

An Ongoing Series

GWOT Lessons Learned

Metal in Africa

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ABSTRACT

Intra-articular metallic foreign bodies can cause both short- and long-term outcome complications, from range of motion limitations to plumbism. Locating retained metallic foreign bodies can be challenging on physical exam alone due to unexpected trajectory of the object, though ultrasound can significantly aid in identification, especially in resource-limited environments. During a deployment to AFRICOM, a Special Operations Forces Operator had an intra-articular round retained during marksmanship, requiring consultation with both medical directors and specialists and eventual removal of the foreign body; strong advocacy for removal allowed for both preserved range of motion as well as return to duty in the deployed location.

KEYWORDS: *SOFtoSOM; shrapnel; ultrasound; resource-limited environment; foreign body*

Introduction

While conducting partner force weapons training, my teammate was struck by a steel fragment from a target. From the point of injury through surgery, I advocated for my patient and addressed his concerns by consulting with physicians and physical therapists. His small wound could have developed into an intra-articular infection necessitating evacuation, emphasizing the importance of early telemedicine consultation. Although I had received a peripheral nerve block ultrasound course prior to deployment, I did not use my tools in this novel situation. I could have used my point-of-care ultrasound to locate the steel fragment in the absence of radiography.

On Continent

During a deployment to Africa, my team conducted marksmanship training for a partner force at a flat range. I was positioned between the left and middle stations when I heard the call for a medic. As a ceasefire was established, I grabbed my bag and visually inspected my teammate as he ran up to me, identifying a hole in his pants with blood. I sat him on the back of a Toyota Hilux, so I could better assess his injury. After lifting his pant leg, I observed a small 2-cm wound on the lateral side slightly below his left knee. The wound was not bleeding heavily, though it was oozing blood. After exposing the whole leg and confirming that there was no life-threatening hemorrhage, my next concern was damage to bone and ligaments, as well as intra-articular movement. After cleaning his knee, I irrigated the open area with 2L of 0.9% sodium chloride from intravenous bags and bandaged him with Kerlix and Ace Wrap until we got back to my clinic. I administered a combat wound medication pack (CWMP; 1000mg acetaminophen, 400mg moxifloxacin, and 15mg meloxicam) and conducted a telemedicine consultation with my medical director, an emergency medicine physician, to brief my plan and discuss our options for wound exploration. If I were unable to reach my medical director, I still planned to administer a CWMP and start a course of antibiotics to prevent infection. After discussing courses of action with my medical director, I used sterile technique to explore the wound. Although the entrance wound was not directly on the knee, its proximity made me hesitant to expose the joint to outside infection. This could result in structural damage, septic arthritis, or osteomyelitis. I was unable to palpate the steel fragment. After entering the wound to a

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depth of 1cm, no steel shrapnel was found. I discussed my plan with my medical director and made the decision to evacuate my patient. I continued a course of antibiotics with cephalexin 500mg every 12 hours for 7 days. During this time, I reassessed my teammate for calor at the wound site, rubor, and tumor expanding around the knee and monitored his temperature to ensure he wasn't becoming febrile. Upon administering the Lachman test and the anterior drawer test, I noted no laxity or structural damage, though these tests can be falsely negative in the acute phase following an injury.¹ While the wound showed no signs of infection, I evacuated my teammate to Germany with our main body approximately 3 days after the incident due to concern for intra-articular involvement.

Role 4

I scheduled an appointment at Landstuhl Regional Medical Center upon landing in Germany. Before our appointment, my teammate mentioned feeling a sharp pain when bending his knee. In addition to writing a medical note, I contacted my medical director, a trauma surgeon, and a sports-focused physical therapist to discuss outcomes for similar patients. Although this fragment would not necessarily be removed in the civilian practice setting, I advocated for surgery, knowing that my teammate needed knee flexion for functional movement in his job as well as concern for long-term complications.²⁻⁴ Knee radiographs identified a 3-cm piece of shrapnel within his left knee joint capsule. The Landstuhl team scheduled surgery to remove the shrapnel, and I assisted the Certified Registered Nurse Anesthetist in airway management. My teammate made a full recovery, remained with us for the duration of the deployment, and healed well without residual left knee issues.

Lessons Learned:

1. Having a plan to irrigate and manage possible infection.
2. Calling my medical director early.
3. Using my tools in a novel application.

Conclusion

After this incident, I sought to learn a less invasive procedure to identify shrapnel. In learning about the benefits of using ultrasonography, I underwent additional ultrasound training to prevent complication in future care, including infections as well as long-term complications including lead arthropathy and lead poisoning.^{1,5} I had ultrasound training and the tools to identify the shrapnel, but I did not use them in the management of this patient. Ultrasonography would have identified the steel shrapnel earlier, expedited the evacuation process, and reduced the risk of infection associated with wound exploration.

In continuing to read articles on how ultrasound machines are used in low-resource environments, I am better prepared to maximize my tools; given the higher sensitivity of ultrasonography to identify metallic foreign bodies when compared with CT scanning, comfort and facility with ultrasonography can pay huge dividends in austere deployment locations.⁶

Calling my medical director early and opening my initial plan to refinement was a helpful decision that I would repeat in the future. My presence from the point of injury to evacuation, surgery, and through recovery for my patient was insightful and eye opening. It was a lesson that I will carry with me for the rest of my career in medicine, applying the same advocacy and care for future patients.

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Author Contributions

DC and MAB conceptualized the paper and drafted the manuscript. Critical revision and editing were performed by IRM, MS, RMD, and REB. All authors read and approved the final manuscript.

Disclosures

RMD is a peer reviewer for the *Journal of Special Operations Medicine*.

Disclaimer

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