

**Lesão facial por munição de elastômeros com sequela importante: relato de caso e breve  
revisão de literatura**

**Face injury by elastomer ammunition with important sequel: case report and brief  
literature review**

**Lesiones faciales por munición de elastómero con secuela importante: informe de caso y  
breve revisión de literatura**

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**Leonardo Alan Delanora**

ORCID: <https://orcid.org/0000-0002-3002-4420>

Universidade Estadual Paulista, Brasil

E-mail: [leonardoaland@gmail.com](mailto:leonardoaland@gmail.com)

**Francisley Ávila Sousa**

ORCID: <https://orcid.org/0000-0002-1427-071X>

Universidade Estadual Paulista, Brasil

E-mail: [francisley.avila@unesp.br](mailto:francisley.avila@unesp.br)

**Monique Gonçalves da Costa**

ORCID: <https://orcid.org/0000-0002-0867-1736>

Universidade Estadual Paulista, Brasil

E-mail: [moniquegc30@hotmail.com](mailto:moniquegc30@hotmail.com)

**Leonardo Perez Faverani**

ORCID: <https://orcid.org/0000-0003-2249-3048>

Universidade Estadual Paulista, Brasil

E-mail: [leonardo.faverani@unesp.br](mailto:leonardo.faverani@unesp.br)

**Ana Paula Farnezi Bassi**

ORCID: <https://orcid.org/0000-0002-0031-4953>

Universidade Estadual Paulista, Brasil

E-mail: [ana.bassi@unesp.br](mailto:ana.bassi@unesp.br)

**Resumo**

Ferimentos por arma de fogo são situações que requerem cuidados exclusivos em seu tratamento. Atualmente, o número de acidentes resultantes do uso de armas de fogo está aumentando e isso reflete a necessidade de uma abordagem segura e eficiente para esses

casos. Assim, o cirurgião maxilofacial deve avaliar o paciente o mais rápido possível e planejar efetivamente o tratamento, evitando consequências indesejáveis, como infecções e comprometimento de funções primárias, como a visão. Este trabalho tem como objetivo relatar um caso de maneira qualitativa e descritiva, no qual o indivíduo compareceu ao atendimento apresentando uma lesão por arma de fogo com munição de elastômero, assim abordando e discutindo as singularidades, complicações e formas de tratamento para tais tipos de ferimento, com o objetivo de consolidar e sugerir um possível consenso sobre o assunto.

**Palavras-chave:** Bala de borracha; Sequelas; Lesão facial; Ferimento por arma de fogo; Trauma balístico.

### **Abstract**

Gunshot wounds are situations that require unique care in their treatment. Currently, the number of accidents resulting from the use of firearms is increasing and this reflects a need for a safe and efficient approach to these cases. Thus, the maxillofacial surgeon should evaluate the patient as soon as possible and plan the treatment effectively, avoiding undesirable consequences such as infections and impairment of primary functions such as vision. This work aims to report a case in a qualitative and descriptive manner, in which the individual attended the service presenting a firearm injury with elastomer ammunition, thus addressing and discussing the singularities, complications and forms of treatment for such types of injuries, in order to consolidate and suggest a possible consensus on the subject.

**Keywords:** Rubber bullet; Sequellae; Facial injury; Gunshot Wound; Ballistic trauma.

### **Resumen**

Las heridas de bala son situaciones que requieren un cuidado único en su tratamiento. Actualmente, el número de accidentes resultantes del uso de armas de fuego está aumentando y esto refleja la necesidad de un enfoque seguro y eficiente para estos casos. Por lo tanto, el cirujano maxilofacial debe evaluar al paciente lo antes posible y planificar el tratamiento de manera efectiva, evitando consecuencias indeseables como infecciones y deterioro de las funciones primarias como la visión. Este trabajo tiene como objetivo informar un caso de forma cualitativa y descriptiva, en el que el individuo asistió al servicio presentando una lesión por arma de fuego con munición de elastómero, abordando y discutiendo las singularidades, complicaciones y formas de tratamiento para este tipo de lesión, para consolidar y sugerir un posible consenso sobre el tema.

**Palabras clave:** Bala de goma; Secuelas; Lesión facial; Herida de bala; Trauma balístico.

## 1. Introduction

Firearm Projectile Injuries (FPI) are considered, within the facial trauma segment, the second place in causes of death, being surpassed only by car accidents (Shvyrkov, 2013). Moreover, they constitute a worldwide public health problem, and the maxillofacial region is a constant target of this type of injury (Shyyrkoy, 2013; Amaral, Bueno, Abdala, & da Silveira, 2017).

The face is the most important component of the human body, and gunshot wounds or injuries from the use of these less lethal munitions can cause major aesthetic and functional damage in this region, leading to psychological complications and loss of quality of life (Gruss, Antonyshyn, & Phillips, 1991; Walker & Frame, 1984). The occurrence of these injuries is more frequently reported in the mandible, maxilla, orbit, TMJ region, as well as important anatomical structures such as facial nerve, which may lead to traumatic paralysis. Orbital fractures are common because the tissues of the orbit are easily penetrated and if reached rarely are recovered (Lavy & Asleh, 2003; Khonsari *et al.*, 2010). The type of injury caused by a projectile is classified based on factors such as its mass, shape, impact speed, nature of the tissues affected, kinetic energy and weapon category, the latter two being the most used (Walker & Frame, 1984; Motamedi, 2003).

The treatment of injuries becomes a challenge to the health service team, since the relationship between these foreign bodies and the several important anatomical structures of the face requires a quick diagnosis and adequate therapeutic conduct by the team, in order to reduce the number of complications and sequelae (Motamedi, 2003). In the first moment of assistance to the victim, attention should be given to his general condition, thus, problems such as: airway obstruction, hemorrhage and other general impairments should be detected (Kihitir, Ivatury, Simon, Nassoura, & Leban, 1993). It is important to evaluate the trajectory of the projectile and correlate with the affected structures (Motamedi, 2003). For a more accurate assessment, it is necessary to use imaging exams such as radiographs and computed tomography that allow an assessment of these displaced structures and their exact positioning (Lavy & Asleh, 2003; Khonsari *et al.*, 2010; Kihitir *et al.*, 1993; Khatib *et al.*, 2017).

In this context, with a thorough investigation of the literature and the discussion of case reports, we aim to bring subsidies and list important points for a possible consensus about the subject.

## **2. Methodology**

This work addresses a case report in a descriptive and qualitative way, aiming to report the care of a patient by the team of Oral and Maxillofacial Surgery at UNESP-Araçatuba, Sao Paulo, Brazil, which presented a face injury by a firearm, with elastomer ammunition, detailing thus, the chosen approach, in addition to exposing the singularities, possible sequelae and types of treatments for this type of injury (Soares Pereira, Moreira Shitsuka, José Parreira, & Shitsuka, 2018).

## **3. Case Report**

In the present case, a 42-year-old male patient attended at the emergency of Hospital Santa Casa de Misericórdia de Araçatuba/SP, victim of a gunshot wound with a rubber projectile lodged in the frontal/orbital region, on the extraoral examination the patient had a good general physical condition and was oriented. In the facial analysis, the presence of a foreign body positioned in the right supraorbital region, anisocoric pupils, photo reagents, hyposfagma, palpebral ptosis, a slight ocular proptosis on the right side, as seen in the Image 1, restriction of eye movements by the right orbit and reported altered visual acuity were found.

**Image 1:** A - Initial aspect of the patient. B - Front view of the foreign body located in the frontal/orbital region.

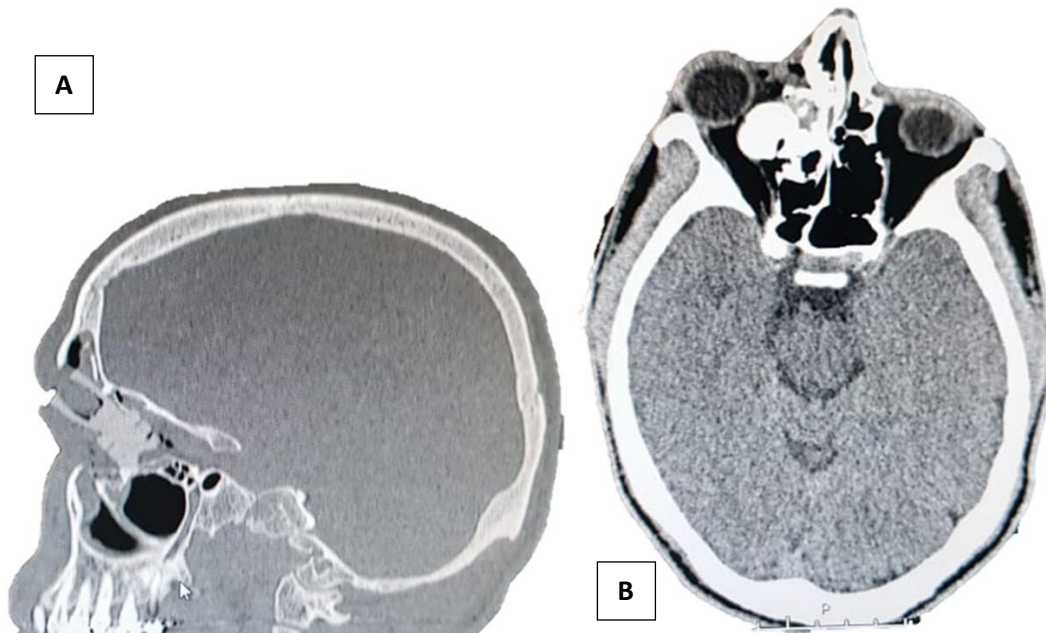


**Source:** Personal archive.

In Image 1 we can see in A the initial appearance of the patient, with the wound already in the right supraciliary region. In B we can see in more detail the projectile housed with the clinical characteristics already described.

The patient was admitted, underwent anti-tetanus therapy and medicated as a protocol for surgical preparation. In computed tomography, as shown in Image 2, in sagittal, axial and coronal sections, it was possible to verify the involvement of a portion of the anterior wall of the frontal sinus and the upper margin of the right orbit, leaving the foreign body lodged between these structures, which can be seen in detail in Image 3.

**Image 2:** A - CT - Sagittal section showing the projectile lodged within the orbit and fracture of the anterior board of the frontal sinus. B - Axial section showing intimate contact between the projectile and the optic nerve.

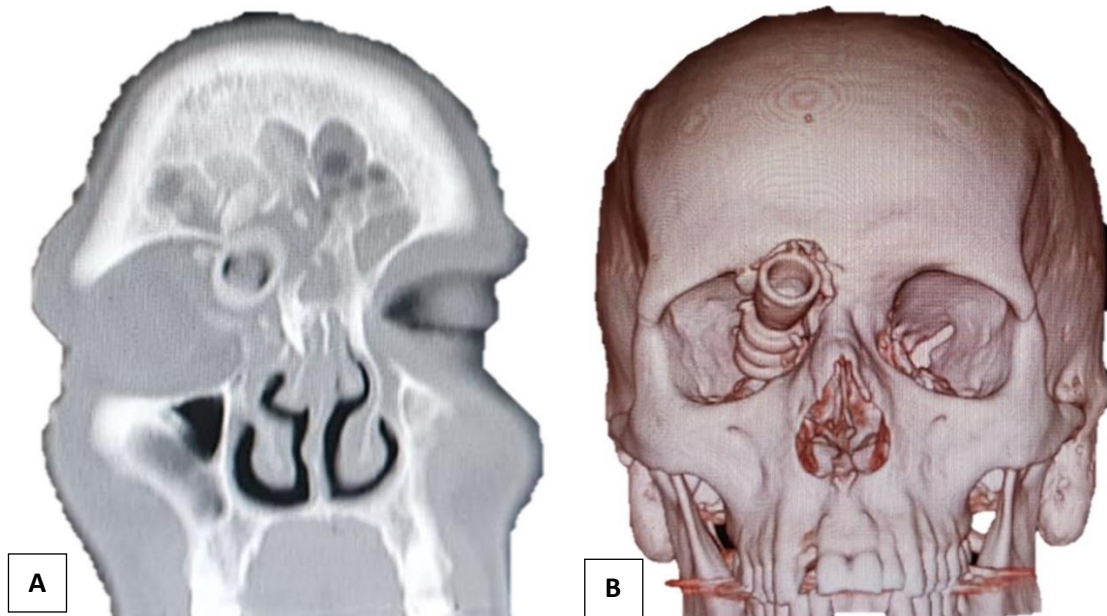


**Source:** Personal archive.

In image 2 we can see in A the sagittal section for hard tissues from computed tomography, where it is possible to check the position of the projectile, as well as its extension. In B in the axial cut for soft tissues it is possible to see the intimate contact of the bullet with ophthalmic structures.



**Image 3:** A - CT - Coronal section showing comminution of the anterior board of the frontal sinus and lateral orbital board. B - 3D reconstruction allowing the visualization of the possible ballistic path.



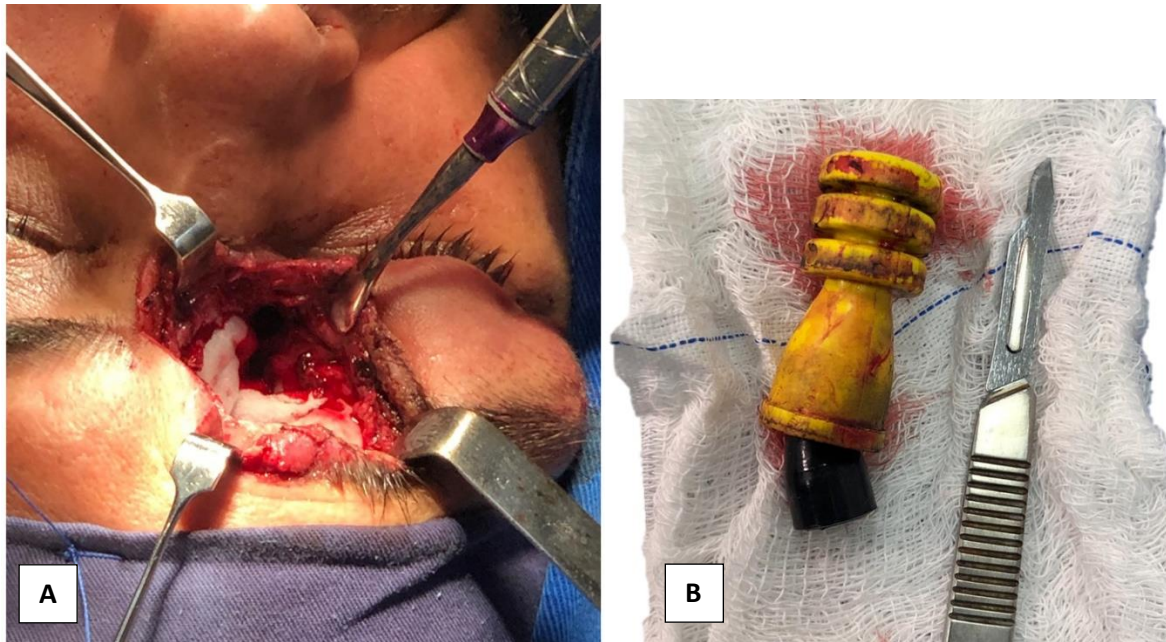
**Source:** Personal archive.

In image 3 in A, it is possible to verify in the coronal section for hard tissues of computed tomography the involvement of the anterior wall of the frontal sinus and the upper/medial border of the right orbit. In B, we can see in the 3D reconstruction the ballistic path of the projectile.

It was planned for this patient to remove the projectile without immediate reconstruction, since the risk of contamination was high due to the type of injury and guarding against possible consequences related to the trauma sequelae, with reconstruction scheduled in a second surgical period, this being linked to the patient's evolution.

The patient underwent surgery to remove the projectile under general anesthesia, with the wound itself as access of choice, debridement of the wound was performed, followed by removal of the foreign body and comminuted bone fragments, as shown in Image 4, ending with cleaning of the surgical store and suture by layers.

**Image 4:** A - Wound used as surgical access and aspect of the surgical store after removal of the projectile, debridement and cleaning. B - Elastomer projectile removed.



**Source:** Personal archive.

In Image 4 in A, it is possible to notice a wound that was used as a surgical access and the appearance of the surgical store after removal of the project. In B, the elastomer projectile removed next to the scalpel blade.

The patient showed edema compatible with the procedure in the P.O. (postoperative), compatible with the procedure that regressed during the 7-day follow-up. As for the sequelae, the patient had restricted movement in the right eyeball and altered visual acuity, but to a lesser extent, when compared to the initial condition, (Image 5) the patient was discharged on request, since his condition was stable and he had pending issues related to the Justice.



**Image 5:** A - Patient on the 7th day of P.O. with good healing aspect, presenting eyelid occlusion due to edema. B - Examination of ocular motricity showing restriction in laterality movement.



**Source:** Personal archive.

In Image 5 in A, it is possible to see the patient on the 7th postoperative day, presenting eyelid occlusion due to edema, with a good healing aspect. In B it is visible during the examination of ocular motricity the restriction in the movement of laterality by the right eye.

#### 4. Discussion

There is no universal classification in the care of patients with injuries caused by firearm projectiles, much less in terms of less lethal ammunition, however FPI victims must be treated within the ATLS (Advanced Trauma Life Support) protocol, developed for the initial care of various types of trauma. The literature shows that the main factors to be considered in the classification of injuries are the category of the firearm and the velocity of the projectile (Lavy & Asleh, 2003; Khatib et al., 2017). The surgeon must be aware that the presence of a well-trained team and good fixation systems can indicate or contraindicate the immediate surgical reconstruction procedure (Khatib *et al.*, 2017).

The late or immediate surgical approach to fractures resulting from FPI has been a major subject of discussion in the literature over the years (Amaral *et al.*, 2017; Lavy & Asleh, 2003). Some authors defend the immediate reconstruction at the time of the initial approach because it is a single time, recommending the immediate surgical cleaning, antibiotic therapy and careful suturing followed by immediate reconstruction, returning the facial contour and projection to the patient (Kihtir *et al.*, 1993). Other studies indicate surgical intervention and reconstruction at a later time, with the wound stabilized, without edema and a cleaner and closed surgical field (Shvyrkov, 2013). Both options have their advantages and their risks, and the choice of the most opportune time for the intervention must consider the patient's stable condition and the resources available to perform the procedure.

FPIs are characterized as dirty wounds, due to the possibility of contamination not only by the projectile itself, but also by secondary projectiles originating during its path during the flight and when reaching the target. Primary infections have been reported as the main complication associated with the use of rubber bullets (Shvyrkov, 2013; Khonsari *et al.*, 2010; Walker & Frame, 1984), which, in our view, justifies the concern about surgical wound infection and its ways of prevention. Another complication associated with FPI is the crushing of the bone that predisposes patients to tetanus (Lavy & Asleh, 2003). Because of this, it is essential to clean the wound by mechanical action and vigorous antisepsis, and always performing the anti-tetanic and antibiotic coverage (Amaral *et al.*, 2017), as well as the protocol adopted for the treatment of the patient.

The literature has shown that injuries resulting from firearm projectiles, when not treated correctly and rigorously, can generate significant complications for victims, which can lead to death (Shvyrkov, 2013; Lavy & Asleh, 2003). Regarding the surgery approach, it is generally divided into 3 phases: wound debridement, rigid internal fixation and tissue synthesis; reconstruction of hard and soft tissues; rehabilitation of secondary deformities (Motamedi, 2003). In the case addressed, we opted for reconstruction in a second step, which allows us to assess the possible sequelae resulting from the trauma, plan a treatment for these and then reconstruct the affected area. The realization of a precise and safe multidisciplinary approach is fundamental for consequently reducing the number of complications and sequelae (Khonsari *et al.*, 2010; Maguire *et al.*, 2007). In this way, each point of that mentioned must be taken into account when choosing the conduct to be taken for each patient, valuing the individual and preventing possible problems.

## 5. Final Considerations

Firearm injuries with elastomer ammunition have a different dynamic than a conventional projectile, which does not exclude the possible sequelae resulting from its use. The qualification of the multidisciplinary team and the time elapsed from the trauma to the start of the care are crucial factors for the success of the treatment to be achieved, with this the patient will receive the necessary care as soon as possible, consequently reducing the number of complications and sequelae. The field that encompasses firearm wounds lacks reviews and new research that supports the correct approach in different clinical situations.

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**Percentage of contribution of each author in the manuscript**

Leonardo Alan Delanora – 20%

Francisley Ávila Souza – 20%

Monique Gonçalves da Costa – 20%

Leonardo Perez Faverani – 20%

Ana Paula Farnezi Bassi – 20%