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Case Study

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CASE SERIES: SONOGRAPHIC FINDINGS IN SOFT TISSUE FOREIGN BODIES

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ABSTRACT

Penetrating injuries are a common problem in emergency, orthopedic and surgery clinics in our rural setup. Retained foreign bodies complicate many of these penetrating injuries. Conventional radiology is sometimes incapable of diagnosing these retained foreign bodies because of their radio-lucent nature. Sonography can be a useful modality in such cases. We present 4 such cases in the form of case series to study the role of sonography in the evaluation of foreign bodies.

KEYWORDS: Penetrating injuries, foreign bodies, Sonography, radio-lucent.

INTRODUCTION

Penetrating injuries are a common problem in emergency, orthopedic and surgery clinics in our rural setup. Retained foreign bodies complicate many of these penetrating injuries. A retained foreign body may cause severe infection or inflammatory reaction, prompt detection and removal of foreign bodies are necessary.[1] As the patient presents in emergency department with penetrating injury, wounds and soft tissue lacerations are carefully inspected and palpated to rule out presence of a foreign body. If suspected, radiographic evaluations are routinely used to look for radio-opaque foreign bodies such as glass, metal, and stone within the soft tissue.[2,3] About 38% of foreign bodies remain overlooked in initial survey of penetrating wounds.[4] A radiolucent foreign body such as wood remains undetected by conventional radiology. In such situation other imaging modalities should be explored. Sonography plays an important role in the evaluation of these patients.[5] Sonography allows detection of multitude of soft-tissue foreign bodies, including wood, glass, metal, and plastic, along with evaluation of their associated soft-tissue complications. Sonography has a reported sensitivity of 95% for detection of foreign bodies.[6,7] With sonography, all the radio-lucent foreign bodies appear echogenic with surrounding hypoechoic rim and posterior acoustic shadowing or reverberation artefact. This shadow may be either complete or partial depending on the angle of insonation and the composition of the foreign body. A hypoechoic halo surrounding the foreign body is sometimes seen, which represents edema, abscess or granulation tissue Sonography allows accurate detection of radiolucent soft-tissue foreign bodies and also helps in the assessment of their associated complications. Even in case of radio-opaque foreign bodies, sonography can provide precise localization with improved assessment of surrounding soft tissue injury. Sonography appears to be the choice of investigation for detection and localization of radiolucent soft-tissue foreign bodies and it can also help in assessment of their associated complications. Sonography is widely available and inexpensive as compared to other imaging modalities. There is an advantage of interaction between radiologist and patient at the time of examination and manoeuvrability with sonography. Modifications of the standard procedure include colour Doppler and three-dimensional power Doppler, which significantly improves sensitivity and specificity of sonography.[8] Doppler studies provide information about lesion vascularity and can be useful aides when making a diagnosis. Sonography is especially critical in separating cystic from solid masses and retained foreign bodies are usually readily identified on sonography. Apart from being a diagnostic imaging modality, sonography can be used to guide biopsy or aspiration of the suspected soft tissue mass to provide histopathological or microbiological clue about the diagnosis. It is important to recognise the limitations and indications for use of sonography so that it can be used safely in the diagnosis of retained foreign bodies. In our rural setup, sonography apart from conventional X-ray assumes an important role as the choice of investigation for retained foreign bodies in the soft tissue, because of easy availability as well as less financial implication to the patient in comparison to CT/MRI. Keeping this in mind, we present sonographically diagnosed 4 cases of retained foreign body in soft tissue.

Case 1 A foreign body masquerading as a tumour
29 years old, farmer presented with a soft tissue mass in antero-medial aspect of right thigh. This swelling was present for the past one year. It had not changed in size, although he complained of increasing tightness in the region. He denied any systemic symptoms or history of local trauma. Previous imaging of the patient done outside suggested of a musculoskeletal tumour. Ultrasound done in our department showed a thick walled hypoechoic mass lesion involving anteromedial group of right thigh, just superficial to the femur. In the centre of the mass, a distinctly hyperechoic linear focus was noted, consistent with foreign body presence (fig. 1)

Figure 1: Hypoechoic mass lesion with distinct linear hypoechoic focus noted on ultrasound, consistent with foreign body with surrounding inflammatory reaction.

Only after confronting with these findings, did the patient recalled vaguely about a penetrating injury with a wooden stick some 20 months previously. Intra-op findings included presence of a well circumscribed lesion filled with purulent material between vastus medialis and vastus lateralis muscles. It was excised completely and histological analysis revealed a central abscess surrounded by a collagenous wall with florid chronic and acute inflammation, granulation tissue reaction and foreign body giant cells. At the centre was the tip of wooden stick. At one month follow up, patient showed complete recovery.

Case 2 Chronic discharging sinus with a foreign body
84 years old, female from a rural background, presented to the surgery outpatient clinic with complaints of pain, swelling and discharge from left foot. On examination, a chronic discharging sinus with surrounding induration was noted(fig. 2).

Figure 2: Chronic discharging sinus with surrounding induration involving dorsum of left foot.

Outside done X-ray showed subtle soft tissue swelling without any evidence of foreign body. Patient referred to department of radiology for routine ultrasound. Ultrasound showed a well defined hypoechoic lesion with central anechoic collection and a linear hyperechoic focus. On surgical exploration a well-defined abscess was noted with a linear wooden splinter in the centre of the lesion was noted. Histopathological evaluation of the collection showed a central abscess with multiple foreign body granulomas. Patient showed complete post op recovery.

Case 3 Foreign body involving non-dominant hand
39 years old male, presented to emergency department after large wooden splinter had pierced through the hypothenar eminence of his non-dominant hand and had broken off.

Part of the splinter was removed by the patient himself, before coming to the emergency. On examination a laceration was noted involving dorsum of left hand without any obvious foreign body. Eight weeks later, the patient presented to our Emergency Department complaining of palmar erythema and swelling in the affected hand. Plain film radiographs were unremarkable. Ultrasound of the affected area showed a well defined linear hyperechoic focus involving hypothenar group of muscles. Surgical exploration at that time showed a large perifascial abscess, which originated in the mid-palmar space and had spread superficially. Further deep exploration showed, a retained one-inch long wooden splinter. Subsequent recovery after removal of the foreign body was uneventful(fig.3).

Figure 3: Retrieved radiolucent one-inch long wooden splinter.

Case 4 Conspicuous foreign body in right hand
50 years old carpenter had sustained a wooden splinter injury in right hand 6 months back. Patient now presented with mild swelling and vague pain in first web space of right hand. There were no signs of infection on clinical exam and plain film radiographs were negative.

High-frequency ultrasound examination revealed a 2.9 mm foreign object in the first webspace(fig. 4). Subsequent surgical exploration revealed a retained wooden splinter, and the patient had an uneventful recovery.

Figure 4: High frequency ultrasound shows a 2.9 mm (between cross marks) wooden splinter in the first webspace.

DISCUSSION

As clearly shown with above mentioned cases, retained foreign body of extremities is not a very uncommon finding. Common low density materials such as wood splinters account for wide variety of soft tissue foreign bodies in our rural setup. Exclusion of its presence is important, given the possible allergic, inflammatory, and infectious complications associated with a retained foreign body. Conventional X-rays should be obtained to rule out radio-opaque foreign bodies. Plain radiographs will show approximately 80% of all foreign bodies, but several types of radiolucent foreign bodies such as wood remain undetected.[9] Plain radiographs of wooden FB are negative in 86% of such patients.[4] In these patients. Ultrasonography is the modality of choice for identification of such radiolucent foreign body. Ultrasonography has been used for foreign body localization since 1978.[10] Ultrasonographic evaluation provides important information on the depth, size and anatomical relationship with surrounding structure. Surgical removal is facilitated by knowledge of location of the FB in relation to muscles, tendons and vessels. Detection of foreign body is difficult in interphalangeal space and in air contaminated tissue after a penetrating trauma. FB must be distinguished from hyper-echoic body tissue such as ossified cartilage sesamoid bones, scar tissue, gas bubble, intermuscular fascia etc. Acoustic shadowing is an important clue in differential diagnosis. Acoustic shadowing can differentiate foreign body from scar tissue, gas bubble and normal intermuscular fascia, because these structures lack acoustic shadowing. For detection of superficial, nonradiopaque foreign bodies, Ultrasonography has been shown to be more effective than computed tomography (CT).[11] Magnetic resonance (MR) imaging a appears to have higher cost and limited availability in comparison to ultrasonography. In addition, MR imaging often does not allow differentiation of foreign bodies that have low signal intensity from other structures that can have low signal intensity, such as scar tissue, tendons, and calcifications.

CONCLUSION

Ultrasonography is an inexpensive, portable, and readily available imaging modality for superficial soft tissues without the risk of ionizing radiation. Ultrasonography has emerged as the study of choice for detection of radiolucent foreign bodies. For radiopaque foreign bodies, ultrasonography can provide more precise localization. For all foreign bodies, ultrasonography can aid assessment of the surrounding soft tissues and demonstrate associated soft-tissue complications.

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