

Gunshot Injury from a Lead Bullet in a 10 Year Old Boy

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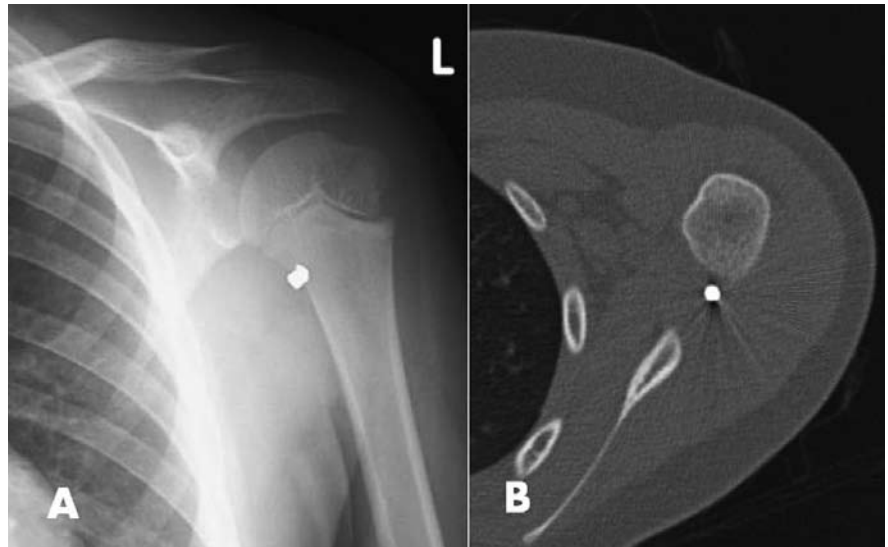
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The signs and symptoms of lead poisoning vary and therefore may be difficult to recognize. Plumbism (lead intoxication), most commonly caused by ingestion of lead-based paint by children, is a rare complication although it has been documented in cases of gunshot injuries, especially in an intra-articular joint. Removal of foreign bodies from a patient is controversial; the decision being made according to the size location and material of the foreign body. The rule of *primum non nocere* (first do not harm) must be adhered to before performing an invasive exploration. Thus, many patients are left with metal shrapnel fragments and bullets. In some these foreign bodies are pushed to the surface and are spontaneously removed. We describe the case of a lead bullet rifle injury, and discuss its management.

Patient Description

A 10 year old boy was admitted 1 day after being shot by an air-shotgun containing lead bullets. A small entry wound was seen over the anterior aspect of the left shoulder. The patient reported initial immediate parasthesia in his left arm which resolved by the time of arrival. Physical examination did not reveal any signs of neurological or vascular deficit. However, although the range of motion of the shoulder was preserved, the patient reported pain upon movement. On X-ray imaging the bullet was seen in the anterior aspect of the shoulder joint [Figure A]. A computed tomography scan of the shoulder demonstrated, intra-articularly, the bullet near the anterior labrum of the glenoid [Figure B]. At a preliminary consultation it was decided not to remove the bullet due to concern of an injury to the brachial plexus. Serum lead levels



[A] Antero-posterior view of the left shoulder showing the metal bullet. [B] CT view showing the depth of the bullet.

measured at admission were 4.9 µg/dl. Still, there was concern about late lead poisoning from the retained bullet. This led us to review the literature on this issue, after which we consulted with the Israel Poison Information Center at Rambam Medical Care Campus, and the decision was made to remove the bullet. An open arthrotomy of the left shoulder was performed. The bullet was found buried in the anterior capsule of the joint and removed uneventfully. The child was placed in shoulder immobilization for 3 weeks. The postoperative course was uneventful. Blood lead level, complete blood count and renal function at discharge were in the normal range. At 12 months follow-up, the patient was doing well, with preserved strength and range of motion.

Comment

Lead is an important metal in industrial communities, and excess exposure can

lead to plumbism. Numerous case reports have demonstrated that lead poisoning with potentially severe consequences can result from retained lead projectiles following firearm injuries [1-5]. The signs and symptoms of lead poisoning are non-specific and might be minor, often masking the clinical diagnosis. These can include headaches, attention deficit, abdominal pain, and laboratory findings such as anemia and renal failure. Fetal anomalies from maternal bullet-related plumbism, and even death, can occur. The diagnosis of lead intoxication usually includes both clinical findings and analysis of serum lead levels. The upper limit of the normal range of serum lead levels in the pediatric population is 10 µg/dl. Levels above 10–15 µg/dl can be associated with behavioral and learning disturbances in children. In addition, it can be associated with elevations of erythrocyte protoporphyrin, impaired

vitamin D metabolism, and pyrimidine-5'-nucleotidase inhibition.

Despite the absence of symptoms in the majority of patients carrying lead fragments in their bodies, awareness of the possible signs and symptoms of lead intoxication when bullets are lodged in large joints like knees, hips and shoulders is needed [4]. Fragments of lead bullets retained intra-articularly may result in arthralgia, arthritis, focal synovitis, and "bursogram" [2]. The associated arthritis with the concomitant increased vascularity and inflammatory cells may well be a sufficient explanation for the systemic absorption of lead from a joint space [3].

The treatment of lead poisoning from gunshot wounds is based on the combination of surgical debridement and chelation therapy with oral succimer-DMSA (2,3-dimercaptosuccinic acid). Traditionally, chelation therapy has necessitated hospitalization for intravenous administration, but a new chelating agent that is given orally, succimer, has allowed effective chelation therapy on an outpatient basis. Multiple courses of chelation therapy may be needed to deplete the body stores of

lead. Chelation therapy alone may not decrease the levels of lead. Therefore, when dealing with penetrating trauma it should be combined with surgical removal [5]. In the case presented here there were no signs of systemic lead poisoning, nor was there any laboratory evidence of elevated lead levels, therefore chelation therapy was not initiated. In fact, quite the opposite – the proximity of the bullet to the joint required surgical debridement and extraction.

Recently, a few cases demonstrated the utility of arthroscopic intervention for the management of gunshot wound to the joints [5]. Arthroscopic removal of bullets from joints like the shoulder avoids traditional exposure, which would result in extensive soft tissue damage. In most cases removal of foreign bodies should be considered according to the location, size and the potential damage during surgical removal. Lead foreign bodies, however, pose an additional problem due to their potential toxicity. The case described here is a reminder that lead foreign bodies located intra-articular should be removed even if it involves a surgical risk.

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