

# Management and Treatment of Wounds by Projectile from a Firearm in Hand in the Plastic and Reconstructive Surgery Service of the Central Military Hospital in Two Years

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## Abstract

**Introduction:** Gunshot wounds are a major cause of morbidity and lead to serious socioeconomic problems. Wounds often causing severe functional sequelae. Therefore, it is vitally important to provide proper management of these wounds.

**Objectives:** Define the treatment of gunshot wounds at the Central Military Hospital in the period from March 2019 to March 2021.

**Material and Methods:** It is a descriptive, retrospective, observational study, RESULTS: Patients who fulfilled the diagnosis presented 3 metacarpal fractures (27.27%), 2 metacarpal and phalangeal fractures (18.18%), 2 fractures of phalanges (18.18%), 1 carpal + metacarpal fractures (9.09%), 3 with injury only to skin cell tissue without evidence of fractures (27.27%). Therapeutic management: 3 patients received external fixator, 2 ORIF, 1 external fixator + ORIF + inguinal flap + bone graft, 1 external fixator + bone graft + ORIF, 0 wound closure, 4 management with wet therapy.

**Conclusions:** The wounds By firearm in hand are frequent injuries, which merit immediate treatment. This depends on the complexity of the injury for a speedy recovery and integration into the workplace.

**Keywords:** gunshot wounds

## Introduction

To date, gunshot wounds (HPAF) constitute a public health problem in the world. This fact is influenced by multiple factors such as: family disintegration, unemployment, early incorporation into criminal groups, experiences with drugs, uncontrolled dissemination of violent acts through the mass media, as well as greater ease in acquiring weapons [1]. In Each year in the United States, 30,000 to 50,000 people die secondary to HPAF, and they constitute the first cause of death in the first 2 decades of life; furthermore, it is estimated that for each death there are at least 3 disabling injuries. With regard to homicide, it mainly affects men; the most affected age range being 15 to 34 years [1, 2]

In Mexico, it is evident that the frequency of these injuries has increased [2]. In the last 15 years, injuries from this type of projectile have increased

significantly; causing damage through tissue disruption, hemorrhage and infectious processes. These types of wounds are often contaminated with foreign materials such as cloth, dirt, stones, bullets, and splinters [3]. It is therefore important to promptly manage these injuries.

The Central Military Hospital receives both civilian patients who suffer assaults on public roads and active military patients who suffer assaults due to assaults and during confrontations against armed groups.2 Due to the use of means of protection in the thorax and head, the extremities are areas vulnerable to projectiles and explosions. These are affected with a frequency of 60-80%, and the hand in particular in about 25%, 4 being these infrequent sites. The injuries are generally caused by low speed missiles (pistols), tending to cause complex injuries to the upper extremities6, causing prolonged or permanent disabilities with a personal,

social and economic impact on young adults and different degrees of severity [7].

**Ballistics**

In firearms injuries, three components can be distinguished: entry port, trajectory, and exit site [10].

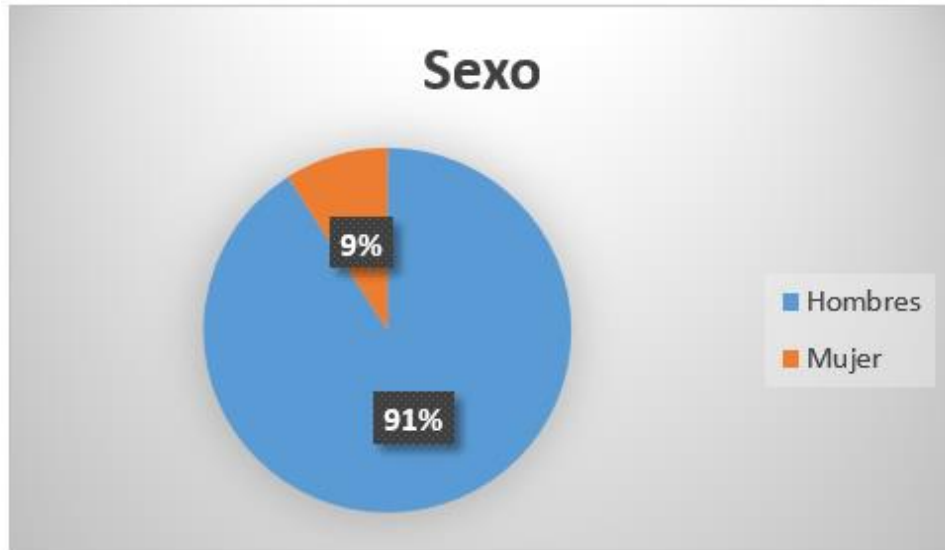
**Entry orifice**

Corresponds to a smaller contused wound; among its characteristics are the carbonaceous halo (false tattoo or smoking) which corresponds fundamentally to the deposit of the elements of deflagration of the gunpowder around the entrance orifice. The flash from the muzzle will cause a burn, so a period of observation is required. If it is an area where

the skin is on a bone plane, the following characteristics may be present: Hoffman lesion, stellate lesion, Benassi sign and impression of the cannon on the skin. The "quarter mine" or Hoffman lesion corresponds to a pocket between the skin and the bone; produced by the sudden expansion of the jet of compressed gas after the shot.

**Intracorporal trajectory**

During its intracorporeal trajectory, the projectile releases kinetic energy towards the surrounding tissues perpendicular to its trajectory, generating a shock wave that, due to their elasticity, produces a space called "temporary cavity"; but if the shock wave exceeds the resistance of the tissues, they rupture, generating a definitive cavity greater than the diameter of the projectile. If an easily accessible projectile is found, it must be removed.



**Graph 1:** *Distribution by sex*



**Graph 2:** *Distribution by probate*

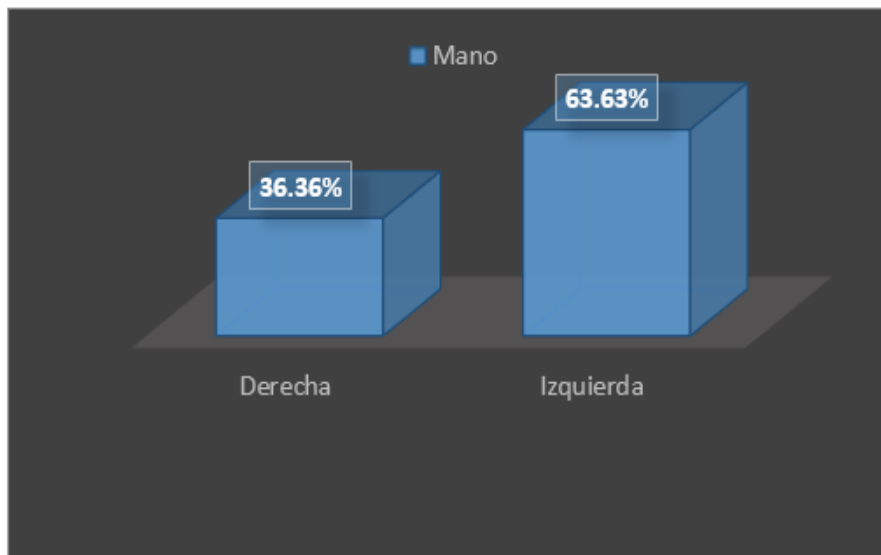
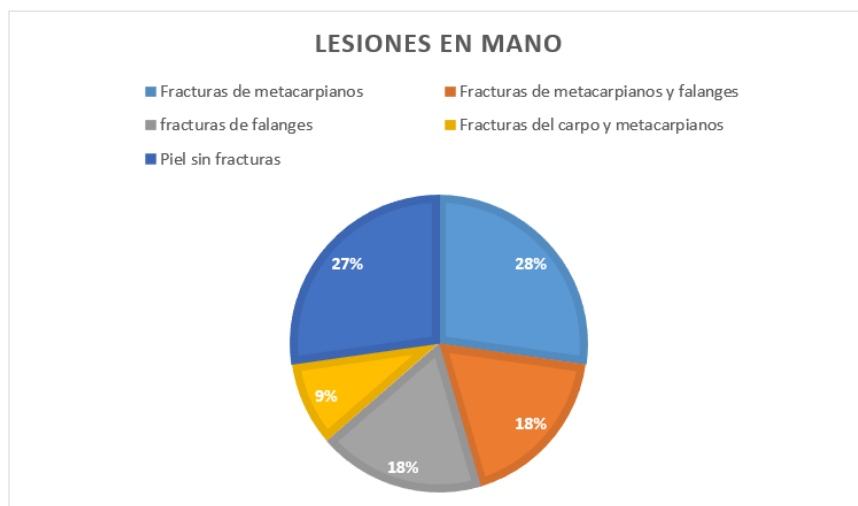
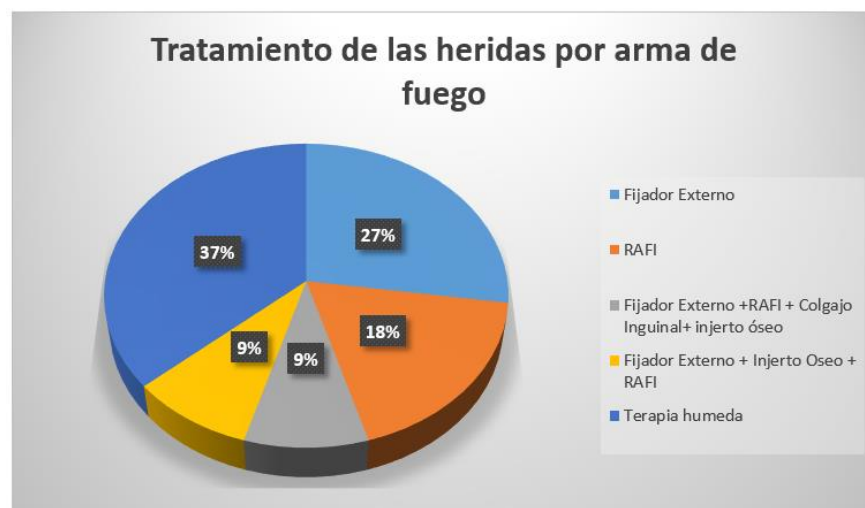


Table 1: Injured hand



Graph 3: Hand injuries due to projectile wounds from a firearm



Graph 4: Treatment of gunshot wounds from a firearm

## Outlet hole

It is formed by the pressure exerted by the projectile from the inside out, everting the skin, the exit orifice tends to be larger and more irregular than the entrance orifice, giving the appearance of having exploded outwards due to the energy they release [8, 10].

In the context of wound ballistics, these have 2 classifications, the 1st one classifies it as Low velocity <2500 ft / s (750 m / s) and high velocity = or > 2500 ft. 2 The 2nd classification is divided into: Low velocity <350m / s (pistols), intermediate 350-600 m / s (shotguns), high velocity 600-700 m / s (rifles, 357 revolver, automatic and semi-automatic weapons) causing “explosive effects” [8, 9].

Injuries caused by HPAF present multiple variables in terms of their production or ballistics mechanism, the site of the injury, the anatomical regions affected, the degrees of injury produced and the evolution that the affected organs may have. The amount of kinetic energy transferred from the projectile to surrounding tissues, internal organs and directly damaged structures, as well as the final location of the projectile, determines the severity of gunshot projectile wounds.1 These injuries are complex due to their proximity neurovascular structures and the concurrent participation of various tissues (tendinous, bone or nerve) 3; which require complex and meticulously planned treatments.



**Figure 1:** 8mm x 6mm firearm projectile wound entry hole in the left hand in flexor zone IV



**Figure 2:** Outlet path with lesion in left hand extensor zone VI causing skin defect of 4cm x 3cm



**Figure 3:** Multifragmented fractures of the base of the 3rd, 4th, 5th metacarpals, large, hamate, pisiform of the left hand



**Figure 4:** Lesion of 50% of the extensor tendon of the 3rd, 4th and 5th fingers, extensor of the 2nd integral finger of the left hand



**Figure 5:** AP, oblique and lateral X-ray control of the 9.5 cm external fixator in the head of the 3rd metacarpal to the distal radius of the left hand



**Figure 6:** Reconstruction of the left hand with reduction of fractures with bone graft of the left iliac crest (measures 11cm, for bone defects of the 3rd, 4th and 5th metacarpal of 7cm, 5cm and 4cm) as well as 4 titanium plates system 2.0 1) 16-hole double to 3rd metacarpal 2) 9-hole T-plate. 3) Simple plate with 4 holes towards 4th metacarpal and 4) with 6 holes towards 5th metacarpal





**Figure 7:** Coverage of the skin defect with a left inguinal fasciocutaneous flap



**Figure 8:** Inguinal Flap Release

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