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Case Reports and Series

Ankle Lead Arthropathy and Systemic Lead Toxicity Secondary to a Gunshot Wound After 49 Years: A Case Report

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ABSTRACT

Intra-articular bullet wounds have been found to cause both local and systemic consequences, in particular, when retained over many years. Only a few such cases have been described in published reports, each with different implications, depending on the joint involved and whether the patient experienced lead toxicity. We report the rare case of a 63-year-old male with lead arthropathy of the ankle secondary to a gunshot wound 49 years earlier. In addition to his severe tibiotalar arthritis, he presented with significantly elevated blood lead levels. Although he remained asymptomatic of lead toxicity, the patient was treated with preoperative chelator therapy and arthroscopic debridement, excision of accessible bullet fragments, and partial synovectomy to alleviate his ankle pain. However, he continued to experience ankle pain, and his blood lead levels remained elevated. He, therefore, underwent arthroscopic ankle arthrodesis with preoperative chelator therapy to prevent a further increase in blood lead levels secondary to surgical manipulation. Although lead arthropathy and toxicity secondary to retained intra-articular bullets has been documented in various joints during the past decades, to the best of our knowledge, the present case is the first adult case of an affected ankle reported in published English studies in 40 years. The standard of care has evolved since then, in particular, in regard to chelator therapy and the necessity for removal of intra-articular lead fragments to prevent further lead toxicity. The present case serves as an example of lead arthropathy of the ankle and highlights the importance of balancing the standard of care with symptomatic care to optimize patient well-being.

Injuries secondary to gunshot wounds overall, and their clinical progression, remain substantially underreported compared with the frequency with which they occur (1,2). According to American statistics for 2009 to 2013, an average of >100,000 people experienced gunshot wounds annually (3). The significant range of context of injury and type of injury among those with gunshot wounds has contributed to optimal treatment remaining a subject of discussion (4–6). Lead arthropathy secondary to a retained intra-articular bullet is a rare phenomenon reported in few cases in published reports. Although a fragmented lead bullet can remain relatively inert if lodged in the soft tissues, it has the potential to cause significant harm if the fragments come into contact with an articular surface (7–11). Lead synovitis is a degenerative process in which intra-articular retention of lead results in synovial hypertrophy, chronic inflammation, and fibrosis, thereby contributing to further arthropathy (8). As the damaged cells die, intracellular lead particles are released directly into the synovium and enter the systemic circulation, explaining the increased risk of plumbism associated with an intra-articular bullet (8). We report the case of a patient who presented 49 years after gunshot trauma with significantly elevated blood lead levels and significant ankle arthropathy secondary to retention of an intra-articular bullet. To the best of our knowledge, the present case is the first adult case of an affected ankle reported in published English studies in 40 years.

Case Report

A 63-year-old male was shot in the right ankle with a 22-caliber lead bullet at the age of 14. At that time, immediate debridement and irrigation of his ankle was performed, and the patient was hospitalized for several days. However, complete removal of foreign bodies from the joint was not performed. The patient had been

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Fig. 1. Anteroposterior, mortise, and lateral ankle radiographs at initial presentation.

asymptomatic in regard to his ankle until 2007, at which point minor traumatic injuries began to cause him more discomfort. In March 2013, a grocery cart hit his right ankle. This accident resulted in chronic pain and occasional swelling throughout the joint. In February 2014, the patient was seen at the foot and ankle clinic for right ankle pain with weightbearing and pain at night. The patient denied any other previous medical issues and was not taking any medication. His clinical evaluation showed a visible synovitis and pain on palpation of the anterolateral aspect of the right ankle. The ankle was otherwise stable and well aligned. The patient had both active and passive complete painless range of motion of the ankle and subtalar joints. On weightbearing radiographs, his ankle exhibited moderate osteoarthritis with synovitis likely associated with the lead from residual bullet fragments (Fig. 1).

While waiting to undergo further imaging, the patient underwent a trial of conservative management with an ankle stabilizing orthotics and a tibiotalar intra-articular corticosteroid injection. At 3.5 months after the initial visit, the patient showed no improvement. A computed tomography scan revealed intra-articular metallic fragments, degenerative joint disease, and lead synovitis of the ankle joint (Fig. 2). Testing for blood lead levels, complete blood count, and liver and renal function tests were requested, and a trial of an ankle–foot orthotics and an oral nonsteroidal anti-inflammatory drug were attempted. His initial blood lead level was 3.04 μmol/L (normal value 0.00 to 0.320; Table). The public health department was notified and hematology consulted. No other form of environmental exposure to lead was identified. The medical team confirmed that the elevated blood lead level was secondary to the intra-articular bullet fragments. Interdisciplinary consensus between the medical team and the orthopedic surgeon confirmed the patient's need for chelator therapy, followed by surgical removal of the lead fragments, despite his lack of symptoms for severe lead toxicity. Follow-up radiographs 9 months later also revealed further progression of the arthropathy (Fig. 3). Therefore, 1 year after his initial visit, the patient began a 6-day course of oral succimer therapy (Chemet®, 100 mg capsule, Recordati Rare Diseases, Lebanon, NJ) at 500 mg 3 times daily, followed by 12 days of 500 mg twice daily. He underwent surgery 10 days later.

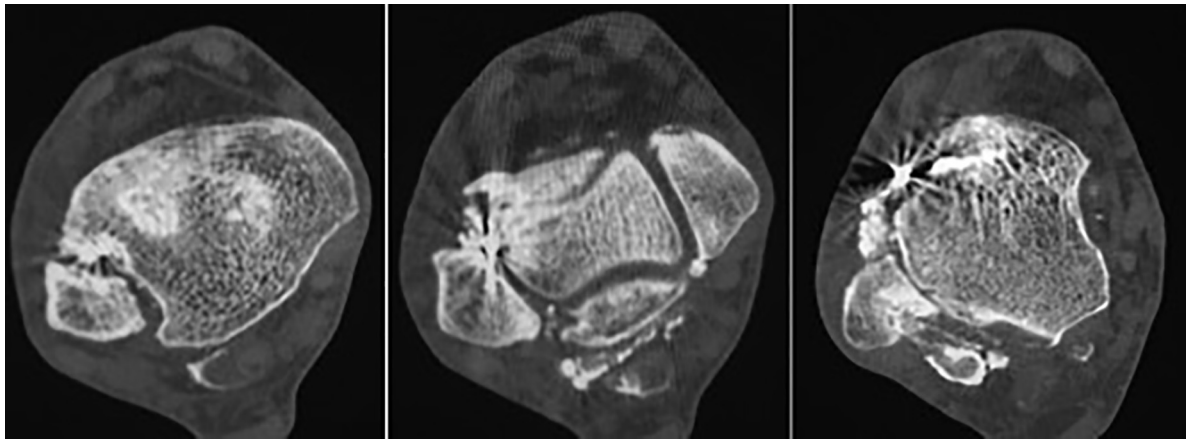

Fig. 2. Axial computed tomography views of the ankle from proximally to distally at initial presentation.