

CASE REPORT

General Surgeon's Challenge: Primary Reconstruction of High-Velocity Facial Trauma

Stanko J. Baco¹, Jovica Misic², Milos Mitric¹, Zoran Matkovic²

Received: 21 October 2023; Accepted: 1 November 2023

ABSTRACT

Background: Facial wounds are often seen in the emergency department. Whether isolated or associated with cranial injuries or poly-trauma, they can have a significant impact on the patient's facial aesthetics and consequently, their eminent psychological states.

Case presentation: A 63-year-old man was referred to our emergency department with an extensive facial injury, which occurred when a grinder disc for working with metal broke, while he was working at home and hit him with high velocity in the face. The patient was hemodynamically stable with a disfiguring, profusely bleeding wound of the maxilla and mandible. One tooth in the lower jaw had been broken and one was missing. The wound was closed with synthetic, resorbable, interrupted sutures in two layers (the inner layer was buccal mucosa, and the other layer was only the skin).

Discussion and conclusion: The extent of damage to soft tissue depends on the type and velocity of the object. Proper wound treatment is necessary, including thorough irrigation, removal of foreign bodies, tension-free closure, reconstruction of anatomical landmarks and correct follow-up. Wound healing starts shortly after the initial tissue trauma, and can take up to several months to complete. Disorder in hemostasis and uncontrolled inflammation can lead to an unfavorable outcome. Facial injuries are treated by general surgeons in only 0.5% of cases, with plastic surgeons, oral and maxillofacial surgeons, and otolaryngologists/head and neck surgeons being the most common specialties. Anatomic, diagnostic, and handling considerations should be analyzed to achieve the best results and minimize late post-traumatic deformities. Complex facial reconstruction is possible when treated by an experienced general surgeon.

Keywords: Facial wounds, wound healing, scar, aesthetic outcome, soft tissue injuries, full thickness wounds, general surgeon

¹ General Surgery, Public Health Institution Hospital "Dr Mladen Stojanović", Prijedor, Bosnia and Herzegovina

² Department of General Surgery, Saint Luke the Apostle Hospital, Dobo, Bosnia and Herzegovina

Stanko J Baco

Email: sbaco3@gmail.com

ORCID 0000-0002-6218-2482

Introduction

In terms of epidemiology, injury patterns in facial trauma differ considerably and depend on the patient population¹. Falls are frequently the cause of acute soft tissue injuries in children and the elderly, but the dominant causes are working or motor-cycle accidents, and polytrauma [1]. The management of acute soft-tissue trauma can be very challenging even for facial and plastic surgeons. Thus, evaluation should be based on the Advanced Trauma Life Support Protocol and the patient must be examined for associated injuries². Information about the timing and mechanism of the injury and post injury signs and manifestations (throwing up, passing out, headache) should also be obtained because this may direct further therapy. Questions about the mechanism of the injury are important due to delayed and not immediately obvious tissue injuries manifestations, which make it more difficult to determine the definite wound boundaries, and may subsequently require additional debridement³. In the case of a strong clinical suspicion (GCS <15 two hours post injury, suspected open skull fracture, sign of base of skull fracture, vomiting more than twice, age >65 years) according to Canadian CT head rule (CCTHR), additional imaging, such as a head CT, is necessary to detect concomitant intracranial, craniofacial, ophthalmological, and cervical spine injuries³⁻⁵. A thorough physical examination of all wounds is required, with attention to detail, to assess soft tissue damage and determine if there are concomitant injuries, where necessary. The location of the wound, its size, depth and the appearance of the wound floor (contamination, viability of the wound edges, and surrounding soft tissues) should be described⁴. In the presence of craniofacial fractures, stabilization of the patient and further detailed diagnostics have priority, in terms of detection of potentially life-threatening injuries and, sometimes, primary wound treatment is delayed⁶.

Case Presentation

A 63-year-old man was referred to our ED with an extensive facial injury, which occurred when a grinder

disc for working with metal broke, while he was working at home, and hit him with high velocity in the face. The patient suddenly felt heat in his face and began bleeding profusely. He experienced pain but was unbelievably calm. The patient was regularly taking antihypertensive medication and had no previous operations or allergies. Clinical examination at presentation showed a hemodynamically stable patient with blood pressure of 120/75 mm Hg, heart rate of 88 beats per min, and saturation of 97% on room air. There was a left-sided facial laceration extending from the lower right angle of the chin, across the lower and upper lip to the left cheek. The disfiguring, profusely bleeding, full-thickness wound was 10 cm long with exposure of the mandible, partially the maxilla, and the avulsion and degloving of the skin on the chin. One tooth in the lower jaw had been broken and one was missing (Figure 1).



Figure 1. Preoperative picture after cleansing and debridement.

There were no obvious tongue, nose or parotid gland injuries. The neurological examination was unremarkable. No other obvious injuries of the face or

cranium were observed nor was there any history of loss of consciousness or vomiting.

At that time, help from facial plastic surgeons, maxillofacial surgeons or otolaryngology specialists was inaccessible in the ED. The wound was treated by a general surgeon. It was meticulously flushed with 3% hydrogen peroxide (H₂O₂) and 5% povidone-iodine, and then a generous amount of isotonic saline was administered. After the cleansing and debridement of the wound, a single-stage primary reconstruction under local anesthesia followed. The wound was closed with 3/0 Vicryl, synthetic, resorbable, simple interrupted sutures in two layers (the inner layer was buccal mucosa, and the other layer was only the skin) (Figure 2).



Figure 2. Immediate postoperative condition after repair of the injured structures. Simple, interrupted, more time-consuming absorbable sutures. Fine wound edge approximation was achieved.

Amoxicillin/clavulanate) 1000 mg per os, twice a day, and Metronidazole 400 mg per os, three times a day, were prescribed for 5 days. A tetanus Toxoid

vaccine was administered, and the patient was given instructions in case any signs of infection appeared. Postoperative wound treatment should have included the washing of the wound, three times a day. The patient did not follow the instructions he was given in the first three days in their entirety and we were not satisfied with the results (Figure 3).



Figure 3. After 3 days - healing wound with resorbable sutures in position and unsightly crust.

For instance, the wound was washed only once a day. Further follow-ups continued for 12 days at three-day-intervals. On the first visit a hemerosious discharge was observed along the wound with erythema around the wound. Already the second examination showed a significant improvement, as there was only erythema along the wound. On the third follow-up examination the wound was healing normally with mild erythema only around the sutures (Figure 4).

The sutures were removed after 10 days. The patient was referred to an outpatient dentist for treatment of the traumatic dental injuries (one crown fracture and one avulsed lower incisor). The wound healed



Figure 4: 10 days after the primary repair - sutures still present with foreign body reaction.

well (Grade A - Normal healing on the Southampton Wound Assessment Scale) with no edema, signs of infection or unsightly scarring (Figure 5).

Discussion

The extent of damage to soft tissue depends on the type and velocity of the object that has caused the facial trauma. Independent of the extent of the damage, meticulous wound treatment is necessary, especially paying attention to following the general surgical principles.

The first step of these principles is thorough wound irrigation, the removal of foreign bodies, and the debridement of necrotic tissue with preservation of all viable tissue; the second is tension-free closure with reconstruction of the anatomical landmarks and realignment of important facial aesthetic structures, with coverage of skin defects⁷; and the third step should be the correct follow-up and the surgeon's continuous supervision throughout the healing period,



Figure 5: Well-healed wound 1 year after the repair. No signs of residual 'rail-road track' shaped scars caused due to the ingrowth of epithelium into the suture tracks.

and the importance of this should be emphasized to the patient⁷.

Wound healing begins shortly after the initial tissue trauma. Hemostasis and the formation of a clot, followed by an inflammatory phase are the hallmarks of the initial few hours of the wound-healing process^{8,9}. Disorder in hemostasis - the first phase of wound-healing - and uncontrolled inflammation can lead to an unfavorable effect on the final aesthetic outcome of the scar⁹. Remodeling can take up to several months to complete, and during this time the wound generates the greatest percentage of prior strength⁹⁻¹¹.

Information gained from more than 50 level-1 trauma hospitals in the United States has shown that facial injuries are treated by general surgeons in only 0.5% of the cases. The distribution of facial injury coverage by the different specialists was: plastic surgeons, 39.6%; oral and maxillofacial surgeons, 36.6%; and otolaryngologists/head and neck surgeons, 23.3%¹².

Therefore, general surgeons must pay particular attention to injuries of functional structures, such as the facial nerve, ductal systems or organs, and ensure proper management of these formations¹³. In addition, lesions to deep structures and associated facial fractures should, if at all possible, be first diagnosed and possibly repaired at the time of soft tissue repair^{13,14}. Anatomic, diagnostic, and handling considerations should be analyzed to achieve the best results and minimize the late post-traumatic deformities, because most unfavorable outcomes are usually the result of poorly addressed underlying structural injury during primary management¹⁵.

In our opinion, even complex facial reconstruction with good aesthetic results is possible in the ED when wounds are treated by an experienced general surgeon, and when the general surgical principals are followed (good wound irrigation, debridement, and tension-free reconstruction).

Conclusions

General surgeons are frequently presented with traumatic craniofacial injuries in the emergency department. Proper treatment of simple soft tissue injuries, relying on the surgeon's personal experience and the treatment protocol, can lead to excellent aesthetic outcomes. More complex wounds may require help from a maxillofacial or plastic surgeon to obtain excellent lifelong aesthetic outcomes. In times when there is a growing lack of experts and specialists in various fields, and when the provision of professional assistance and surgical coverage in underdeveloped areas is needed, general surgeons can provide adequate and optimal care, respecting the basic surgical postulates, which given today's increasingly narrow specialties, is something that has been almost forgotten.

Conflict of interests

The authors have no relevant financial or non-financial interests to disclose.

Patient Consent Form: The participant was informed about subject of the study.

Author's Contribution:

Stanko Baco: Data curation, Visualization, Investigation, Writing-Reviewing. Jovica Misić: Investigation, Conceptualization. Milos Mitric: Conceptualization, Methodology, Writing-Original draft. Zoran Matković: Writing- Reviewing.

References

1. Kretlow JD, McKnight AJ, Izaddoost SA. Facial soft tissue trauma. *Semin Plast Surg.* 2010;24:348-56.
2. Braun TL, Maricevich RS. Soft Tissue Management in Facial Trauma. *Semin Plast Surg.* 2017;31:73-79.
3. Kool DR, Blickman JG. Advanced Trauma Life Support. ABCDE from a radiological point of view. *Emerg Radiol.* 2007;14:135-41.
4. Manna B, Nahirniak P, Morrison CA. Wound Debridement. [Updated 2022 Sep 19]. In: StatPearls [Internet, Treasure Island (FL): Stat Pearls Publishing; 2022.
5. Stiell IG, Wells GA, Vandemheen K, et al. The Canadian CT Head Rule for patients with minor head injury. *Lancet.* 2001;5:1391-6.
6. Jose A, Nagori SA, Agarwal B, Bhutia O, Roychoudhury A. Management of maxillofacial trauma in emergency: An update of challenges and controversies. *J Emerg Trauma Shock.* 2016;9:73-80.
7. Tedeschi E, Menegazzi M, Margotto D, Suzuki H, Förstermann U, Kleinert H. Anti-inflammatory actions of St. John's wort: inhibition of 8 of 9 human inducible nitric-oxide synthase expression by down-regulating signal transducer and activator of transcription-1alpha (STAT-1alpha) activation. *J Pharmacol Exp Ther.* 2003;307:254-61.

8. Matton, G. Soft tissue trauma of the face. *Acta Chir. Belg.* 1991;91:192-197.
9. Wallace HA, Basehore BM, Zito PM. Wound Healing Phases. [Updated 2022 Aug 25]. *Stat Pearls* [Internet, Treasure Island (FL): Stat Pearls Publishing; 2022].
10. Fattahi T. Reoperative soft tissue trauma. *Oral Maxillo fac Surg Clin North Am.* 2011;23:63-71.
11. Schultz GS, Chin GA, Moldawer L, Diegelmann RF. Principles of Wound Healing. In: Fitridge R, Thompson M, eds. *Mechanisms of Vascular Disease. A Reference Book for Vascular Specialists* [Internet]. University of Adelaide Press; 2011;23:534261.
12. Bagheri SC, Dimassi M, Shahriari A, Khan HA, Jo C, Steed MB. Facial trauma coverage among level-1 trauma centers of the United States. *J Oral Maxillofac Surg.* 2008;66:963-7.
13. Bhattacharya V. Management of soft tissue wounds of the face. *Indian J Plast Surg.* 2012;45:436-43.
14. Skinner EJ, Morrison CA. Wound Foreign Body Removal. [Updated 2022 Jun 6]. In. *Stat Pearls* [Internet, Treasure Island (FL): Stat Pearls Publishing; 2022].
15. Parashar A, Sharma RK. Unfavorable outcomes in maxillofacial injuries: How to avoid and manage . *Indian J Plast Surg.* 2013;46:221-34.