The Saudi Dental Journal (2017) xxx, xxx–xxx

King Saud University

The Saudi Dental Journal

www.ksu.edu.sa
www.sciencedirect.com

CASE REPORT

Management of extensive maxillofacial injury related to a Tyre Blast: A rare case report

Sanjay S. Rao *, **Sridhar D. Baliga**, **Abhinav Bhatnagar**

Department of Oral and Maxillofacial Surgery, KLE VK Institute of Dental Sciences and Hospital, Belgaum 590010, Karnataka, India

Received 16 May 2015; accepted 22 August 2017

KEYWORDS

Maxillofacial injury;
Tyre blast;
Comminuted mandible;
Internal fixation;
Complications

Abstract *Background:* Severe blast injuries of large tyres are similar to those resulting from explosions with neither thermal nor chemical effects. The literature related to the destructive nature of these blasts is very sparse. This case aims to report the clinical management of a patient involved in large tyre blasts who presented with a severe soft tissue injury, comminuted mandible and associated multiple facial fractures due to a tyre blast injury.

Results: Excellent results were obtained following reduction and fixation of fractures with primary suturing, as these types of injuries are prone to infection secondarily.

Conclusion: Due to the etiology and severity of injury, these injuries are challenging to operate and are more prone to infection following surgery. These require careful management skills.

1. Introduction

Blast injuries have become more common in the past few decades resulting in extensive casualties. These include bomb explosions, terrorist blasts, and industrial and home-related explosions. One of the rare causes of blast injuries is related to tyre explosion and reports related to this important area are sparse (Hayda et al., 2004). Most tyre explosions occur during servicing by the road side or in service stations. The severity of the injuries depends on the size of the tyre, the contained air pressure, and the distance between the tyre and the victim. Head and upper limb injuries are most likely to happen while inflating the tyre. The dominant hand is prone to be injured in most of the cases where the upper limb was involved which can cause a significant loss of function and disability to those young mechanics. Primary effects are caused by the initial pressure wave (blast shock wave) that can shatter rigid bones and tear off soft tissues as well as the skin and vessels. Secondary effects are caused by the fragments and materials propelled by the blast force as they strike, the victim at a high speed. Tertiary effects occur as a result from the body being thrown against the ground, wall, or other objects causing deceleration injuries with serious fractures and countercoup injuries (Pyper and Graham, 1983). Herein, we present our recent experience in the management of extensive tyre blast injury.

* Corresponding author.
E-mail address: sanjsamuel@yahoo.com (S.S. Rao).
Peer review under responsibility of King Saud University.

Production and hosting by Elsevier

https://doi.org/10.1016/j.sdentj.2017.08.002

Please cite this article in press as: Rao, S.S. et al., Management of extensive maxillofacial injury related to a Tyre Blast: A rare case report. The Saudi Dental Journal (2017), https://doi.org/10.1016/j.sdentj.2017.08.002

2. Case report

A 30-year-old man was brought to our emergency department with severe facial injury following a tyre blast, in his working place. Patient was semi-conscious and uncooperative. Patient's relatives provided the history of the tyre blast injury on his face and left hand region. The patient was trying to change the tyre of a truck when the blast incident occurred, was not under the influence of alcohol. One could visualize entire right side of the patients face involving the hard and soft tissue totally avulsed and hanging (Fig. 1A and B). His Vitals recorded were within normal limits. Patient had severe degloving injury to Right side of the face causing a contused lacerated wound 5 * 5 cm extending from lateral half of the upper lip to the ear region exposing the entire mandible on the right side that was comminuted into multiple segments. Patient had a fracture over the right side dentoalveolar segment involving the maxillary anterior and posterior region also. Vision in both eyes was intact.

Patient had a routine CT (computed tomography) scan done that revealed no neurological abnormality. CT revealed multiple comminuted fracture of the mandible involving right side and parasymphysis fracture of the left side mandible, dentoalveolar fracture involving the maxillary anterior and right maxillary posterior teeth region (Fig. 2A–D).

Prophylactic antibiotics (Inj Cefotaxim and Inj Metronidazole) was started and open reduction, internal fixation with primary closure was planned under general anesthesia. Patient was shifted to Operation Theater immediately, intubated nasally and wound was irrigated thoroughly with normal saline and betadine solution with minimal debridement of the exposed tissue. The injured site contained multiple pieces of foreign body such as wood and sand. After thorough debridement and removal of the foreign bodies, bleeding was controlled over the lacerated wound margins. Fractured mandibular bone over right side was examined to assess the extent and severity of injury. After carefully releasing the soft tissues entrapped within the bone fragments, inferior alveolar nerve was found to be intact (Fig. 3A). The mandible on the right side was fractured into three small segments near the angle region, had a body fracture in-between 44 and 45 region, parasymphysis fracture on the left side of mandible. IMF (intermaxillary fixation) using screws was secured prior to plating of the fractured segments on the left side as the molars over right side posterior maxilla were mobile with the alveolus. Interdental wiring was done between 44–45 and 32–33 regions to secure the fractured segments (Fig. 3B). The angle region had a fracture with three segments (proximal, middle and distal). Fragments over the right side mandibular angle region were approximated to aid in reduction. The fractured fragments were aligned and plated using 2 mm miniplates (5-hole 4 screws, two 3-hole 3screws and 4-hole 4 screws) respectively (Fig. 3C). In the right side mandibular body region, careful subperiosteal dissection of soft tissues was done to expose the fractured fragments. The mental nerve was identified exiting from the mental foramen and fractured segment were aligned properly. On examination there was a triangular piece of fractured fragment in the inferior border and was plated using 2 mm miniplate system (5-hole 5 screws) at the lower border and with 5-hole 4 screws at the upper border. On the left side of mandible, parasymphysis fracture was treated using 2 mm miniplates (5-hole 4 screws) at the lower border and (4-hole 3 screws) at the upper border. Fractured maxillary segments on the right side were approximated using interosseous wiring as plating was not possible owing to the severe comminution of the fractured segments (Fig. 3D). Stability of the plated segments was assessed and IMF released to check for occlusion. Thorough irrigation of the site was done prior to suturing using povidone iodine solution and copious amount of normal saline. Primary suturing of the wound was done over plated fracture segments using Polyglactin (Vicryl). Once the suturing over the fracture segments was done, suturing of the soft tissue avulsion was planned. Injury to the parotid duct was assessed and was found to be atraumatic. The laceration did not involve the parotid gland and hence facial nerve involvement was also ruled out. Suturing was done in layers starting from the mucosa intraorally to the extra oral skin layer. An initial approximation suture was placed at the upper lip junction for proper orientation of the soft tissue injury. Suturing was done in layers using resorbable Polyglactin (Vicryl) for deeper layers and Nylon (Ethilon) for superficial skin region. An additional cut lacerated wound (CLW) was found extending from the angle of mouth to the chin measuring 2 * 1 cm deep. Similarly suturing was done using Polyglactin (Vicryl) and Nylon (Ethilon). An antibiotic ointment was applied over the sutured wound margin and a pressure dressing was applied. The surgery took around 6 h to complete and postoperative radiographs demonstrated satisfactory approximation (Fig. 4A and B).

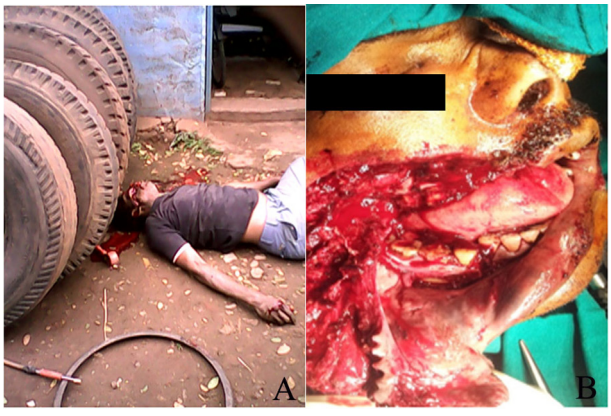

Fig. 1 Photograph taken at the accident site following large trick tyre blast (A). Intraoperative photograph demonstrating the extensive soft tissue laceration and comminution of the mandible (B).

The patient had an associated fracture of metacarpal bones of his right hand, tendon injury with severe soft tissue lacerations and was operated under plastic surgery for the same. Regular dressing was done over the sutured wounds after cleaning with povidone iodine solution daily. Pus Discharge was evident on the 10th postoperative day over the sutured wound near the angle of mandible (Fig. 5A). Intra orally, sutured Polyglactin material became loose without exposing the fracture site even after thorough and regular irrigation using povidone iodine solution and mouth wash (Fig. 5B). Salivary leak was ruled out as the culture report and antibiotic sensitivity revealed gram negative organism namely E. coli that might have been hospital acquired. The organisms were managed effectively using Ciprofloxacin Intravenous injections.

Please cite this article in press as: Rao, S.S. et al., Management of extensive maxillofacial injury related to a Tyre Blast: A rare case report. The Saudi Dental Journal (2017), https://doi.org/10.1016/j.sdentj.2017.08.002