



## *Tooth Displacement to Maxillary Sinus Associated with Gunshot Wound*

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### Abstract

**Introduction:** Due to the high number of assaults and increasing violence within our society, face trauma is among the most common injuries, and the number of gunshot wounds especially in the craniofacial region has been shown relatively high numbers. Such lesions can cause a variety of injuries and may evolve from permanent sequelae to death.

**Objectives:** The purpose of this article is to describe a clinical case of a 16-year-old female patient with gunshot injury, with a displacement of the dental germ into the maxillary sinus and retention of the projectile in the infra-temporal space, with the orifice of the projectile in the region of the infra-spinal muscle.

**Conclusion:** The treatment of gunshot wounds on the face depends on the degree of injury caused by the projectile, and haemorrhage control and airway protection are essential steps for successful treatment.

**Keywords:** Tooth displacement; Dental trauma; Gunshot wound.

### Introduction

Urban violence in terms of definition are attacks on laws and public order, which has increased significantly over the years, being a reflection of the political, economic, psychological and social problems and conflicts of a society. As a consequence, there are constant presences of firearm victims in both public and private health services, so that victims, for the most part, carry with them lifelong sequelae or are even put to death [1].

Firearm projectiles when fired can reach any part of the body; however, a greater assiduity is observed in the head and/or face region, both jaw and jaw may be hit, the former having a higher index recorded. Face fractures may be small and/or multiple, as a result of impact and bone fragments by the affected area [2].

The complexity of the trauma from injury caused by the projectile is related to velocity, shape and angle of penetration, as it crosses soft and hard tissues, expelling bone fragments that increase the damage. Since the severity of the wound depends on the

anatomical location and the path that the projectile traversed internally, often leading to destruction of teeth and lesions of noble structures such as nerves and vessels, which can lead to haemorrhages difficult to control [3].

In cases of impact of the projectile with the skull, it can assume several directions, reaching the orbit, nerves, great vessels and even the brain. Removal of a foreign body, one should strike a balance between the benefits and the risk of withdrawal. Since 1980, surgeons are able to perform the removal of these foreign bodies efficiently and accurately in a conservative way through endoscopic surgeries [4].

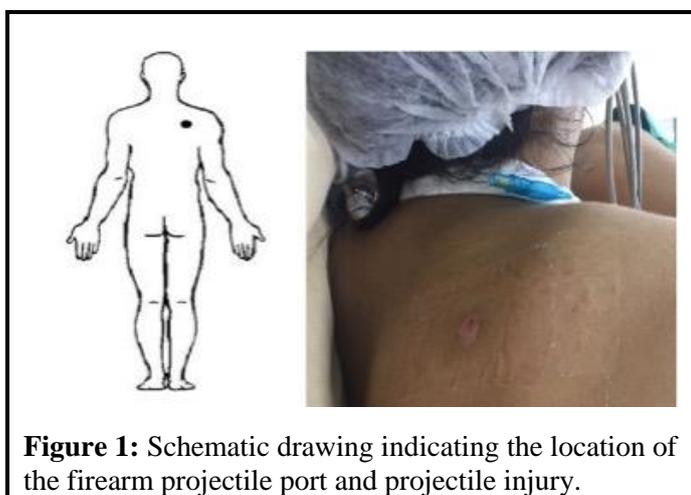
One of the places that the projectiles can reach in the head are the paranasal sinuses, being rare, and needing the removal of the projectile as soon as possible as prevention of chronic problems like sinusitis [5].

Given the importance of the subject, this article aims to report a case of a patient affected by a firearm shot,

with displacement of the dental germ into the maxillary sinus and the projectile to the infratemporal space.

### Case Report

A 16-year-old female patient was referred to the emergency department, a victim of attempted assault with a firearm. Patient had an entrance orifice in the dorsal region, at the level of the right scapula, without exit orifice (Figure 1). In addition, she presented severe dyspnoea, aphonia and intense cervical edema, being urgently submitted to a tracheostomy for the protection and clearing of the airway.



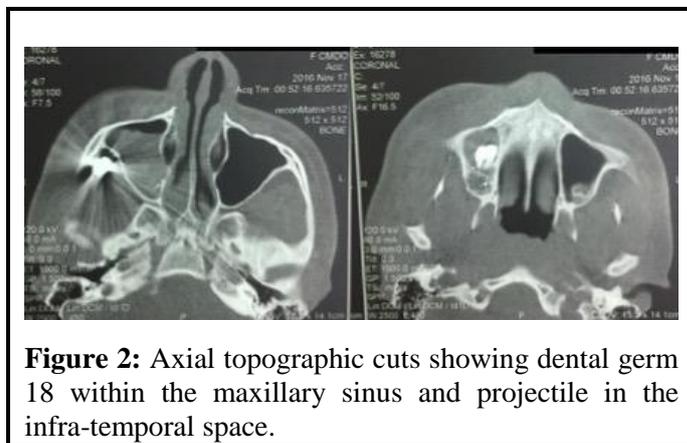
**Figure 1:** Schematic drawing indicating the location of the firearm projectile port and projectile injury.

Imaging examinations were requested for the secondary evaluation. In the chest and cervical scans, no lesions were observed, nor was the projectile. Computed tomography of the skull and face was requested three days after the trauma, due to the patient evolving with extensive edema in the face and mild epistaxis. In the axial sections of the face tomography, we observed the displacement of the dental germ of element 18 into the maxillary sinus and the projectile of firearm housed in the infratemporal space (Figure 2).

The adopted manoeuvre was surgical treatment through the Caldwell-Luc access technique for the removal of the dental germ and projectile, using the same incision, under general anesthesia. An incision was made at the vestibule bottom of the tooth region 13 to tooth 17, mucoperiosteal detachment and exposure of the anterior wall of the maxillary sinus, which was then submitted to osteotomy by means of a drill under constant cooling (Figure 3).

After the cavity was opened, it was hygienized, localization and subsequent removal of the dental germ was performed. To avoid possible complications such as sinus infection or oro-communication, intense

irrigation was performed with 0.9% saline solution and sutures were performed with slow absorption wire. In addition, the patient was using intravenous Clindamycin 600 mg every 8 hours as part of the prevention of sinus infections.



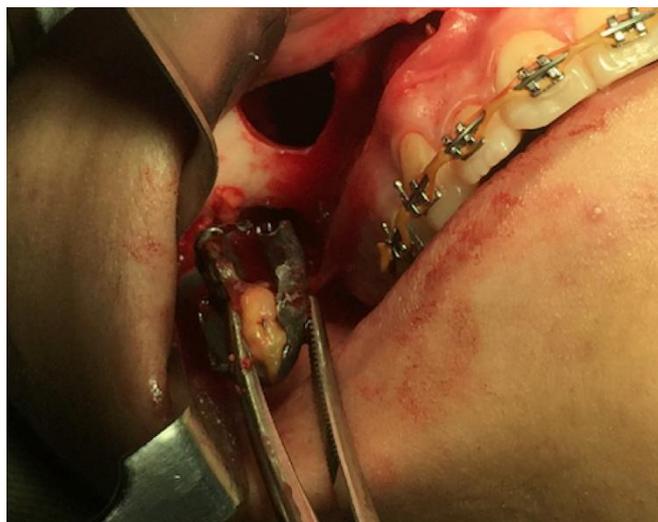
**Figure 2:** Axial topographic cuts showing dental germ 18 within the maxillary sinus and projectile in the infra-temporal space.



**Figure 3:** Access Caldwell luc for tooth germ removal.

After removal of the dental germ, the probe was located using infratemporal space probing with Freer Straightener and removal of the projectile with the aid of haemostatic forceps (Figure 4), ending the procedure with continuous suture using Polyglactin 4.0 Wire. The projectile presented structural deformation, which confirms the impact with bone structure and tooth (Figure 5).

The patient was followed up for another 5 days in the hospital, being discharged after removal of the cannula from the tracheostomy and beginning of outpatient respiratory therapy.



**Figure 4:** Removal of firearm projectile from infratemporal space.



**Figure 5:** Dental germ and firearm projectile.

## Discussion

The presence of foreign bodies in the region of the maxillary sinus is little reported in the literature, with idiopathic causes, being iatrogenic, trauma due to automobile accidents, firearms and penetrating injuries. In the case reported, element 18 was displaced into the sinus due to the high kinetic energy of a firearm projectile [6]. Having this as the entrance orifice the infra-spinal muscle region, its likely path being the region of subcutaneous screen and spaces muscle fibers from the cervical region passing medially to the right mandible branch until reaching the third molar, which consequently was displaced to

the maxillary sinus, and the projectile was housed in the infratemporal region, with no exit orifice, demonstrating a rare case to occur.

The displacement of foreign bodies into the maxillary sinus may pre-dispose to the occurrence of maxillary sinusitis, consequently the patient will experience strong, constant and localized pain, with painful sensitivity in the adjacent teeth. Panoramic radiographs and computed tomography of the skull and face should be used, and the second may bring additional information bringing greater security to perform surgical procedures, a fact observed in this case [5].

Depending on the anatomical location of the fragment, technique such as endoscopic surgeries assist in the removal of small foreign bodies in the paranasal cavities. In other cases, the surgical technique of Caldwell-Luc, as was used in the reported case, is used successfully and satisfactorily [5]. This technique is generally used in general to remove foreign bodies and, depending on the site, exposure of the anterior wall of the maxillary sinus occurs [7].

The Caldwell-Luc technique was used because the germ had been detached to the sinus. Even though some complications related to this technique, such as epistaxis and peri-orbit insults [5], have been found in literature, because it is the most chosen in surgical routines similar to the case report and mainly because of its advantages: operative field, effective access to the maxillary sinus allowing access to the foreign body and its removal and besides being a comfortable procedure for the patient [8]. Norris et al. In this study, we analyzed the trends of surgical treatment of patients admitted to the Department of Oral and Maxillofacial Surgery at Boston Medical Center for a period of 10 years, concluding that of a total of 1957 patients admitted for firearm injury, 136 (6.9%) had involvement of the facial region, with a higher percentage of mandible fractures in men, where 70% required airway management [9].

## Conclusion

With the increase of violence, several cases of firearms injuries arrive at hospitals routinely, and the regions most affected by such shots are the craniofacial ones. When the displacement of the teeth to the interior of the maxillary sinus occurs its location as well as that of a firearm projectile is necessary, where appropriate therapeutic protocols will be adopted according to protocols of care. In this way a face tomography is done, and from the imaging findings the intervention protocol is done, which in this case was the Caldwell-Luc technique that provides safe approaches when

there is maxillary sinus involvement, especially when body penetration occurs strangers to its interior, and these when not removed, generate complications to the patient.

#### **Conflict of Interest**

None declared.

#### **Funding**

None declared.

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