Sclerotic Bone Lesion: A Novel Modification in Biopsy Technique to Increase Diagnostic Yield

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Abstract

Sclerotic bone lesions pose a significant diagnostic challenge due to their low diagnostic yield in core needle biopsy. In this technical note, we propose a novel modification to the standard biopsy technique aimed at improving the diagnostic yield of biopsies performed on sclerotic bone lesions. The modification involves use of trephine needle to acquire one bony core sample then using trucut biopsy needle to acquire samples through the tunnel created by the trephine needle. Our approach leverages optimized instrumentation to increase the likelihood of obtaining sufficient and representative tissue samples from challenging sclerotic lesions. Through a detailed description of the technique and its application in clinical practice, we demonstrate how this modification can significantly improve the diagnostic approach for sclerotic bone lesions, providing clinicians with a reliable method for accurate histopathological diagnosis.

Keywords
- sclerotic bone lesion
- bone biopsy
- C-arm-guided bone biopsy

Introduction

The diagnostic yield of percutaneous biopsies for bone lesions ranges from 69 to 91% and is influenced by factors such as lesion size, bone matrix, and final diagnosis. Percutaneous core needle biopsy of sclerotic bone lesions is associated with a relatively low diagnostic yield and a significant false negative rate.[1–4] We propose a novel modification in core needle biopsy technique from a sclerotic bone lesion to increase diagnostic yield.

Technique

Traditionally, biopsies from sclerotic lesions are obtained using a trephine needle by manually drilling or using a battery-operated drill. We propose a novel modification in core needle biopsy technique that has significantly improved diagnostic yield in our clinical practice.

Selection Criteria

In suspicious sclerotic lesion of the vertebrae (correlated with positron emission tomography-computed tomography [CT]/

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bone scan), for example, suspicious metastasis from carcinoma breast and carcinoma prostate, the lesion was targeted for biopsy. The biopsy from the periphery of the sclerotic lesion is advised to improve the diagnostic yield (►**Fig. 1**).[5,6]

Choice of Image Guidance

Both CT and C-arm can be used depending on the lesion's location, and the interventionist's experience.

Needle Selection

For the procedure, a trephine bone biopsy needle (11–13G × 10 cm) and a trucut biopsy needle (14–16G × 16 cm) are required. It is essential to ensure that the trucut biopsy needle is longer than the trephine bone biopsy needle.[7]

Procedure

(1) Patient positioning: To ensure comfort, safety, and optimal ergonomics for the operator.
(2) Path selection: Choose the shortest path, ensuring that no more than one anatomical plane is breached. Discuss the chosen path with surgeons before finalizing.
(3) Local anesthesia: Administer local anesthetic from the skin to the periosteum.
(4) Trephine needle insertion: Advance the trephine needle and confirm its position using imaging. Carefully drill through the longest possible length of the lesion (►**Fig. 2**) and obtain the bone core sample using a coaxial needle or marrow acquisition cradle (►**Fig. 3**).
(5) Withdrawal and trucut biopsy: Withdraw the trephine needle by 2 to 3 cm (►**Fig. 4**). After a 2- to 3-minutes wait, advance the trucut biopsy needle through the trephine needle cannula and obtain 2 to 3 core samples (through the tunnel created by the trephine needle) by repeatedly firing the trucut needle (►**Fig. 5**). As in densely sclerotic lesion, the trucut biopsy needle will bend after striking the lesion, so the tract needs to be excavated by the trephine biopsy needle prior to the passage of the trucut needle.
(6) Specimen handling: Typically, specimens are placed in separate sterile containers with normal saline and formalin. Both saline and formalin containers are sent regardless of imaging findings to rule out atypical infection in suspected malignancies and potential malignancy in suspected infections.

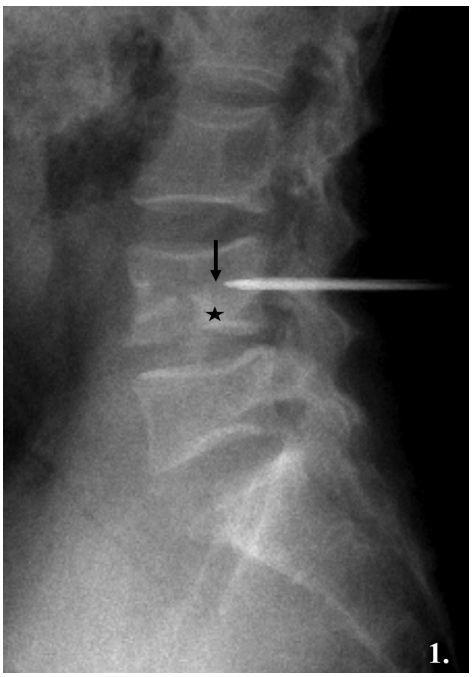

Fig. 1 Fluoroscopic lateral image of the lumbosacral spine demonstrates sclerotic lesion in the L4 vertebral body (asterisk). Biopsy was targeted from the less dense and periphery of the lesion (arrow).

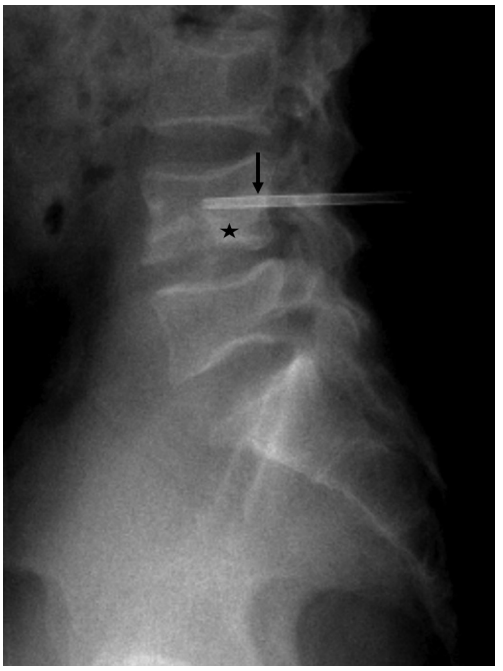

Fig. 2 Fluoroscopic lateral image of the lumbosacral spine demonstrates acquisition of core from the sclerotic lesion (asterisk) by the trephine needle (arrow).

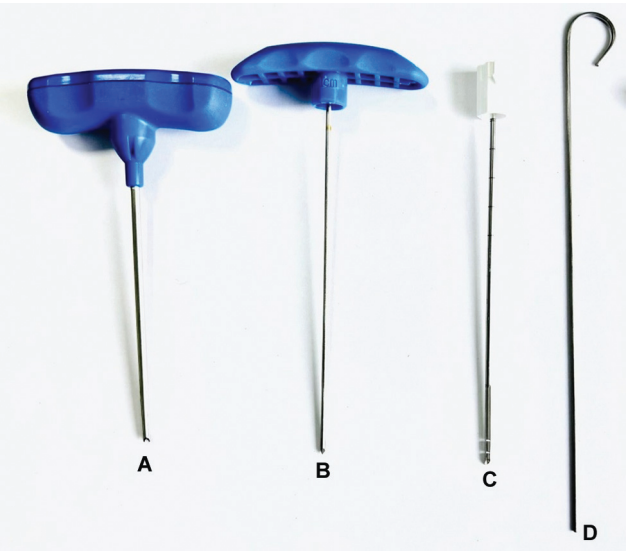

Fig. 3 Photograph of coaxial bone biopsy needle with marrow acquisition cradle: (**A**) Bone biopsy cannula, (**B**) stylet, (**C**) marrow acquisition cradle, and (**D**) core ejector tool.

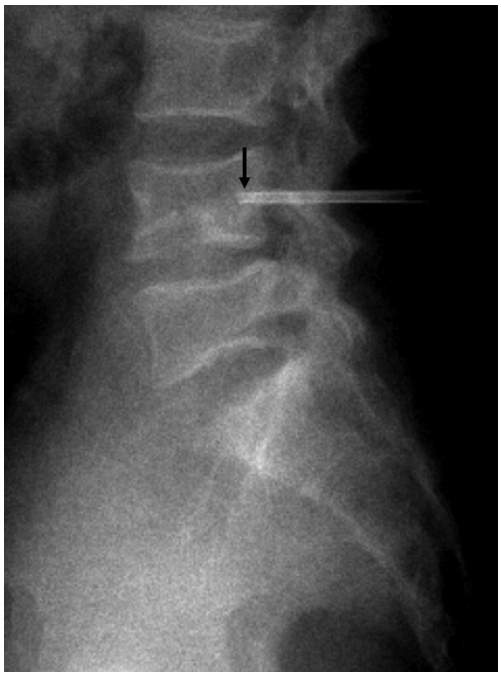

Fig. 4 Fluoroscopic lateral image of the lumbosacral spine demonstrates withdrawal of trephine needle (arrow) after acquisition of one bone core.

Postprocedure

Following the procedure, the needle is carefully removed, and pressure is applied to control bleeding at the site. Gelfoam may be injected along the tract to prevent blood ooze. A sterile dressing is then applied to promote healing and prevent infection. Patients are then monitored in the recovery area to ensure stability and promptly address any potential postprocedure complications.

In our clinical practice, we have observed 86% positive diagnostic yield in sclerotic lesion with this novel modification in 53 patients having sclerotic vertebral lesion from January 2024 to December 2024. This novel method for biopsying sclerotic lesions may be used to enhance diagnostic yield, making it a potential valuable addition to our clinical practices. Future research should focus on validating this technique through larger, multicenter studies.

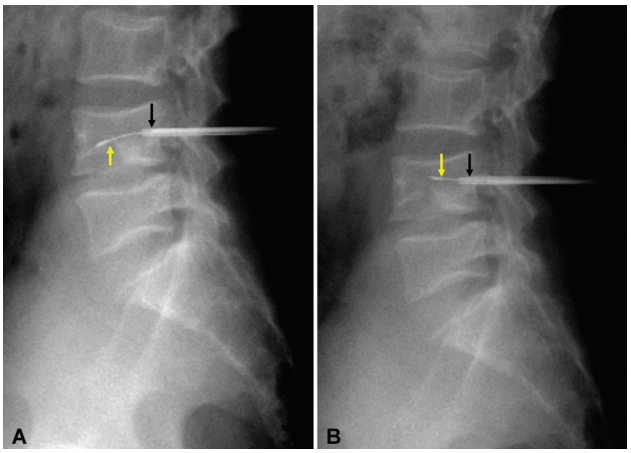

Fig. 5 (**A**, **B**) Fluoroscopic lateral images of the lumbosacral spine demonstrate trucut needle (yellow arrow) through the trephine cannula (black arrow) along the tunnel created by trephine bone core acquisition.

Conflict of Interest

None declared.

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