

## A Rare Case of Surgical Treatment of Projectile in the Infratemporal Fossa

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### Introduction

It is difficult to calculate the actual incidence of facial injuries by firearms. In a retrospective study of about gunshot wounds, 6,9% of injuries affected the face [1]. The majority of maxillofacial gunshot wounds are caused by suicide attempts, which young men are most often affected.

The facial gunshot victim should be transported to a trauma center equipped to deal with maxillofacial and neurosurgery because 40% require emergency surgery [2].

Injuries caused by firearms can have fatal results. Even if the bullet did not cause great damage to the soft and hard tissues other serious problems can occur. Sometimes, the fragment becomes encapsulated and only the follow-up is necessary [3]. However, elevated serum levels of Lead (Pb) were detected in patients with retained projectiles.

The clinical relevance of this finding is not clear, although patients, especially children, need to care about the symptoms of poisoning and the need for long-term monitoring.

Furthermore, the retained bullets may cause infections, which can lead to meningitis if the object is located near the base of the skull [4].

Because of neurological and vascular complications, it is important the exact location of the fragment and to define which surgical approach to remove the projectiles is more appropriate.

The aim of this paper is to report the case of a projectile located in the left infratemporal fossa, discuss surgical treatment, its risks and complications, since this situation is rarely described in the literature.

### Case report

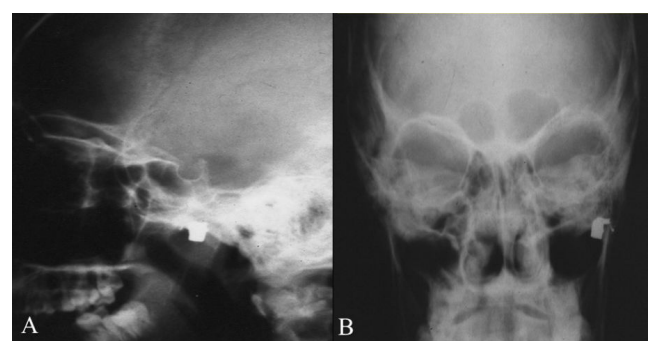
The patient, an 18 year old man, sought for treatment ten days after being shot by a projectile caliber 22. During anamnesis, the patient reported pain, limited mouth opening and and prejudice in motion right laterality.

The physical exam revealed a perforated-contusion lesion in the left zygomatic area (Figure 1). The measuring of mouth opening was 20.01mm. The patient presented neither sensorial, autonomic nor motor impairment.



**Figure 1:** Blunt injury (arrows) in left zygomatic area.

The lateral and forward radiography show the projectile located medial to the left mandibular condyle (Figure 2 A and B) within the infratemporal fossa.



**Figure 2:** (A) Lateral radiography, presence of a projectile located in the infratemporal fossa; (B) Forward radiography, the projectile is located in anatomical space corresponding the infratemporal fossa.

Based on the signs, symptoms and images, a surgery, aiming at the removal of the projectile, was proposed and the patient accepted the treatment.

The patient underwent general anesthesia with right sided nasotracheal intubation. Further, antiseptics with 2% chlorhexidine and apposition of the surgical area were performed, with the ear and the lateral corner of the eye visible and acoustic meatus tamponed with gauze. The preauricular area was stained with methylene blue to asepsis and then, the area was underwent with 2% lidocaine chlorhydrate with vasoconstrictor (1:100000). Skin and conjunctive tissue were incised toward the superficial layer of the temporal fascia, the superficial temporal vessels and nerve auriculotemporal retracted earlier in retail. It is incised obliquely temporal fascia in anteroposterior direction from the zygomatic arch.

Then, the deep dissection to visualize the surface of the temporomandibular ligament, capsule and palpate to the articular eminence was done, all structures were preserved. A second horizontal incision in the anterior direction occurred from the eminence against the zygomatic arch. Now, the dissection was performed with periosteum elevator toward lower, reaching the upper head of the lateral pterygoid muscle. It was continued with the same instrument, in anterior and inferior direction in order to locate the lower head of this muscle. Carefully, the region between the two heads was explored with Matzenbauer scissors, aiming to minimize the chances of achieving the maxillary artery and to locate the projectile. With the help of an anatomical clamp Halsted, the bullet was removed (Figure 3). The closure of the layers was performed from inside to outside with Vycril 4/0 resorbable thread. The skin was closed with continuous 6/0 Polypropilene (Prolene) and protected with a gauze overlay. The suture was removed at intervals from the 5th to the 7th postoperative day.

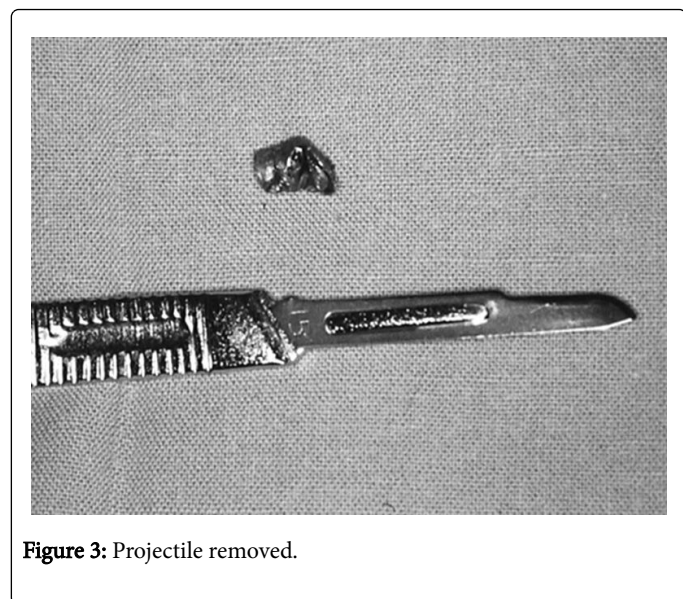


Figure 3: Projectile removed.

The postoperative occurred without complications and the patient began physiotherapy 7 days after leaving hospital. The physiotherapy sessions happened twice a week for three months and the patient underwent ultrasound treatment, 1.5 w/cm<sup>2</sup> on the left area for 5 minutes. It was associated with wooden spatulas, moist hot towels and passive stretching exercises for opening, closing and lateral jaw movement. A new radiographic exam show the projectile is no longer there (Figure 4 A and B). The patient presented neither sensorial autonomic or motor impairment. The follow up revealed that the patient presented mouth opening of 40.02 mm and no pain.

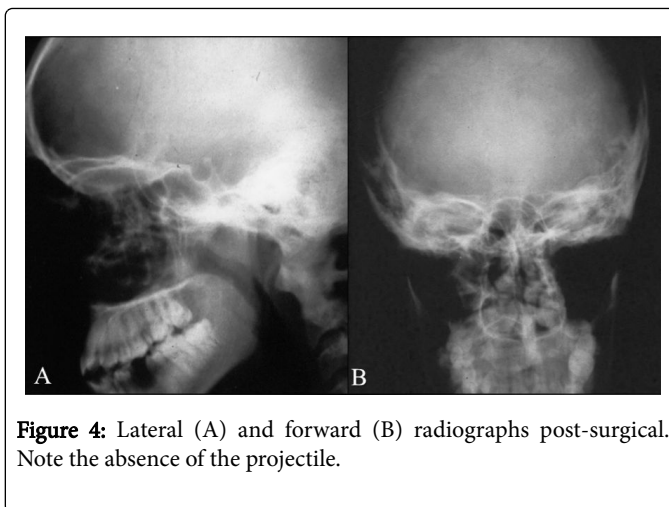


Figure 4: Lateral (A) and forward (B) radiographs post-surgical. Note the absence of the projectile.

### Discussion

The infratemporal fossa is the anatomical sequence of the temporal fossa region. It is located between the medial surface of the zygomatic bone and the lateral surface of the temporal bone, the major wing of the sphenoid bone and ramus of mandible. Structures with great importance are present, as lateral and medial pterygoid muscle, the maxillary artery, which may be superficial or deep below the head from side pterygoid muscle, the pterygoid venous plexus, the otic ganglion, the cord of tympani nerve, the mandibular nerve and one of its branches, the lingual nerve. In this case related, the surgery was indicated because the movement function was limited due bullet presence and the local edema between the two heads of the lateral pterygoid muscle left. As performed jaw movements had pain on opening the mouth and jaw laterality right.

The literature reports that the head and face are common sites of gunshot injury. Usually, it produces major deformity and functional impairment, particularly when the temporomandibular joint or the facial nerve is damaged. Complications may include mandibular displacement, limited mouth opening, limited lateral movement of the jaw, anterior open bite, and temporomandibular ankylosis [6]. Other complications and risks could occur if surgical and clinical measures were not imposed: arteriovenous damage involving the pterygoid venous plexus and / or maxillary artery; fibrosis of one or both heads of this muscle, which could develop into a fibrous ankylosis; or bone and infection; change in saliva production by the parotid, submandibular and sublingual; reduction or absence of taste in the anterior 2/3 of the tongue; hypoesthesia of the leading edge and side of the tongue; and pain in the pronunciation. Front to the therapy there were no such risks and complications. If the projectile was lodged in a hard or soft tissue structure and did not cause pain or dysfunction a more conservative clinical approach would be chosen, one that could be associated to physiotherapy [7].

The pre-auricular surgical approach was chosen because it allows adequate local exposure, with great view of the region, aesthetically acceptable and low risk of facial nerve injury [5]. Despite of choice of such surgical approach gave difficulty locating the projectile between the two heads of the lateral pterygoid muscle and dissect them, because this muscle is located deep to the skin with different provisions about its anatomical and the number of heads, which can vary from two to three [5]. The imaging exam was not the most appropriate, once that

computed tomography would be ideal to evaluate the foreign object place and such muscle. Another problem in the surgical was malfunctioning image intensifier hindering the location of the projectile.

Throughout the arthrotomy, regardless of access that takes place - endaural, preauricular, post-auricular - there is a possibility of damaging the facial nerve, mainly temporal branch and less often the zygomatic branch and auriculotemporal nerve [5,6]. In this case reported, there was no motor, sensory or autonomic damage noted during the follow-up.

The use of endoscopy has increased in recent years because it allows surgeons to get access to different areas of the human body with less exposure of tissues during dissection, reducing the morbidity compared with an open surgical approach. Neff et al., [8] have successfully removing a bullet of the infratemporal fossa by endoscopy with intraoral access. In the present case was not used endoscope due to the absence of such equipment in hospital level and the inexperience of the surgical team in handling such a technique.

Others techniques for obtaining images have been described for locating projectiles and foreign bodies. Ultrasound image, computed tomography, cone beam computed tomography and C-arm techniques allow air gun pellets to be accurately localized [9]. However, these devices are expensive and usually not available. Radiographic localization techniques obtained by exposure of different plains or views of angles allow positioning the researched object in 3 dimensions [9]. In this case, other imaging features were not available in the hospital.

The physiotherapy prescribed after surgery, with ultrasound therapy and superficial heat aimed to restore the proper functioning of the joint, relieving the pain, reducing the edema, promoting neuromuscular reeducation of the masticatory muscles, inhabiting the contracture process and adhesion or adhesiveness formation and facilitating condylar movement [10]. We have also prescribed therapeutic exercises with spatulas to wider the amplitude of the movements and to restore the proprioceptive conditions.

## Conclusion

The removal of the projectile with the preauricular approach and the combined physiotherapy treatment provided in the reestablishment of the joint function, pain elimination, an appropriate mouth opening and no motor or sensory sequel of the face.

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