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Case Report

Extraction of a foreign body due to a penetrating wound in the buttock region by a firearm ultrasound-guided: a case report

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ABSTRACT

The use of ultrasound as a diagnostic and therapeutic support method for patients with penetrating gunshot wounds must be individualized in patients who require the removal of the foreign body. We report the case of a male in the fourth decade of life with a penetrating wound in the gluteal region on the left side of approximately 0.5 cm by 0.5 cm. Initially, stabilization was performed according to ATLS and later the patient was left in charge of general surgery. Doppler ultrasound was performed as the first and only imaging study to assess a possible vascular condition, which was negative. Due to the location of the projectile added to the medical-legal need of the patient to obtain the projectile, it was extracted with the help of an ultrasound-guided radiologist without the need to make an incision, since the bullet was extracted through the entrance hole. The reported literature mentions that there are key points, mentioned later in this article, for the extraction of bullets by firearm. Evidence for the use of ultrasound is limited but it should be kept in mind that ultrasound can be a useful diagnostic and therapeutic tool in removal of foreign bodies.

Keywords: Firearm, Ultrasound, Foreign body, Extraction, Penetrating wound

INTRODUCTION

The work has been reported in line with the SCARE criteria.[1] Trauma, of any kind, is the fourth leading cause of all deaths in the general population in developed countries such as the United States, as well as the leading cause of death among children and adults under 45 years of age.[2] Many victims have multiple injuries, often involving major vascular structures, which may present acutely as exsanguination or present late (e.g., arteriovenous fistula, posttraumatic aneurysm).

Penetrating trauma and high-energy motor vehicle accidents each contribute to the incidence of major injuries, which can occur in urban or rural settings, but the highest incidence occurs in urban areas. Penetrating gunshot wounds (PGSW) continue to be one of the leading causes of mortality in the population under 45 years of age. Although encountered less frequently than stab wounds, PGSW are associated with higher mortality due in large part to the higher energy delivered to the tissues.[3] PGSW abdominal injuries account for up to 90% of the mortality associated with penetrating abdominal injuries. Although data is limited, the mortality rate is reported to be as high as 10%.[4] The small intestine is the most frequently injured organ, followed by the colon and the liver.

According to the world health organization, outside areas of armed conflict territories, penetrating injuries are responsible for less than 15% of traumatic deaths worldwide, but these rates vary by country.[5] As an example, while homicides account for up to 40% of deaths in Los Angeles, penetration injuries account for only 10% of deaths in Norway.[6] While the most common causes of death from trauma are hemorrhage, multi-organ dysfunction syndrome, and cardiopulmonary arrest, the most common preventable causes of morbidity are

unintentional extubation, surgical technical failures, undetected injuries, and related complications. with the intravascular catheter.[7]

Advances in the diagnosis and treatment of these lesions are the result of the increasing quality of computed tomography (CT) angiography for diagnosing lesions, multiplanar CT reconstructions for surgical planning, and the increasing availability of appropriately sized endovascular stents. Modern resuscitation combined with improved surgical strategies has also contributed to increased survival. Endovascular management has provided clinicians with options that are generally faster and less morbid.

Unfortunately, not all hospitals have the necessary technology to carry out an ideal approach, especially general hospitals in developing countries. It is important that the specialist physician in charge of the emergency area and the surgeon are aware of effective alternatives for PGSW without increasing the patient's morbidity and mortality. We present a case of a patient who presented a wound to the left buttock due to a probable firearm.

CASE REPORT

This is a male patient in his fourth decade of life who came to the emergency department reporting that, after a fight, he was attacked by a probable firearm in the left pelvic extremity. Due to the type of emergency, he was immediately admitted to the shock area and an exhaustive assessment by the treating service began. Following the algorithm suggested by ATLS, the airway is adequately secured, then two peripheral routes are obtained for infusion of 0.9% saline solution and the patient is carefully reviewed to identify more sites with penetrating wounds.

During all times in the shock area, vital signs remained within normal parameters with heart rate of 91 beats per minute, respiratory rate of 19 breaths per minute, blood pressure of 128/84 mmHg, and oxygen saturation of 97%. Without clinical data of tissue hypoperfusion, it was decided to leave the shock area and go to the general area. general surgery department was consulted to regulate optimal patient management.

Patient already in charge of general surgery is exhaustively examined, found on physical examination a male patient of apparent age to his real age, oriented in his three spheres (time, place and space), with facies of pain. A 15-point Glasgow scale was obtained, oral mucosa with adequate hydration, mobile cylindrical neck without the presence of palpable masses. Normal chest with adequate magnification and magnification, lung fields with audible breath sounds, no crackles or audible wheezing. Rhythmic precordio of good intensity without murmurs or aggregates. Oxygen saturation without the need for supplemental oxygen at 97%. Semi-globose abdomen at the expense of adipose panicle with present peristalsis of adequate tone and frequency, without relevant data on superficial and deep palpation. Intact bilateral thoracic limbs, no edema, 3-second capillary refill, peripheral pulses present. Left pelvic limb with the presence of a penetrating wound located in the buttock region of approximately 0.5 cm by 0.5 cm with well-defined edges, with the presence of residual bleeding, the rest of the limb without edema, adequate skin coloration, 3-second capillary refill, present peripheral pulses. Right pelvic limb without relevant data to report. A second inspection of the whole body was carried out where only the already mentioned penetrating wound was observed.

Doppler ultrasound of the affected pelvic limb was requested where no data of vascular involvement in the affected site or at a distance are reported. Tracking is performed to visualize the location of the firearm projectile found approximately 1 cm below the epidermis, staying in the muscle compartment. With the support of the radiologist on duty, the ultrasound-guided foreign body was extracted.

With the patient lying in the prone position and after asepsis and antisepsis with soapy isodine, sterile fields are placed. Skin and muscle tissue are infiltrated with a 20CC syringe loaded with 2% lidocaine and applied with a 20G needle around the circumference of the penetrating wound and surrounding tissue. A Kelly clamp was inserted through the affected site to assess skin tunneling and then a linear transducer was placed to identify the location of the foreign body (Figure 1).

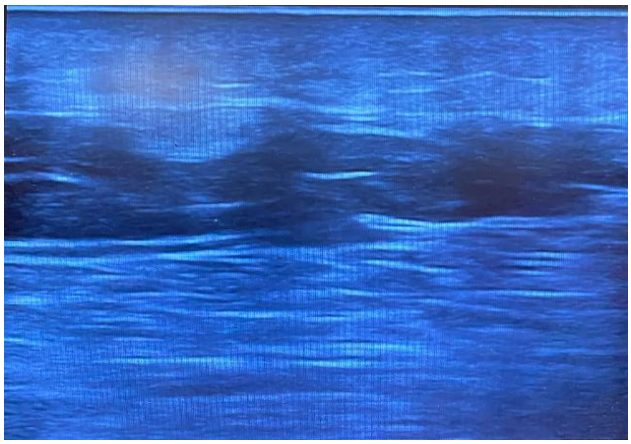

Figure 1: Foreign body ultrasound tracking of features compatible with a firearm projectile.

Subsequently, an Allis forceps is inserted and a foreign body is extracted satisfactorily using ultrasound guidance (Figure 2), approximately 1.5 cm by 0.5 cm, ovoid in shape, compatible with a .22 caliber bullet (Figures 3 and 4).

Hemostasis is verified and direct skin closure is proceeded with Nylon 2.0 separate simple stitches. The site is cleaned with water and neutral soap and a clean dressing is placed. The patient recovers adequately 24

hours after the intervention and is discharged. Follow-up by outpatient consultation was performed 7 days later with a new Doppler ultrasound where no data on vascular involvement was reported. He is discharged from the general surgery department.

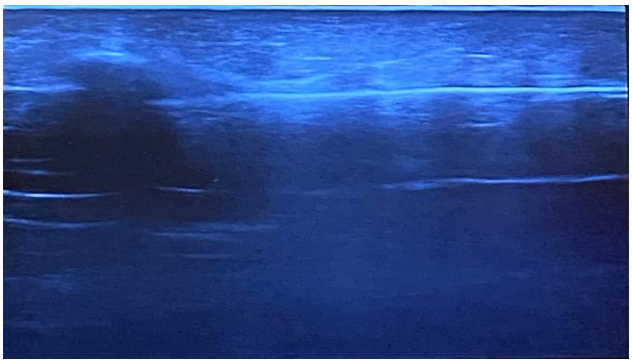

Figure 2: Ultrasound showing a foreign body and allis forceps.

Figure 3: Firearm projectile approximately 1.5 cm by 0.5 cm compared to scalpel handle.

Figure 4: Visualization of firearm projectile at the moment of being extracted.

DISCUSSION

In developing countries such as Mexico, the prevalence of penetrating gunshot wounds remains one of the main causes of mortality in young people. According to data obtained by the national institute of public health of Mexico, in 2017 there were 703,047 deaths throughout the country, of which 56% were men and 44% women.[8] Of the approximately 393,706 men who died during that year, 7.3% were the result of homicides caused by PGSW. In the female sex, this percentage only represents less than 1%.

The focus of this work is to discuss the attitude that the surgeon should take when faced with a picture of penetrating wounds caused by firearms and the treatment that should be given. In this case, it was a wound located in the gluteal region without vascular compromise, accessible to remove without the need to make a new incision. The removal of foreign bodies compatible with firearm projectiles continues to be discussed and the points for and against removing said objects are argued.

Should foreign bodies compatible with firearm projectiles be removed? It is definitely not a simple answer, since it refers to a comprehensive assessment of the patient for decision making. Although patients often request prompt treatment and complete removal of all bullet fragments, there are medical limitations to performing such procedures. In this article, we review the available literature and international contributions on bullet removal concepts and the extent of initial debridement required.

According to data reported by Dienstknecht, approximately 2% of all shooting victims require medically justified bullet removal.[9] Most of these are for palpable bullets, bullets visible at surgery or exposure of the bullet to synovial fluid or cerebrospinal fluid, or due to injury to the eye. Bullets can be located by direct palpation, with conventional X-ray or CT diagnostics, using an image intensifier in the operating room, or with special adaptive electronic amplifiers.[10] The presence of metal fragments is generally a contraindication to the use of magnetic resonance imaging.

A bullet located close to the skin in combination with obvious patient discomfort (due to pressure effects) is an obvious reason to remove the bullet. This could be the case when the bullet is under the skin of an exposed area such as the ventral lower leg, or high-pressure temporal areas such as the bottom area. Cosmetic effects when the bullet is visible in delicate areas such as the skin of the neck or even the face are addressed differently. Often there is no problem in locating and extracting these palpable bullets, so support this indication whenever the patient wishes. In summary, the following are clear indications for the removal of foreign bodies compatible with firearm projectiles (FP), according to Dienstknecht:[8] FP found in joints, cerebrospinal fluid, or the eyeball. FP

that impinges on a nerve or nerve root. FP that lies within the lumen of a vessel, resulting in a risk of ischemia or embolization. FP that causes lead poisoning (rare). FP seen or clinically palpated on examination. FP that requires extraction for a legal examination. In all other cases, the indication must be critically reviewed before removal.

The use of ultrasound for the extraction of accessible bullets has been reported very little in the literature.[11-14] We recommend that it represents a valid option in patients who meet any of the previously mentioned criteria and do not increase the general morbidity of patients. In our case, the patient requested verbally and in writing the need to remove the foreign body since, according to Mexican law, the bullet is required as evidence to initiate legal proceedings against the aggressor.

CONCLUSION

The use of ultrasound as a diagnostic and therapeutic support method for patients with penetrating gunshot wounds must be individualized in patients who require the removal of the foreign body. The reported literature mentions that there are key points for the extraction of bullets by firearm. Evidence for the use of ultrasound is limited but it should be kept in mind that ultrasound can be a useful diagnostic and therapeutic tool in the removal of foreign bodies.

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