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Diagnostic Accuracy of FNA of Soft Tissue and Bone Lesions

The diagnosis of bone and soft tissue lesions can be obtained in a variety of ways, including FNA biopsy, core biopsy, or open biopsy. Each of these diagnostic tools has advantages and disadvantages. When compared to open biopsy, FNA is a simple, outpatient procedure which is well tolerated by patients and has minimal risk of complications. In addition, the multiple trajectories of the FNA biopsy needle make it possible to sample different parts of large tumors, opposed to a single small core biopsy or open biopsy. However, FNA biopsies can have sampling errors attributed to low cellularity, inadequate sampling of the target, and copious cystic/bloody/necrotic material.¹⁻³ Despite these difficulties, FNA cytology is being used as a diagnostic modality for initial diagnoses, as well as for recurrences and metastases of soft tissue and bone lesions in numerous medical centers due to its simplicity, low morbidity, cost-effectiveness, and ability to issue rapid diagnoses that can facilitate clinical decision making.¹⁻²³

There have been a large number of studies looking at the success and limitations of FNA biopsy in the setting of soft tissue and bone lesions. In at least 12 studies in the literature, the sensitivity has been reported to range from 25 to 100% and the specificity has ranged from 83 to 100% (Table 2.1).^{1,2,4-13} Furthermore, many studies have had variable inadequacy rates that range from a low of 0–5%^{2,3,14,22} to a high of 31–33%^{4,23} raising concerns

TABLE 2.1. Sensitivity and specificity of soft tissue and bone FNA in 12 studies.

Studies	Sensitivity (%)	Specificity (%)	Number of cases
Layfield et al ¹²	95	95	N.A.
Bommer et al ¹¹	96	99	450
Wakely et al ¹⁰	100	97	82
Garcia-Solano et al ⁹	91	100	107
Jorda et al ⁴	92	99	314
Nagira et al ¹	92	97	N.A.
Kitagawa et al ⁶	100	100	93
Amin et al ⁵	81	100	N.A.
Dey et al ⁸	92	93	N.A.
Rekhi et al ⁷	100	83	127
Hirachand et al ¹³	25	100	50
Khalbuss et al ²	97	98	1114

about the ability of FNA to obtain sufficient diagnostic material. The large variability in the reported sensitivities, specificities, and inadequacy rates is related to the variable number of cases available in the different studies, the type of lesions biopsied (soft tissue versus bone), the presence or absence of onsite evaluation, and other factors. Due to variability in the reported success of FNA, the use of this diagnostic tool in bone and soft tissue lesions has been fraught with some controversy, particularly in the setting of initial diagnoses of mesenchymal tumors.

Our data show a high overall sensitivity of 96% and specificity of 98% for the FNA diagnosis of soft tissue and bone lesions, and a very low rate (3%) of inadequacy, in the largest series of bone and soft tissue FNAs reported in the literature. The success of FNA in our practice may be attributable to the presence of a cytopathologist for onsite evaluation in the majority of cases and the presence of concurrent core biopsy in selected cases, which allows for optimization of the FNA in obtaining sufficient material and provides immediate cytological–histological correlation, respectively. In addition, our large volume of cases, including cases with a history of previous malignancy and/or supporting ancillary studies, has generated experience and familiarity with these challenging cases. A combination of all of these factors likely contributes to the high diagnostic sensitivity and specificity, in addition to minimizing our number of inadequate cases.

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