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Self-inflicted face gunshot injuries: two case reports

Rokas Gelažius[1], David Kasradze[2], Albinas Gervickas[1,2]

SUMMARY

Self-inflicted gunshot injuries to the head and neck area are challenging cases. Immediate and complex approach is required due to complexity of head and neck anatomy. The extent of injury largely depends on velocity of a rifle and penetrated tissues. Management of these type of patients consist of vital resuscitation, primary wound management, soft and hard tissue reconstruction and rehabilitation. Here we present two cases of self-inflicted gunshot injuries with low and high velocity rifles.

Keywords: self-inflicted wounds, SIW, face gunshot injury, maxillofacial reconstruction.

INTRODUCTION

Self-inflicted gunshot injuries to the face present serious challenges to the oral and maxillofacial surgeons. These injuries cause functional and esthetic harm, while resulting in significant loss of soft and bone tissue. The mortality rates from gunshot injuries reach as high as 15% and complication rates up to 30% (1). Significant mortality rates constitute to surgical emergencies. Managing these injuries are more complicated in comparison to other types of facial trauma and require involvement of different specialty doctors (maxillofacial surgeons, otolaryngologists, plastic surgeons and neurosurgeons). Gunshot wounds are relatively rare and mostly depends on demography, for instance in 2011 there were 43 cases of facial gunshot wounds in UK (2), although GSWF (Gun-Shot Wounds to the face) in US are recorded commonly – approximately 115000 firearm related injuries a year (3). Whereas in our case there were only 2 cases of self-inflicted gunshot injuries during 2016-2017 reported in clinics of Lithuanian university of health sciences.

Gunshot wounds to the face require emergency management of resuscitation with focus on airway compromise, excessive bleeding from major vessels and hemodynamic resuscitation if necessary. Following resuscitation subsequent reconstructive management is challenging. In this article we report two cases of different damage-profile gunshot injuries of the face area.

[1]*Faculty of Odontology, Medical Academy, Lithuanian University of Health Sciences, Kaunas, Lithuania*
[2]*Department of Oral and Maxillofacial surgery, Lithuanian University of Health Sciences, Kaunas, Lithuania*

Address correspondence to David Kasradze, Department of Oral and Maxillofacial surgery, Lithuanian University of Health Sciences, A. Lukšos - Daumanto g. 6, Kaunas, Lithuania.
E-mail address: davidkasradze@gmail.com

CASE REPORT

Case 1

A 48-years old male was brought to ER of Kaunas clinics around 5:00 AM with severe gunshot wound of lower third of face (Figure 1). The patient denied a suicide attempt and explained that it was an accident followed by unsafe handling of hunting rifle. The bullet entrance wound was in left submandibular are and possible exit wound in left cheek (Figure 2). The initial evaluation of airway and control of bleeding was performed in the ER. The risks of asphyxiation or bleeding were eliminated. A tracheostomy intubation was performed. Subsequently CT scan of head and neck was performed.

After stabilization of patients vital state and elimination of life threatning factors the patient was transported to the surgery room of maxillofacial department for planned operation. Under general anesthesia wound was washed with 0.05% chlorhexidine solution and debridement of necrotic and gunshot debris was performed. Facial artery and vein were identified and ligated. The deffect of mandibulae was exposed and recostructed with titaneous plate (Figure 3). Fractures in symphysis of mandible and left maxillae were fixated with titanium plates (Figure 4). Regional soft tissues were disengaged and sutured to cover the exposed bone tissue with 3-0 and 4-0 resorbable vicryl sutures. The transposition flaps with local skin were performed to achieve the primary closure of the wound. Skin was sutured with non-resorbable 4-0 polypropyl-

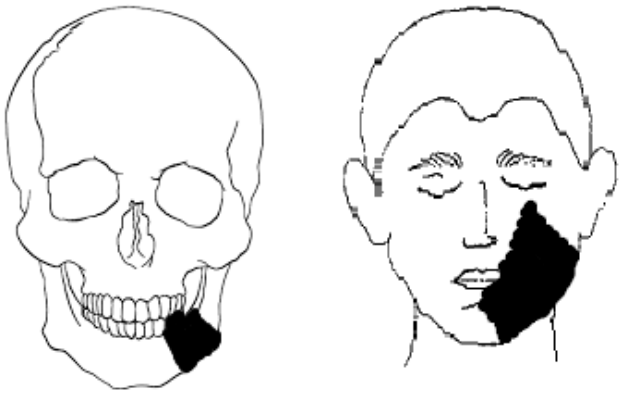

Fig. 1. Schematic representation of first patient's bone and soft tissue injury extent (high velocity gunshot)

Fig. 2. Initial picture at emergency room

Fig. 3. Primary debridement, fixation and reconstruction of mandible and maxillae with titanium plates

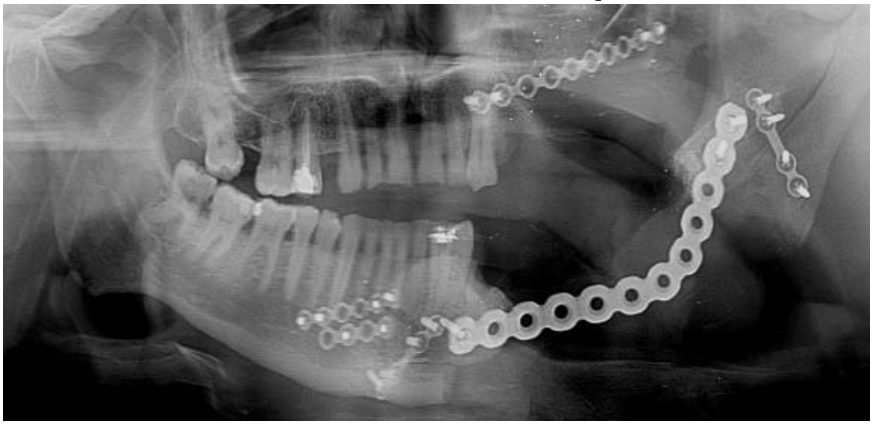

Fig. 4. Panoramic radiograph after primary reconstruction

ene suture. Remaining deffects of the skin were tamponated with iodoform tampons for secondary healing (Figure 5). Post-operational care consisted of daily dressings of the wound and drug therapy. Infection control was managed with intravenous antibiotics (Sol. Cefazolini 1 g ×3 t/p/d), analgesia was achieved with ketoprofenum, diazepam and dexketoprofenum (Figure 6).

After 4 weeks patient was treated due to accumulated seroma. Under local anesthesia with Lidocaine, the sutures were removed and seromic fluids were reached with blunt instrument. Nearly 300 ml of fluids were drained. Afterwards seromic fluids did not accumulate repeatedly.

The second stage of the treatment was performed in the department of plastic and reconstructive surgery after 10 weeks. Under general anesthesia the full, vascularised skin and bone transplant was obtained from iliac crest and transplanted to recipient site – left side of the madible (Figures 7, 8).

After another 10 months the third surgery was performed in the department of plastic and reconstructive surgery due to remaining defect on the left labial angle ~3×3 cm. The defect was managed and reconstructed with local fasciocutanic flap. The soft tissues were sutured with 4-0 and 5-0 sutures (Picture 9).

Case 2

A 79-year old patient was brought to ER after suicide attempt with low velocity rifle (Figure 10). The gunshot injury was seen in the middle third of the face. The patient was fully conscious, disoriented in time, place. Extra-orally the post traumatic edema of the periorbital and temporal tissues, orbital hematomas were observed bilaterally. The entrance wound was in the right temporal are. The exit wound was observed in left supraorbital area. Right eye bulb was exophthalmic and ruptured. Left eye appeared egzophtalmic as well with chemosis of the conjuctiva (Figure 11). The patient was examined by emmergency doctor, ophtalmologist, otorynolaryngologist and maxillofacial surgeon. A CT scan of the head was performed (Figure 12). The clinical diagosis was multiple fragmental fractures of right orbit, nasothmoid complex and left supraorbital area. No bullet was observed. Initial evaluation of vital signs and management of bleeding was done in ER. After concluding the stable airway and

Fig. 5. Primary closure of wound with local tissues and iodoform tampons

Fig. 6. Daily care and dressing of the wound

hemodynamic conditions patient was transported to the maxillofacial department.

On the next day patient was examined by ophthalmologist and psychiatrist. Ophthalmologist concluded irreversible loss of sight of the right eye. The patient could only indicate stimulus of light with left eye. Psychiatric assessment exhibited that patient was still disoriented in time and place, however he could answer simple questions: tell his name, home address and motives of suicide attempt. He regretted the suicide attempt and did not refer any will of repeated one.

Daily dressings of the wound were performed. Infection control was managed with intravenous antibiotics (Sol. Cefazolini 1 g ×3 t/p/d), analgesia was achieved with ketoprofenum, diazepam and dexketoprofenum (Figure 13).

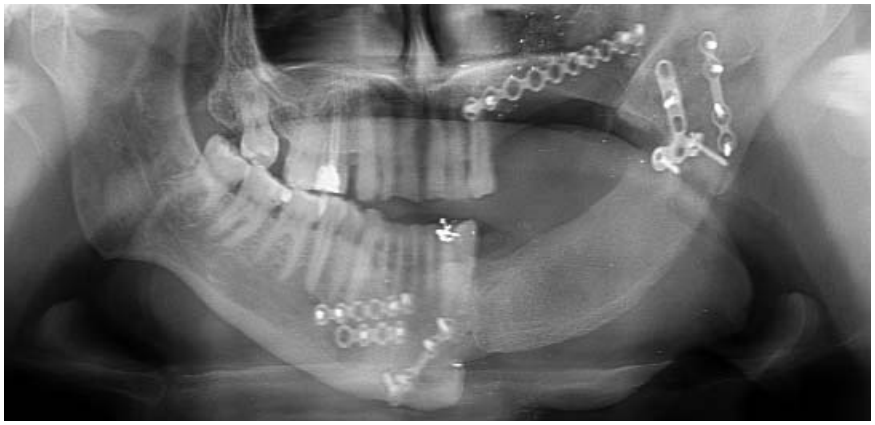

Fig. 7. Panoramic radiograph after secondary reconstruction with iliac crest graft

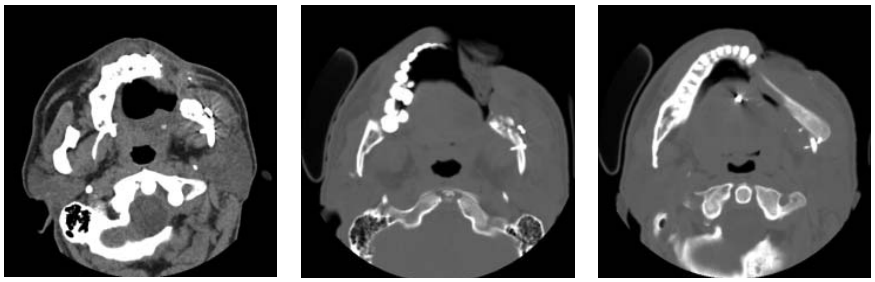

Fig. 8. CT scan after reconstruction

On the eighth day, after the primary swellness passed the reconstructive surgery was performed. Under general anaesthesia, the operating site was prepared. On the first stage of the surgery right eyeball was enucleated. Secondly, infraorbital approach to left right orbit was performed. Small bone fracture fragments and debris were removed from the wound. Entrance and exit wounds were revisioned, washed and sutured. The orbit surfaces were washed with 0,05 percent chlorhexidine solution. Floor and medial and lateral surfaces of right orbit were reconstructed with titanium mesh. Soft tissues were sutured graddualy with 4-0 resorbable vicryl sutures. The skin and eyelids of right eye were sutured with non-resorbable 4-0 suture. Post-operative care was continued in maxillo-facial department for another 5 days with subsequent wound dressing and therapeutic treatment. Afterwards patient was transported to psychiatric clinic (Figure 14).

Fig. 9. Panoramic radiograph after secondary reconstruction with iliac crest graft

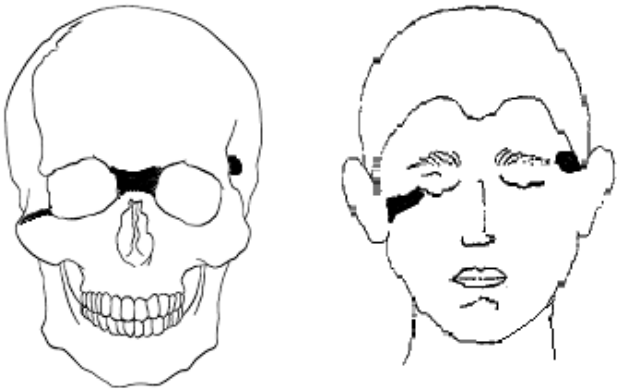

Fig. 10. Schematic representation of second patient's bone and soft tissue injury extent (low velocity gunshot)

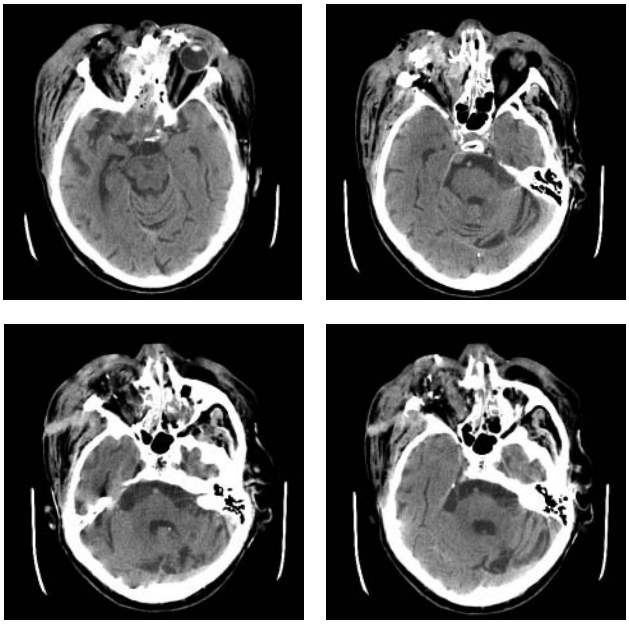

Fig. 12. SPrimary CT scan after injury

Fig. 13. 3 days after unjury

Fig. 14. Picture after reconstruction surgery

DISCUSSION

Gunshot wounds to the face, although uncommon, are considered as a challenge because of the blasting functional and aesthetic consequences. Successful management of these facial injuries is determined by (4):

Fig. 11. Primary picture in ER

• The kinetic energy of the missile;

• The distance between the gun and the victim;

• And viscoelastic characteristics of the penetrated tissues;

Factors influencing the efficiency of kinetic energy transfer include the kinetic energy of a body, proportional to mass and velocity, projectile's deformation and fragmentation, entrance profile and path travelled through the body and biological characteristics of the tissues (5).

In this case study we described 2 GSWF cases with both low-velocity and high-velocity injuries this experience showed us different treatment protocols and planning. High-velocity gunshot wound to the face was reconstructed by multistage treatment method, as mentioned in numerous articles, aggressive debridement and immediate titanium plate reconstruction have led to some complication rate (6), It has been demonstrated that early surgical debridement plays an important role in minimizing the ultimate loss of tissue (7). An early and comprehensive surgical management of soft tissue at the first stage with less aggressive debridement can decrease morbidity. A primary closure or local flaps are preferred over secondary healing as it may cause excessive scarring (8). Generally, low-velocity injuries are from projectiles travelling at less than 1200 feet/s. High-velocity missiles are those travelling at greater than 1200 feet/s (5), although, guns with projectiles of less than 2000 feet/s is still considered as low-velocity in US (6). Low-velocity injuries result in little bone and soft tissue loss and are generally treated with limited debridement, fracture reconstruction and primary soft tissue closure. In our case the injury with low-velocity rifle was managed after post-traumatic edema was controlled to gain a better access to the fractured components. In contrast to high-velocity injury, there were no risks of airway obstruction or mortal bleeding, so physicians had ability to apply more conservative approach and delayed surgery. Whereas high-velocity missiles inflict considerably significant damage. In addition to the initial cavity created by the bullet path, an evolving pattern of tissue loss is observed, with resultant bone and soft tissue loss for several days or weeks. These injuries require immediate management of vital functions as

the risk of airway obstruction, excessive bleeding and damage of vital organs is higher. As shown on our case the physicians applied immediate surgical involvement to achieve debridement, fracture stabilization and primary closure. Soft tissue injury, which could not be closed primarily, is allowed to be healed by secondary intention. Bony reconstruction is addressed secondarily, which often results in significant scar contracture and suboptimal cosmetic and functional outcome.

Gunshot injuries to the face are associated with significant mortality and they constitute surgical emergencies, with the cause of death being most frequently concomitant intracranial injury, and surgery required for significant vessel injury and airway compromise. Early management of these patients must focus on the basics of resuscitation and control of vital signs. Bleeding from the injury and the post-traumatic swelling can significantly compromise the airway. Control with either an endotracheal tube or tracheostomy should be considered early. Following this, hemodynamic resuscitation should be performed, if necessary, followed by thorough patient evaluation to rule out concomitant injuries. Subsequent clinical and radiological evaluation of injured structures is obligatory. The complex anatomy of head and neck can require clinical involvement of several branches of specialists. In our cases patients were primarily examined by ER doctors, neurosurgeons, otorynolaryngologists, ophthalmologists, plastic surgeons and maxillofacial surgeons. Following resuscitation, the reconstructive challenge for these injuries may be formidable.

In both presented cases patient's treatment required multi-staged approach. First stage of treatment consistent from resuscitation, primary stabilization and wound closure. Secondly reconstructive surgery measures were performed. First case required reconstruction of mandible using the iliac crest graft and management of complications (seroma) and later reconstruction of labial defect with fasciocutanic flap. Whereas second case required approach of psychiatrist as it was a suicide attempt.

In addition, therapeutic treatment is equally important. Antibiotics play important role in preventing infections in hard and soft tissues of Class IV wounds. In both our cases patients received empirical antibiotic therapy, no symptoms of infection were observed. Proper analgesia and sedation are necessary as well. In both cases additional medications for hemodynamic stability, proper diuresis, prophylaxis of thromboembolism were used along with specific drugs for psychiatric disorders and maintenance of eye-bulb for case 2. Post-operational dressings of the wound, maintenance of nutrition, circulating fluid volume are essential (9, 10).

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