



▪ **Brief Communication**

Wooden foreign bodies in soft tissue: role of tissue harmonic sonography

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Abstract

Background: Wooden foreign bodies (WFB) are usually not detectable on radiography. Ultrasound is a useful tool for detection and localization of WFB. **Objectives:** We evaluated the efficacy of tissue harmonic sonography in detection of WFB and describe the imaging features of WFB on tissue harmonic imaging. **Methods:** We retrospectively evaluated 28 patients with history of wooden (wood/thorn/bamboo) foreign body prick with tissue harmonic sonography. **Results:** The WFB was detected on ultrasonography in all 28 patients (100%) which was confirmed on surgery or follow up study. All WFB were echogenic casting strong posterior acoustic shadowing with or without surrounding hypoechoic halo. **Conclusion:** Tissue harmonic imaging is useful tool for detection and localization of retained WFB.

Keywords: soft tissue, tissue harmonic imaging, ultrasonography, wooden foreign body

Introduction

Foreign bodies may penetrate soft tissues of the body accidentally or may be self inflicted.¹ Retention of foreign body in the soft tissue is associated with complications like infection, tendon injury, non healing sinus, necrotizing fasciitis.^{2,3,4} Foreign body granuloma may mimic soft tissue neoplasm.⁵ Therefore, their removal is required to decrease the morbidity.

It can be clinically suspected but difficult to confirm since patient may not be able to recall the history of injury or might think that they removed it completely. Radiopaque foreign bodies are visible on radiographs but wooden foreign bodies (WFB) usually go undetected on radiographs. Therefore, it is not possible to localize them on radiographs.^{6,7}

Ultrasonography (USG), Computed Tomography (CT) and Magnetic resonance imaging (MRI) are the other imaging modalities useful for the detection of the radiolucent foreign bodies.^{8,9} The identification of WFB may be exceedingly difficult on MRI.⁹ CT and MRI are not easily available and costly in the developing countries. As USG is easily available and without risk of radiation exposure, it has been commonly used for

evaluation of the foreign bodies. However, there is paucity of literature on the efficacy of tissue harmonic sonography in detection of WFB. The purpose of this study was to determine the efficacy of tissue harmonic sonography in detection of WFB and describe the imaging features of WFB on tissue harmonic sonography.

Methods

We retrospectively evaluated 28 patients with history of wooden (wood/thorn/bamboo) foreign body prick, referred to the department of radio-diagnosis and imaging, B. P. Koirala Institute of Health Sciences for ultrasonography, over a period of 18 months (January 2011 to June 2012). Plain radiographs were obtained prior to USG in all patients. One patient also had sinogram study prior to the USG. USG was performed by a single radiologist with more than 3 years of experience in USG with 7.5-11 MHz linear transducer on Philips HD 7 USG machine. The appearance, distal shadowing, length, thickness, depth from the skin surface and the number of the foreign bodies were recorded. The site of the foreign body was marked. All patients underwent surgical exploration for the removal of the foreign body. The sonographic findings were correlated with the surgical finding to determine the accuracy of the sonography.

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Results

There were 18 male and 10 female patients. The mean age of the patient was 30.6 years (range 7 to 46 years). Plain radiograph did not reveal abnormality in any patient. Sonogram study in one of the patients revealed filling defect. The WFB was detected on USG in all 28 patients (100%) which was confirmed on surgery or follow up study. The sensitivity, specificity and accuracy of the sonography were 100% in the detection of the WFB. The WFB was found in arm (2/28 patients), forearm (2/28 patients), hand (8/28 patients), gluteal region (1/28 patient), leg (7/28 patients) and foot (8/28 patients).

There was single WFB in 23 patients and 2 or more in 5 patients. All WFB were echogenic causing strong posterior acoustic shadowing (Fig. 1).

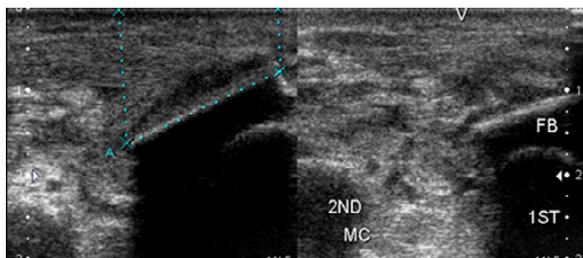


Figure 1: Ultrasonography of the hand shows retained wooden foreign body (FB) as a linear echogenic structure (measured between xx 'A') with strong posterior acoustic shadowing.

The size of the WFB ranged from 1.6 mm – 19 mm and they were 3-17 mm deep to the skin surface. They were 0.8-4 mm thick. Hypoechoic halo was found around 9 WFB (Fig. 2).

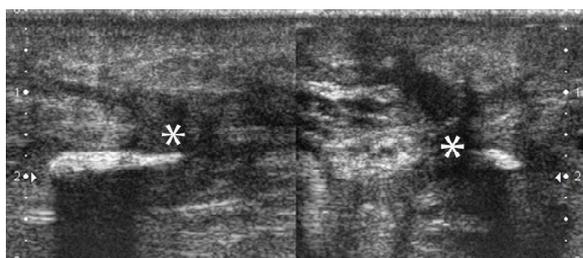


Figure 2: Ultrasonography in a 34 years male patient with history of retained wooden foreign body shows hypoechoic halo (*) around the echogenic wooden foreign body.

Seven patients had discharging sinus. All patients were operated and foreign body could be retrieved in all except 1. In this case the foreign body was extruded itself later on. In one of the patient who had sinogram

study prior to the USG, the foreign body could not be retrieved on exploration. It was removed only after localization with USG.

Discussion

Foreign bodies may be radiolucent or radiopaque. Plain radiograph is initially used for detection of foreign body which is highly sensitive for radiopaque foreign bodies.⁶ However, radiolucent foreign body like wood are usually not seen on plain radiographs. In our study also the WFB were not detected on plain radiographs. Radiograph failed to reveal WFB in the study done by Peterson JJ et al also.⁹

Patient may present very late with symptoms following retained foreign body thereby increasing the morbidity.¹⁰ USG has been used not only for detection and localization but also to guide removal of the foreign bodies.^{11,12} Our result showed that tissue harmonic sonography was 100% sensitive for the detection of the wooden foreign bodies.

Rockett MS et al also found USG to be 100% sensitive for detection of wooden foreign bodies in foot.¹³ A recent study with fundamental imaging has also found USG to be 100% sensitive for the detection of the WFB.¹⁴ In an experimental model, the sensitivity and specificity of detection of WFB have been found to be 85% and 80% respectively.⁷

In our study, all WFB were hyperechoic with posterior acoustic shadowing. In other studies also retained wooden foreign bodies were seen as linear echogenic structures with pronounced acoustic shadowing.⁹ Shiels WE 2nd et al has also found the soft tissue foreign body to be hyperechoic with partial or complete acoustic shadows and with/ or without surrounding hypoechoic halo.¹² We found posterior acoustic shadowing in all our cases probably because of use of tissue harmonic sonography. Hypoechoic halo around the foreign body could be due to edema, abscess, granulation tissue or hematoma.^{9, 12, 13, 15} The limitation of this study is that we have not compared the result with the fundamental imaging.

Conclusion

Tissue harmonic imaging is a useful tool for detection and localization of retained wooden foreign bodies, which can better show additional fragments of the foreign body thereby allowing early diagnosis and avoidance of complications.



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