

Research Article

Diagnostic accuracy of fine needle aspiration cytology in soft tissue tumors: our institutional experience

Hemali J. Tailor*, Vasudha M. Bhagat, Kumar Bhargav R. Kaptan, Sonal L. Italiya, Hasmukh R. Balar, Manik P. Agarwal

Department of Pathology, Government Medical College, Surat, Gujarat, India

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*Correspondence:

Dr. Hemali J. Tailor,

E-mail: hemsanp@yahoo.co.in

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ABSTRACT

Background: Diagnosis of Soft tissue tumors by FNAC (Fine needle aspiration cytology) is one of the diagnostic modality of choice in pathological evaluation of soft tissue neoplasms especially to differentiate from the non-neoplastic soft tissue lesions. It is challenging and controversial. Very few centers rely on simple FNAC for diagnosis which is largely due to a lack of experience, familiarity, confidence and tricky cytological features.

Methods: We have studied 140 cases of soft-tissue tumors by simple FNAC procedure done by cytopathologist from 01/01/2012 to 31/12/2012. After considering thorough history, clinical, radiology and other findings all cases were reported by the experienced faculty in cytopathology section of our institute.

Results: Out of total 140 cases of soft tissue tumors 131 (93.58%) were benign and 9 (6.42%) were malignant. In benign category maximum numbers were lipoma 105 cases (80.15%) followed by benign neural tumors 5 cases (3.82%), ganglion 4 cases (3.05%), benign fibrohistiocytic lesions 2 cases (1.53%) and others.

Conclusions: Current study demonstrates that FNAC is valuable as a primary tool in diagnosing soft tissue tumors specifically benign lesions like lipomatous tumors, high grade malignant sarcoma and recurrent lesions. Findings are well supported by histopathological correlation.

Keywords: FNAC, Soft tissue tumors, Diagnostic accuracy

INTRODUCTION

In the modern era there is growing trend of making the diagnosis by least invasive, short, simple, and cost effective procedures. Primary diagnosis is most important before deciding the radical surgery or noninvasive treatment like preoperative chemotherapy. So in case of soft tissue tumors first step is differentiating benign from malignant & aggressive tumors. Prognosis, therapeutic difference & chances of recurrence depend on subtype of soft tissue tumors. Primary diagnosis in case of soft tissue tumor require histopathological assessment and for that open biopsy is considered gold standard, conventional and time-honored approach to pathologic diagnosis of a soft tissue mass since long with rising trend of practicing core

needle biopsy. So initial diagnosis is made by open biopsy or excision biopsy. This diagnostic strategy markedly decreases the likelihood of surgical sampling error in contrast to closed biopsy and supplies the pathologist with a larger specimen. In some instances, this form of biopsy will be the only method whereby a definitive pathologic diagnosis can be made. This approach is not, however, without problems, including a greater incidence of operative hematoma, tumor-cell spillage, increased cost relative to closed biopsy by FNA or tissue cores, operative infection, and, if bone is entered, pathological fracture.¹

FNAC is an outpatient department procedure, necessitating neither patient preparation nor general anesthesia. It is safe, almost painless and cost effective.

Though FNAC is used as a first line investigation in primary evaluation tumors like Breast, Thyroid, Lymph nodes and others, its use in diagnosis of soft tissues tumors is still debated.^{2,3} Its main role is for detecting suspicious recurrences or metastases. For a variety of reasons, FNA cytopathology of soft tissue remains controversial across the world except few centers.⁴

The relative infrequency of soft tissue tumors produces unfamiliarity with their histological and cytomorphological features, an increased risk of sampling error due to their tissue heterogeneity & reluctance in soft tissue pathology experts to endorse this technique, which is understandable if a pathologist has limited exposure and experience to this type of cytologic sample.^{5,6} This excludes the Europe and selected centers in the United States, where the reported use of soft tissue FNA is relatively common.⁷⁻¹⁶

The relative absence of recognizable tissue architectural pattern in cytological preparation makes diagnosis by FNAC even more difficult. However, FNAC offers several advantages like it can provide a predictive diagnosis of a benign or malignant neoplasm and in many cases also of specific tumor type. If the diagnosis is of a benign neoplasm, surgery can be avoided in the elderly or other patients who are of poor surgical risk. In case of a high grade malignancy or of recurrent cancers, a cytological diagnosis allows the administration of a palliative treatment.¹⁷

The goal of the current study was to review our FNA cytology experience and diagnostic accuracy with suspected soft tissue neoplasms at a tertiary referral medical center. In the current study, FNAC was done as an OPD procedure and its histopathological correlation whenever possible was done for evaluation. Fine needle aspiration cytology is generally avoided for pathological diagnosis of Soft tissue masses.

METHODS

Current study includes 140 cases suspected of soft tissue tumors referred to Cytopathology section of department of pathology in the Government Medical College, Surat between the periods of January 2012 and December 2012 inclusive. Appropriate data regarding history, clinical examination, clinical diagnosis, radiological findings and previous significant findings were noted down. The data were analysed in simple statistical tables. The procedures were done by cytopathologist in all the cases. Informed consent was taken in every case with explanation regarding the procedure, its complications, advantages and disadvantages. Prior to procedure, a physical examination was carried out to note size, location by superficial or deep, relation to surrounding structures like muscle, nerves, vessels and other vital structures, any enlarged cervical lymph node. The procedures were performed using 22-24 gauge needles, either without or with aspiration by a 10 ml disposable syringe.

Anaesthesia was not used during the procedure. Whenever required help of imaging to guide the FNA been taken especially the swellings in location like abdominal and deep seated tumors and in tumor with cystic and necrotic changes. No major complications were reported like hematoma, injury to underlying vital structures and others. The aspirated contents of the needle are expelled on to glass slides and processed for cytological examination. Slides were fixed by both air dried and wet fixed in 95% methanol. The slides were stained with MayGrunwald Giemsa (MGG), Papanicolaou [PAP] stain and Haematoxylin and Eosin (H&E) respectively and examined with light microscope. In special cases like suspected of Ewing's sarcoma PAS (periodic Schiff stain) also performed. The microscopic diagnosis was interpreted after taking into consideration of all the data including the cytomorphological, radiological, clinical and other findings. Diagnostic interpretation done primarily in the form of Benign and malignant lesions and possible sub typing were given. The cytological results were correlated with clinical features and whenever possible by histopathological examination.

RESULTS

Out of total 140 cases 131 cases (93.58%) were benign soft tissue tumors and 9 cases (6.42%) were malignant (soft tissue sarcoma).

Benign tumors were sub typed including majority of lipomatous tumors 105 cases (80.15%) out of 131 cases, followed by 5 cases (3.82%) of benign neural tumors, 4 cases of ganglion (3.05%), 2 cases (1.53%) of benign fibrohistiocytic lesions and giant cell tumors of tendon sheath each and 1 case (0.76%) of infantile fibromatosis coli. 12 cases (9.16%) out of total 131 cases were not accurately typed and given broad diagnosis including benign soft tissue lesions, benign soft tissue lesions with cystic change and benign reactive lesions.

Malignant lesions included 9 cases especially the high grade sarcomatous lesions which were easily picked up like pleomorphic sarcoma 2 cases, spindle cell sarcoma 2 cases and 1 cases of sarcoma of neural origin. Total 4 cases were diagnosed as malignant round cell tumors (suspicious of Ewing's sarcoma) after evaluating typical cytomorphology and PAS stain positivity.

Age and gender wise distribution of benign and malignant soft tissue lesions were shown in Table 1.

There were 79 cases (56.42%) cases occurring in male and 61 cases (43.58%) in females. Distribution of malignant lesions showed that 5 cases males and 4 cases were females.

Site wise distribution of soft tissue lesions were showed in Table 2.

Table 1: Age wise and gender wise distribution of benign and malignant soft tissue tumors.

Age range in years	Male	Female	Benign	Malignant	Total
0-10	3	3	4	2	6
11-20	6	4	10	0	10
21-30	20	19	38	1	39
31-40	22	21	41	2	43
41-50	14	9	22	1	23
51-60	6	3	9	0	9
61-70	5	2	5	2	7
71-80	2	0	2	0	2
>80	1	0	0	0	1
	79 (56.42%)	61 (43.58%)	131 (93.58%)	9 (6.42%)	140

Table 2: Site wise distribution of soft tissue tumors.

Site	Number	Benign	Malignant
Upper extremity	46(32.86%)	42	4(44.44%)
Lower extremity	17(12.14%)	13	4(44.44%)
Abdomen	9(6.43%)	8	1(11.12%)
Chest, back and Trunk	34(24.29%)	34	0
Head and Neck	32(22.86%)	32	0
Others	2(1.43%)	2	0
	140	131	9

Lipomatous tumors were sub typed into different variants as shown in Table 3. All these lipomatous tumors were sub typed by their characteristic features like for e.g. floret type of giant cells seen in pleomorphic lipoma, hibernoma cell with granular and vacuolated cytoplasm etc.

Table 3: Different lipomatous lesions.

Lipomatous lesions	Number(%)
Conventional	96(91.43%)
Angiomatous	3(2.86%)
Pleomorphic	2(1.90%)
Spindle cell	2(1.90%)
Hybrid	1(0.95%)
Lipoma variant not specified	1(0.95%)
	105

Results were compared and showed accurate diagnosis after correlating with histopathological diagnosis in majority of lipomatous tumors, Ewing’s sarcomas, spindle cell sarcoma, pleomorphic sarcomas, benign neural tumors and others. Malignant soft tissue tumors including 4 cases of Ewing’s sarcoma were confirmed histopathologically.

Correlation with histopathology suggested that FNAC is accurate in correct diagnosis of high grade sarcoma and benign tumors like lipoma in most instances. Out of total 9 cases of malignant soft tissue tumors, 7 cases were confirmed by histopathology and in rest of 2 cases follow up were not possible. Out of total 105 cases of benign lipomatous tumors 85 cases were followed up of which 75 cases were showing satisfactory accuracy with correlation of histopathology specimen. In 10 cases sub typing of lipoma variant differs on histopathology assessment for e.g. spindle cell lipoma on FNA and Pleomorphic lipoma on histopathology, lipoma variant on FNA and conventional lipoma on histopathology. Out of 4 cases of ganglion 2 cases were proved to be Ganglion on histopathology and in rest 2 cases follow up not possible. So overall diagnostic accuracy of FNA for high grade sarcoma was 100%, in benign lesions like sub typing of lipomatous tumor it was 88.23% and for ganglion it was 100%. In other tumors like neural tumors and fibrohistiocytic lesions FNA also shows satisfactory accuracy.

DISCUSSION

In surgical pathology especially the cytopathology diagnosis of soft tissue is challenging aspect. The diagnosis can be obtained in a variety of ways, including FNAC, core needle biopsy, open or excisional biopsy. Each of these diagnostic tools has advantages and

disadvantages. Pathological assessment of a clinically suspicious soft tissue mass traditionally has been from specimens obtained by open surgical biopsy. Because of the larger amount of tissue it obtains, this technique is least susceptible to sampling error and to the problem of insufficient fresh material for ancillary studies, such as electron microscopy, molecular diagnostics, and cytogenetic. However, open surgical biopsy has several points to be considered. It carries risks of local complications, such as post-operative infection, hematoma.¹

More importantly, a poorly placed open biopsy in a sarcoma can increase the risk of tumor spread into an uninvolved muscle compartment and surrounding areas. In current era due to rising trend of least invasive procedures role of FNAC as a simple, safe, cost effective and rapid procedure should be considered especially for preoperative diagnosis. When compared with open biopsy, FNA is also an outpatient procedure that is well-tolerated by patients and has minimal risk of complications. It is considered as a first line investigation in primary evaluation tumors like Breast, Thyroid, Lymph nodes and others.^{2,3}

In addition, multiple passes made during FNAC procedure in different directions and axis of the swelling covers almost all representative areas of tumors to obtain cells for interpretation.¹⁸ But in cases of soft tissue tumors, role of FNAC in primary diagnosis is controversial and coupled with their inherently challenging light microscopic feature, ranging from benign to malignant, and their generally heterogeneous composition, soft tissue tumors can be a source of diagnostic confusion and consternation. So it needs good experience and further studies.

Current study of 140 cases of soft tissue tumors diagnosed by FNAC includes 131 cases of benign tumors and 9 cases of malignant sarcomas. Out of 140 cases in 12 cases (8.57%) lesions were not possible to type accurately so given broad diagnosis like benign soft tissue lesions, benign soft tissue lesions with cystic change & benign reactive lesions It was mainly due to inadequate material obtained or due to atypical heterogeneous cytomorphological features which cannot be accurately categorized.

Histopathological correlation of followed up cases also indicates fair accuracy of FNAC in soft tissue diagnosis especially for high grade sarcoma, recurrent lesions and benign tumors like lipomatous tumors, Ganglion, neural tumors and others. Malignant lesions were identified with 100% diagnostic accuracy in possible 7 cases with histopathological follow up. Roy et al¹⁹ in 2007 in 105 cases reported diagnostic accuracy of FNA 90.6% in benign soft tissue lesions and 91.3% in malignant lesions. Rekhi et al (2007)²⁰ studied 101 cases of sarcoma by FNAC showing 98% accuracy. Kilpatrick et al (2001)²¹ studied 80 cases of sarcoma by FNAC showing 86%

accuracy. Ward W et al (2001)²² studied 73 cases of sarcoma by FNAC showing 84% accuracy. Palmer et al (2001)²³ studied 64 cases of sarcoma by FNAC and showed 92% accuracy. Kulkarni et al²⁴ also studied 67 cases of which diagnostic accuracy 93.3% in benign lesions and 100% in metastatic malignant lesions. Our results were nearly correlated with above mentioned studies.

CONCLUSION

FNAC has proven to be accurate, safe, simple, inexpensive and minimally invasive method for initial diagnosis of primary benign and malignant soft tissue tumors and for the documentation of locally recurrent soft tissue neoplasms. It almost accurately type most of the benign lesions like lipomatous tumors and high grade sarcoma. Interpretation is quite tricky and requires skills, knowledge, expertise and experience. Cytopathological diagnosis offered after correlating clinical, radiological and other data can reached to fair accuracy.

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