/kg was administered intravenously. Thiopentone in small increment doses, maximum 3 mg/kg was administered carefully tailored against the patients haemodynamic status.

Endotracheal intubation (nasal) was accomplished with suxamethonium 2 mg/kg, keeping the back up plan of cricothyroidectomy or tracheostomy readily available. Manually controlled ventilation was achieved with pancuronium 0.1 mg/kg. Anaesthesia was maintained with halothane oxygen using Bain's circuit. Residual effect of neuromuscular blockade were reversed with atropine 30 µg/kg neostigmine 80 µg/kg mixture at the end of surgery. Postoperatively nasal endotracheal tube was kept in situ for 24 hr to maintain clear airway and to prevent pulmonary aspiration. Arterial pressure heart rate, Sao₂ ECG and urinary output were monitored postoperatively.

Observations

Eighty four adult males who sustained facial injuries were managed in intensive care unit based on management priorities of trauma in general and maxillofacial injury in particular. The mode of injury in most cases was gunshot or missile fragmentation. Craniocervicofacial complex injury was seen in 13 patients (head injury - 6, cervical spine injury - 1, ocular injury - 6). Eight patients

sustained associated chest trauma. Twelve patients had abdominal injuries while multiple splinter injuries were seen in 28 patients. Three patients were managed with intercostal thoracostomy and 2 underwent abdominal laparotomy. The most commonly fractured bone in the maxillofacial region was the mandible followed by maxillomandibular complex, maxillo-zygomatic complex and nasal bones in order of decreasing frequency (Table 1). On arrival of the patient in ICU, airway obstruction was seen in 56 out of 84 patients. Saliva, blood, secretions, teeth, bony fragments or displaced tongue were the common causes of airway obstruction. Oxygen administration was possible with a mask applied over the face covered with sterile-water soaked abdominal swabs.

TABLE 1
Maxillofacial Injury : Fracture of different facial bones

Facial Bones	Number of Patients
Fracture mandible	44
Maxilla and mandible	24
Maxillo-zygomatic complex	16

Endotracheal intubation was the most critical portion during anesthetic management. Nasotracheal intubation was done in all the patients since it was the choice of the maxillofacial surgeon and the anaesthesiologist. It helped to maintain an unobstructed airway. Endotracheal intubation was also attempted with back up plan for failed intubation. None of the patients needed cricothyroidectomy or tracheostomy.

Discussion

Maxillofacial injuries are a distressing sight, with a swollen and deformed face concealing a major injury. There may be a fracture of the nasal bone, zygoma or mandible. Much greater force is required for fracture of the maxilla. Fracture mid-face, so called Lefort fractures, may cause several clinical problems. Lefort fracture-I is a simple horizontal fracture of the lower maxilla that produces a mobile palate [12]. A Lefort-II fracture is a triangular extension of Lefort-I fracture involving two oblique fracture lines along the malo-maxillary suture to the floor of the orbit and base of the tongue [12]. The maxillae are displaced backward

and may be free floating. The Lefort-III fracture is a complete disjunction of the facial bones from the cranial skeleton causing epistaxis and a flat dish-face deformity.

Tears in the dura occur in 25 percent of all Lefort II and III fractures as evidenced by leakage of cerebrospinal fluid. Orotracheal intubation is necessary when intranasal damage is a possibility. Attempted passage of a nasotracheal tube may cause bleeding, mucosal dissections and further damage. The course of these tubes during passage may be uncertain; they may enter the maxillary antrum, the orbit, the base of the skull or even the cranium [13]. Maxillofacial trauma with fracture site may obstruct the nasal passages to produce suffocation and choking. Airway obstruction may be encountered as, firstly, a complete or near complete obstruction giving rise to hypoxia, hypercarbia, restlessness, agitation and confusion. Secondly as compromised airway with progressive obstruction, initially manifesting as stridor, laboured breathing, intercostal retraction, tracheal tug and agitation. Patients may be alert and co-operative giving a false sense of security to the anaesthesiologist. These patients may quickly progress to complete obstruction. Thirdly, airway obstruction may present with slow progressive compression. The signs of obstruction may be subtle and need elegant evaluation by experts. During resuscitation, the airway should be continually reassessed.

Airway management of a patient with maxillofacial injuries has been a subject of debate amongst the anaesthesiologists. Initial ventilation with a bag-valve mask apparatus may be almost impossible because of difficulty in achieving satisfactory seal due to facial damage. One may attempt to improve the situation by applying wet pieces of gauze around the mouth and nose to "fill in" the defects. Airway may be secured by placing the patient in the lateral position, pulling the mandible or maxilla forward and clearing the oropharynx of the blood or loose teeth. If these maneuver fail endotracheal intubation or emergency tracheostomy may be life saving.

Facial swelling or upper airway edema may severely impair access to the oropharynx [10]. The mouth may have limited opening due to pain, muscle spasm or fracture of the mandible. An

experienced anaesthesiologist will accomplish the endotracheal intubation and prevent the soiling of the lungs with blood and secretions. Nasal method of intubation prevents dislodging of the tube during surgery and its placement in situ post-operatively. Although the possibilities of interdental fixation may seem to make use of a nasotracheal tube preferable, the easiest route of intubation should be chosen, later, during surgery, the oral tube can be removed and nasal tube inserted. Tracheostomy is the most secure route of tracheal intubation for the patients with facial trauma who will need prolonged ventilatory support. Because most of the patients can be intubated translaryngeally, it may be safer to perform the tracheostomy over an endotracheal tube. When there is no mechanical respiratory obstruction, a routine rapid-sequence induction of anaesthesia and tracheal intubation may proceed. Otherwise, induction of anaesthesia with intravenous sedation or inhaled anaesthetic is indicated.

Fibreoptic tracheal intubation in the presence of bleeding, odema, distorted anatomy of the larynx is not an easy procedure. Awake intubation is very distressing in these patients. Expertise is required to accomplish the tracheal intubation with short acting muscle relaxants, keeping the suction apparatus, cricothyroidectomy and tracheostomy trays ready by the surgeon.

Post-operatively, the airway has to be kept patent till the oedema subsides and the patient is able to spontaneously breathe. We retained the nasotracheal intubation for 48 hours after surgery. Major-

ity of the patients required dental occlusion for 4-6 weeks with dental wiring.

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