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Gunshot Injury-Maxillofacial Intervention

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Abstract : *Gunshot injuries are a relatively rare surgical intervention for Maxillofacial Surgeons. At present the numbers of cases in the Indian subcontinent are few and rarely reported. The protocol and choice of treatment are less than uniform, often relying on the surgeon's personal experience and beliefs. Nonetheless, maxillofacial surgeons must keep abreast of the ever expanding scope of their branch and constantly strive to provide the best treatment for their patients. We present a case of gunshot injury involving the lip, mandible, floor of mouth and submandibular salivary gland.*

Keywords : *gunshot injury, mandibular fracture, salivary fistula*

I. Introduction

Mr. P. K. 34 years old male presented to the hospital with an alleged history of having been assaulted with a pistol / revolver at short range (4 feet). There was no history of loss of consciousness, ear-nose bleed, or vomiting. Although apprehensive, the patient was haemodynamically stable with blood pressure and heart rate within normal limits. He complained of pain in the mandibular anterior region, inability to occlude his teeth properly and difficulty in chewing.

II. Clinical Evaluation

Entry wound appeared to involve the lower lip, mandibular anterior alveolus (Fig.1a). An exit wound could be appreciated at the left submandibular region (Fig.1b). Intraorally the mandibular anterior teeth were missing and a compound wound was evident (Fig.1c). Occlusion was disturbed and mandibular movements were painful.

III. Investigations

Haemogram, serum creatinine, serum electrolytes, blood sugar level (random), HbsAg, HIV, urine analysis, chest radiograph, and ECG were done as standard investigations. CT scan showed a comminuted fracture of the mandibular anterior region with multiple bone and tooth fragments strewn/ scattered across the floor of mouth (Fig.2a, 2b, 2c).

IV. Procedure

Under General anesthesia arch bars were placed to obtain satisfactory intraoperative occlusion. Following standard scrubbing, painting and draping the surgical procedure was commenced. The anterior mandible was exposed using a mandibular degloving incision (Fig.3a). The mandible was exposed from 36 to 46. Floor of the mouth was explored and numerous tooth and bone fragments were recovered (Fig.3b). Fixation was achieved using multiple titanium miniplates with bicortical screws at the inferior border and monocortical screws at the superior border (Fig.3c). The salivary fistula at the left submandibular region was treated conservatively using pressure bandages and anti sialogogues.

V. Postoperative status

Postoperative recovery was uneventful, maxillomandibular fixation was not required postoperatively and prosthetic replacement of missing teeth has commenced (Fig.4a,4b,5a,5b).

VI. Discussion

In a study by Motamedi MH, a total of 44 patients were treated. All maxillofacial gunshot, shrapnel, and warfare injuries were treated by the oral and maxillofacial surgeon. Other concomitant bodily injuries were treated by pertinent consultant specialists. Maxillofacial hard and soft tissue injuries were treated definitively in the first operation except when gross contamination, infection, extensive comminution, or general condition precluded this. Overall mortality in this series was 2.2%. The soft tissue and underlying bony injuries were addressed concomitantly (in a single stage at the time of primary surgical debridement) in 86.3% of the patients. All patients in this series required surgical intervention for treatment of their facial gunshot wounds.

Primary treatment of hard and soft tissue injuries of the face at the time of surgical debridement was possible in the majority of patients. This minimized the number of admissions and did not bear a higher complication rate than other reported series that advocate multiple staged operations to treat such injuries despite the fact that flaps were also mobilized for wound closure in the primary phase [1].

Facial gunshot wounds can result in devastating functional and aesthetic consequences for patients. In an attempt to evaluate the management and outcome in these patients, a 4-year retrospective review was undertaken on all patients presenting with facial gunshot wounds at a Level I trauma center. A total of 121 patients were identified. The gunshot wounds were single in 64% of the cases and multiple in 36% of the cases. Overall mortality in the series was 11%. Seventy-five percent of these patients required surgical intervention. Twenty-one percent of the patients (16/75) required an immediate tracheostomy for management of the airway. Contrary to much of the published literature, most patients in this series required surgical intervention for treatment of their facial gunshot wounds. Reconstructive procedures were performed early in the patient's course and, when possible, addressed both the soft tissue and underlying bony injury in a minimum number of stages [2].Many variables determine the destructive capacity of a weapon. Missile velocity is an important consideration. Wounding capability of a missile depends on the amount of kinetic energy dissipated in the tissues and is proportional to the difference between the kinetic energy on impact minus the kinetic energy on exit. Weapons are classified according to muzzle velocity as either low velocity (<1200 ft/s) or high velocity (>2500 ft/s). Most handguns are low-velocity weapons, whereas hunting rifles and military weapons are high-velocity weapons. Low-velocity missiles tend to crush and push tissue aside; creating a permanent tract that is nearly the same size as the projectile. The path of slower-velocity weapons may be erratic because the projectile may be deflected by the tissues that they strike [3].

Retention of pellets fired from shotguns can cause lead toxicity because the pellets contain 95% lead [4]. Retention of pellets in the craniomaxillofacial region can result in an asymptomatic rise in blood lead concentration [5]. Lin et al.[6], and Meggs et al,[7] reported that short-term exposure to high concentrations of lead causes vomiting, diarrhoea, convulsions, coma, and death, while long-term exposure to low concentrations causes anaemia, impaired mental function, loss of appetite, abdominal pain, constipation, fatigue, insomnia, headache, and renal impairment. Although, the blood lead concentration required to produce noticeable symptoms would vary from patient to patient [8].

Cardoso et al studied 24 patients of low velocity gunshot wounds. The study evaluated the complications after two treatment modalities for gunshot wounds in the maxillofacial area. Twenty patients were treated conservatively and four patients were treated with open reduction and rigid fixation with reconstruction plates; none of these cases were grafted. All patients were treated within 10 days of the initial injury. patients from the conservative treatment group had post-operative infection and sequestra treated with open reduction, debridement, placement of a reconstruction plate, and IV antibiotics. The author concluded that early surgical treatment produced better outcomes [9].

Gunshot injuries to the buccal region of the face may be associated with many complications because of the complex anatomy of the area. The parotid gland is one of the structures that may be involved. Damage to the parotid is often overlooked or underestimated in patients with facial injuries. Failure to recognise such injuries may result in sialoceles, cutaneous fistulas, or cysts of the salivary duct [10].Omer W. Majid treated 16 patients with gunshot injuries to the cheek, 10 of who had damage to the parotid. All patients were operated on within 3 hours of admission. Copious irrigation and careful debridement was required in all cases. Patients were followed up for one month. Two developed salivary fistulas and one developed a sialocele; all were treated conservatively. The author classified the parotid injuries by their pattern. Type I or tangential injury involves the superficial part of the parotid gland, and is similar to a sharp laceration except for the additional need for thorough irrigation and debridement of the wound. The parotid capsule should be closed carefully or approximated. Primary repair of the parotid duct over a stent may be feasible. A Type II injury occurs when the entrance of the bullet is through the parotid itself. A relatively small external wound is commonly associated with a larger intraoral wound. In addition to careful closure of the external wound, intraoral drainage is required. In Type III injury, the exit wound is through the parotid region with the site of entry being either transoral or through the back of the neck. There is a complex, multiple, and large external wound with a variable extent of tissue lost. Salivary fistula should be suspected in every gunshot injury to the parotid region, particularly Type III. The complexity of such wounds facilitates tracking of saliva through injury induced planes toward the surface [11].

VII. Conclusion

Maxillofacial surgeons must make themselves familiar with both emergency and definitive management of gunshot injuries. Proficiency in management of maxillofacial trauma is a prerequisite for satisfactory surgical outcome. Although gunshot injuries are rare, a maxillofacial surgeon may encounter such situations in their career. Most salivary fistulas resulting from gunshot injuries can be treated conservatively.

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Figures and Tables

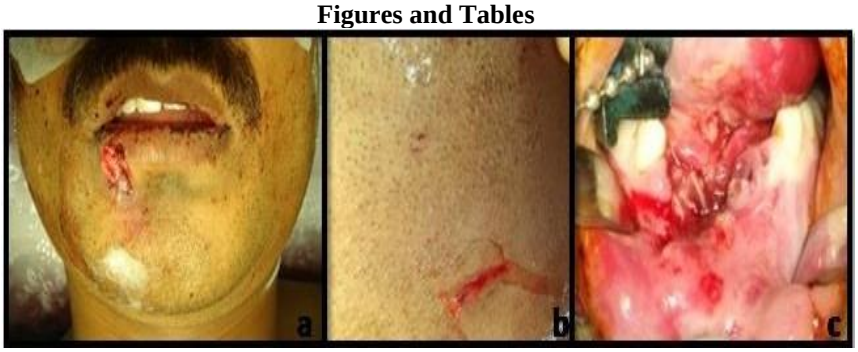

Fig. 1: a. Entry wound- lip, b. Exit wound- salivary fistula, c. Intraoral wound

Fig. 2: a. CT scan – Scattered bone in the floor of mouth, b. Comminution of mandible, c. 3D Reconstruction

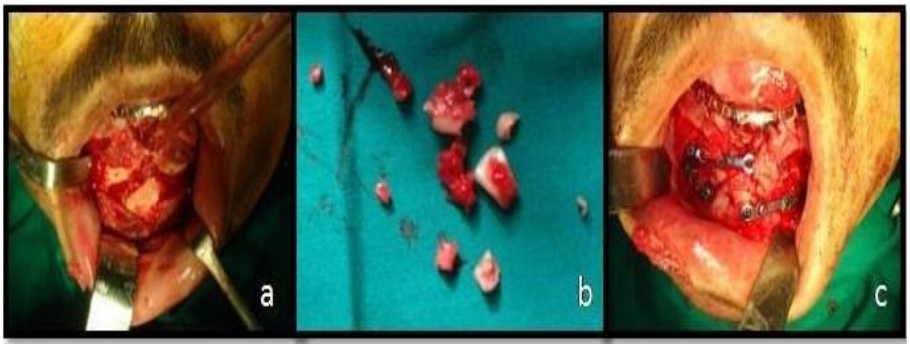

Fig.3: a. Exposure of fracture site, b. Tooth/bone fragments, c. Bone plating

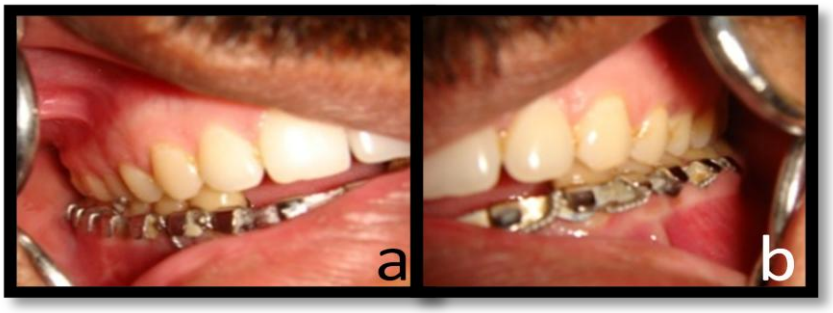

Fig.4: a. Occlusion on the right side, b. Occlusion on the left side

Fig.5: a. Healed fracture, b. Postoperative appearance