

Dormant Shotgun Pellets-Are They Really Dormant?

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Abstract

Shotgun injuries are serious but uncommon type of injury in India. Embedded shotgun pellets have widespread functional and aesthetic implications. No specific guidelines are available as to which pellets need immediate removal. Most pellets are known to lie dormant in the body while some present with complications and warrant removal many years after injury. We hereby report a case of homicidal shotgun injury that was sustained 22 years ago and needed pellet removal due to excruciating pain.

Keywords: Shotgun injuries; Maxillofacial trauma; Hemodynamic stability; Peri-articular fibrosis

Introduction

In India the incidence of firearm homicide rate is about 0.93% according to the United Nations office on drugs and crime 2000 [1]. 14% of all gunshot injuries result in maxillofacial trauma [2]. The large number of pellets dispersed in the tissues increase the damage with the attendant risk of infection. On the contrary, the presence of pellets may not have any consequence and be left *in situ* without any intervention [3,4]. Management of patients with shotgun wounds is controversial and relies on symptoms and clinical assessment. Conventional management includes resuscitation of the patient ensuring airway patency and hemodynamic stability. Debridement and closure of soft tissues should be considered in the first operative stage and bony injuries can be treated after the soft tissues have healed. Most of these cases remain asymptomatic. This case report presents a patient who suffered from homicidal shotgun injury with many penetrated bullets in the body including the head and neck region but without any symptoms for 22 years. We also discuss the complications of shotgun injuries and indications for their removal.

Case Report

A 36 year old female, came from a remote village in India, with complaints of pain in her right mastoid area, neck and chin. History revealed that 22 years earlier she was shot with a locally made shotgun during a homicidal attempt at home. Following the injury she fell unconscious and was taken to the emergency department of the hospital where some of the pellets in her neck region, impinging on the great vessels, were removed. She has had no complaints ever since. Now, after many years since the episode, she had excruciating pain in the

mastoid region, the neck and the chin area. On palpation some of these pellets could be felt just beneath the skin. Radiographic examination showed multiple radio-opaque shadows in the mandible, maxilla, neck and subcutaneous tissues just superficial to mastoid process on the right side, validating the patient's complaints (Figure 1).

Haematological investigations were carried out and serum lead levels were found to be within normal limits. The patient was posted for surgical exploration and removal of palpable pellets under local anaesthesia. One pellet was removed from the subcutaneous tissue layer in the post aural region, another from the muscle layer overlying the symphysis menti and the third one was osseo-integrated into the cortical bone of the body of mandible (Figure 2).



Figure 1: Radiographic view of pellets.



Figure 2: Pellets in the post aural region.

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Discussion

In India, the use of country-made pistols is widespread, especially in the regions of northern India. The components are manufactured from scrap material, such as gun barrels fashioned from truck steering wheels and their production has become a cottage industry. Multiple projectiles are fired simultaneously, making their ballistic properties complex. Glazer et al. [5,6] divided the shot gun injuries to three types focusing on the surface area of pellet scattered.

Type I: Injuries result from scatter contained within an area of 25 cm² and the pellets act as individual missiles.

Type II: Injuries result from scatter contained within an area of 10 cm² to 25 cm²

Type III: Injuries result from scatter contained within an area of less than 10 cm².

Shotgun pellets can be demonstrated on plain X-rays as radiopaque objects scattered in the bone, soft tissue and viscera. Pellets are either made up of steel or of lead. Fortunately steel and lead pellets can usually be distinguished from one another at radiography. Lead pellets tend to be deformed and fragmented by impact with soft tissues and bone. Simple analysis of a radiograph is all that is needed to determine if a patient with shot gun injury can be safely placed in MR imaging magnet. MRI has been shown to be safe for fragments made from lead and/or copper. Steel fragments may get heated up and migrate, as well as produce artefacts in the imaging [7]. 3-D CT is still the best imaging modality in demonstrating the location of the fragments as well as detailing the fractures present.

Shotgun pellet injury may cause major damage to the soft tissues or bone or other adjoining vital structures. Pellets otherwise asymptomatic have been improvised to be left in situ but certain delayed effects of otherwise dormant pellets have also been reported in literature. Some metals embedded in the body tissues can be a source of potential exposure to toxic effects [8,9] Cases of embolisation have been reported in literature with severe secondary damage and even death of the victims [10,11]. Shotgun pellets are known to migrate at various places into soft tissues and bone [12]. Hence, specific anatomic localization of pellets is essential before any surgical exploration is to be carried out.

No clear guidelines for the management of shotgun injuries have been provided in literature. Despite the fact that patients are often concerned and request immediate removal of pellets, there are limited medical indications to perform such procedures. A bullet located close to the skin that is either visible under the thin skin, or causing discomfort in temporary high-pressure zone areas, like the bottom area, should be removed. Intra-articular bullet fragments may cause mechanical symptoms and joint destruction. Furthermore, retained bullets can lead to lead toxicity which can lead to peri-articular fibrosis and chondrolysis [13].

Extra-articular joint injuries can usually be treated with local wound care and do not require radical operative debridement. Bullet injuries of the eye can lead to a ruptured globe or cause extra-ocular or intra-ocular injury. Movements of extrinsic ocular muscles can facilitate the migration of extra-ocular foreign bodies over time. Hence, even delayed symptoms in the eye should not be neglected [14]. Bullets lodged in the spinal cord in contact with CSF undergo electrolysis and can lead to lead toxicity [15]. Lead toxicity however is rare and symptoms can occur even after a long follow up period. All children with retained bullet fragments should be considered candidates for routine serum lead levels at the time of initial evaluation, at monthly intervals up

to 3 months, 1 year post injury and yearly thereafter. In symptomatic patients with retained bullet fragments, definitive treatment involves removal of lead pellets along with chelating therapy.

Summary

Shotgun injuries in India are rare but are showing a rapidly increasing trend. Despite the desire of patients for early and rapid removal of pellets, there are only a few medical indications for the same. Care has to be taken to identify imminent dangers and potential complications caused by the pellets. Steel and lead pellets should be distinguished and serum lead levels and lead toxicity should be taken into consideration before surgical intervention. Surgeons must also not forget that pellets may migrate from their initial lodgement to different areas and may present with serious complications or pain, many years after injury.

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