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Is Core Needle Biopsy Reliable in Differentiating Between Aggressive Benign and Malignant Radiolucent Bone Tumors?

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Abstract

Background: Although there is widespread acceptance of core needle biopsy (CNB) for diagnosing solid tumors, there is reluctance by some clinicians to use CNB for aneurysmal bone cysts (ABCs) as a result of concerns of safety (bleeding, nerve injury, fracture, readmission, or infection) and reliability, particularly to rule out malignant diagnoses like telangiectatic osteosarcoma. This is especially true when CNB tissue is sent from an outside hospital, where the technique used to obtain the tissue may be spurious.

Questions/purposes: (1) Is CNB effective (provided adequate information to indicate appropriate surgical treatment without further open biopsy) as an initial diagnostic test for ABC? (2) Is CNB accurate (pathology consistent with the subsequent definitive surgical pathologic diagnosis) in differentiating between benign lesions such as primary or secondary ABCs and malignant radiolucent lesions such as telangiectatic osteosarcoma? (3) What are the complications of CNB? (4) Is there any difference in the effectiveness or accuracy of CNB performed at outside institutions when compared with a referral center?

Methods: A retrospective study of our musculoskeletal tumor board pathology database (1990-2016) was performed using search criteria "aneurysmal bone cyst" or "telangiectatic osteosarcoma." Only patients undergoing a CNB who proceeded to definitive surgical resection with final pathology were included. Excluding outside CNBs, CNB was performed after presentation at a musculoskeletal tumor board as a result of atypical features on imaging or history concerning for malignancy. Outside CNB tissue was reviewed by our pathologists. If there was sufficient tissue for diagnosis, the patient proceeded to definitive surgery. If not, the patient underwent open biopsy. CNB diagnosis, open biopsy results, and open surgical resection pathology were reviewed. Complications, including bleeding, infection, nerve injury, readmission, or fracture, between the CNB and definitive open surgical procedure (mean 1.6 months) were documented. CNBs were considered "effective" if they

yielded pathology considered sufficient to proceed with appropriate definitive surgery without additional open biopsy. CNBs were considered "accurate" if they were effective and yielded a pathologic diagnosis that matched the subsequent definitive surgical pathology. The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of obtaining a malignant diagnosis using CNB were also calculated.

Results: A total of 81% (59 of 73) of CNBs were effective. Ninety-three percent (55 of 59) of CNBs were classified as accurate. Diagnostic CNBs had a sensitivity and specificity of 89% (eight of nine) and 100% (51 of 51), respectively. The PPV was 1.00 and the NPV was 0.82. There were no complications. With the numbers available, there was no difference in efficacy (90% [37 of 41 versus 14 of 15]; odds ratio, 0.97 [95% confidence interval {CI}, 0.41-2.27], p = 0.94) or accuracy (92% [34 of 37 versus 13 of 14]; odds ratio, 0.87 [95% CI, 0.08-9.16], p = 0.91) between CNBs performed in house and those referred from outside.

Conclusions: These data suggest that CNBs are useful as an initial diagnostic test for ABC and telangiectatic osteosarcoma. Tissue from outside CNBs can be read reliably without repeat biopsy. If confirmed by other institutions, CNB may be considered a reasonable approach to the diagnosis of aggressive, radiolucent lesions of bone.