Original Article

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Cytomorphological Study of Palpable Soft Tissue Tumors by Fine Needle Aspiration Cytology

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ABSTRACT

Background: Soft tissue tumors are a highly heterogeneous group of tumors that are classified by the line of differentiation, according to the adult tissue they resemble. Objective of this study was to assess the utility of fine needle aspiration cytology (FNAC) in diagnosing soft tissue tumors and to do the histo-pathological correlation wherever possible.

Methods: Conventional May-Grunwald Giemsa(MGG) staining was done in all the 100 cases and cytodiagnosis was rendered. Histopathology was available in 41 cases. The cytological diagnosis was correlated with histology in these cases. The accuracy rate, sensitivity, specificity, the positive and negative predictive value were calculated. P value was found by applying Fisher's exact test.

Results: The study was carried out on aspirates of 100 patients. Out of which 65 cases were benign, 30 were malignant while 5 cases were inadequate. Lipoma was the most common cytologically diagnosed benign lesion. Dermatofibrosarcoma protuberans(DFSP) and synovial sarcoma were found to be the most common malignant soft tissue tumors. Cyto-histological correlation could be achieved in 41 cases, with an accuracy of 92.7%.

Conclusion: FNAC is awell-tolerated and cost-effective procedure. It provides predictive diagnosis of benign or malignant soft tissue tumors and also specific tumor type, especially after correlation with clinical and radiological findings.

Keywords: *FNAC, Soft tissue tumors,Benign and malignant, Cyto-histological correlation*

Introduction

There are two main indications for FNAC of soft tissue lesions: the diagnosis before the definitive treatment and the investigation of lesions clinically suspicious of tumor recurrence or metastasis. The most important preoperative information for the surgeon is whether the lesion is a true soft tissue tumor, either benign or malignant. The histotype of sarcoma is of secondary importance. [1]. In view of gross underutilization of FNAC for mesenchymal lesions, the study is being undertaken.

AIMS

To assess the utility of FNAC in diagnosing soft tissue tumors. 2) To study the cytomorphologic spectrum of soft tissue tumors. 3) To do the histo-pathological correlation wherever possible. 4) To identify the problems encountered in cytological interpretation of aspirates obtained from FNAC of soft tumors.

Materials and Methods:

The present study was being carried out on aspirates from 100 patients, who presented with palpable soft tissue swellings and were referred to the FNA clinic. The procedure was performed after obtaining informed consent. The lesion was located. After cleaning and draping, aspiration was done using 20 ml syringe attached to a 22 gauge needle. From the aspirated material, the smears were prepared. Air dried smears were fixed in methanol for 20-30 minutes and then stained with May-Grunwald Giemsa stain. After drying, the smears were mounted with DPX and then scrutinized under the microscope. The cytological findings were compared with histology in 41 cases. The accuracy rate, sensitivity, specificity, the positive and negative predictive value were calculated. P value was found by applying Fisher's exact test.

Results

A total of 100 cases were included in the study. Overall, male to female ratio in our study was 1.5:1. Maximum number of cases were seen in 2nd to 6th decade of life. Overall, lower limb (25.3%) was found to be the most common site for soft tissue tumors, followed by abdomen (20.0%) and head and neck (18.9%). Thorax (17.9%) and upper limb (17.9%) were found to have almost equal distribution of tumor

masses. The adequacy rate in our study was 95%. Aspirates were considered inadequate when they comprised of only blood or few inflammatory cells.

In our study, out of 100 cases, majority were found to be benign (65%), malignant cases comprised only 30%, while 5% of the cases could not be categorized due to inadequate aspirates. Out of 65 cases of tumor masses being cytologically diagnosed as benign, lipoma was found to be the most common benign soft tissue tumor (27.7%), followed by schwannoma (24.6%). Fibromatosis, nodular fasciitis and haemangioma constituted (16.9%), (15.4%) and (9.2%) respectively. Whereas neurofibroma and spindle cell lipoma constituted 3.1% each. [Figure:1 and 2]. [Table.1(a)].

Out of 30 cases of tumor masses being cytologically diagnosed as malignant, DFSP and synovial sarcoma were found to be the most common malignant lesions, comprising 23.34% each, followed by rhabdomyosarcoma and extraskeletal Ewing's sarcoma (10.0% each). Extragastrointestinal stromal tumor and malignant peripheral nerve sheath tumor (MPNST) were found to be 6.67% each. Leiomyosarcoma, atypical lipomatous tumor, myxoid liposarcoma, extraskeletal myxoid chondrosarcoma, myxofibrosarcoma and undifferentiated pleomorphic sarcoma constituted 3.33% each. [Figure:3 and 4]. [Table.1 (b)].

In our study, out of 65 cytologically diagnosed benign soft tissue tumors, histology was available in 30 cases. Two cases of fibromatosis were misdiagnosed (6.7%) on cytology.The positive cytohistological correlation in case of benign soft tissue tumors was found to be 93.3%. In case of cytologically diagnosed malignant soft tissue tumors, histology was available in 11 out of 30 cases. One case of DFSP was misdiagnosed (9.1%) on cytology. The positive cytohistological correlation in case of malignant soft tissue tumors was found to be 90.9%. [Table.2(a and b)].

The problems encountered in cytodiagnosis of soft tissue tumors were:

It was difficult to make diagnosis when too much blood was present in the aspirates. 2) Grading and sub-typing of spindle cell lesions based on the cytological features were problematic. 3) In two cases of fibromatosis, it was difficult to render diagnosis based on cytological presentation. Histologically, they were found to be low grade fibrosarcoma. 4) One case of DFSP on cytology, was found to be benign fibrous histiocytoma on histology.

In the present study, the accuracy rate was found to be 92.7%. Sensitivity and specificity were 83.3% and 96.6% respectively. The positive and negative predictive values were 90.9% and 93.3% respectively. P value was found to be 0.0001.

Table 1(a): DISTRIBUTION OF CASES ACCORDING TO CYTOLOGICALLY DIAGNOSED BENIGN SOFT TISSUE TUMORS.

S.No.	Tumor Masses	Number of cases	Percentage
1	Lipoma	18	27.7%
2	Schwannoma	16	24.6%
3	Fibromatosis	11	16.9%
4	Nodular Fasciitis	10	15.4%
5	Haemangioma	06	9.2%
6	Neurofibroma	02	3.1%
7	Spindle Cell Lipoma	02	3.1%
	TOTAL	**65**	**100%**

Table 1(b): DISTRIBUTION OF CASES ACCORDING TO CYTOLOGICALLY DIAGNOSED MALIGNANT SOFT TISSUE TUMORS.

S.No.	Tumor Masses	Number of cases	Percentage
1	Dermatofibrosarcoma protuberans	7	23.34%
2	Synovial Sarcoma	7	23.34%
3	Rhabdomyosarcoma	3	10.00%
4	Extraskeletal Ewing's Sarcoma	3	10.00%

S.No.	Tumor Masses	Number of cases	Percentage
5	Extragastrointestinal stromal tumor	2	6.67%
6	Malignant peripheral nerve sheath tumor	2	6.67%
7	Leiomyosarcoma	1	3.33%
8	Atypical lipomatous tumor	1	3.33%
9	Myxoid liposarcoma	1	3.33%
10	Extraskeletal myxoid chondrosarcoma	1	3.33%
11	Myxofibrosarcoma	1	3.33%
12	Undifferentiated pleomorphic sarcoma	1	3.33%
	TOTAL	**30**	**100%**

Table 2 (a): Cyto-histological correlation in cytologically diagnosed benign soft tissue tumors.

S.No.	Cytodiagnosis	Histology available in no. of cases	Positive cytohistological correlation and percentage	Misdiagnosed cases
1	Lipoma	6/18	6 (100%)	-
2	Schwannoma	8/16	8 (100%)	-
3	Fibromatosis	7/11	5 (71.4%)	2
4	Nodular fasciitis	4/10	4 (100%)	-
5	Haemangioma	2/6	2 (100%)	-
6	Neurofibroma	2/2	2 (100%)	-
7	Spindle cell lipoma	1/2	1 (100%)	-
	Total	**30/65**	**28 (93.3%)**	**2 (6.7%)**

Table 2 (b): Cyto-histological correlation in cases cytologically diagnosed as malignant soft tissue tumors.

S.No.	Cytodiagnosis	Histology available in no. of cases	Positive cytohistological correlation and percentage	Misdiagnosed cases
1	DFSP	4/7	3 (75%)	1
2	Synovial Sarcoma	4/7	4 (100%)	-
3	Rhabdomyosarcoma	1/3	1 (100%)	-
4	MPNST	1/2	1 (100%)	-
5	Leiomyosarcoma	1/1	1 (100%)	-
	TOTAL	**11/20**	**10 (90.9%)**	**1 (9.1%)**

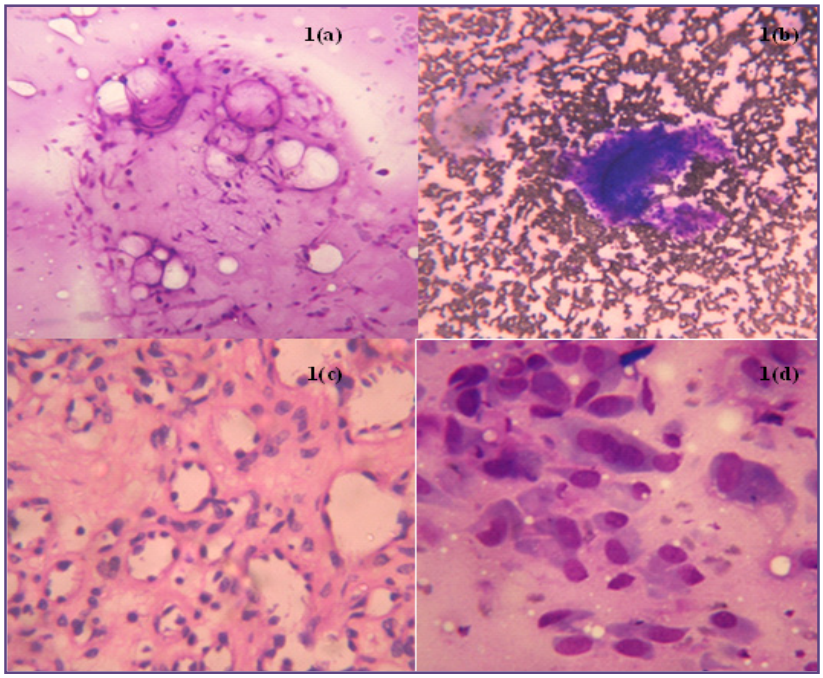

Fig.1 (a): Spindle cell lipoma (FNAC). Showing myxoid matrix, fatcells, uniform spindle cells and mast cells (MGG,100x) (b): Haemangioma (FNAC). Showing cluster of spindle shaped cells in ahemorrhagic background (MGG,100x). (c): Haemangioma (HPE). Showing numerous capillary sized blood vesselslined by endothelial cells (H & E, 400x) and (d): Nodular fasciitis (FNAC). Showing myxoid background, dispersedfibroblast/myofibroblasts, moderate pleomorphism, trinucleate andganglion-cell like cells (MGG,400x).

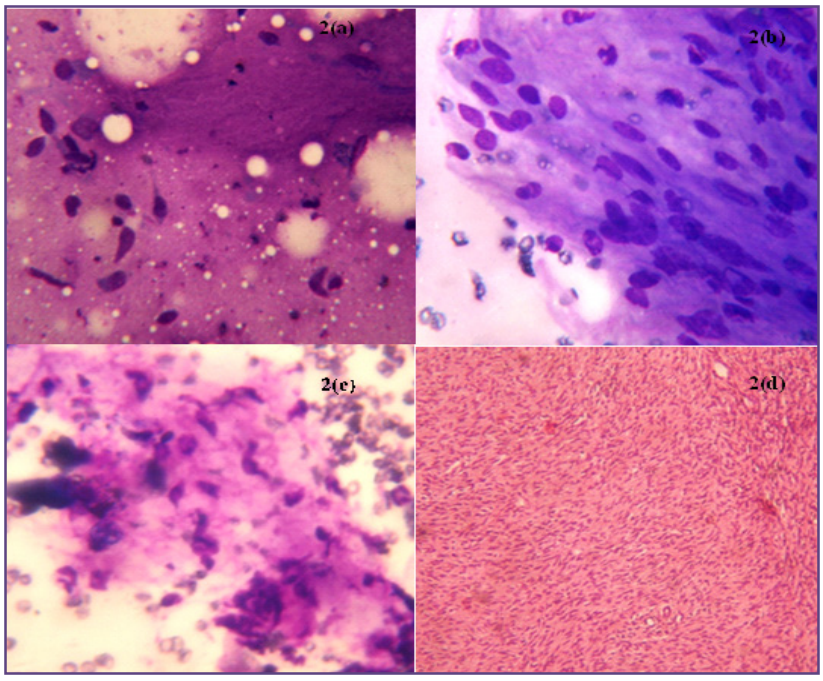

Fig.2(a): Fibromatosis (FNAC). Showing low cellularity, collagenous background and fibroblast-like cells with ovoid nuclei (MGG,400x) (b): Schwannoma (FNAC). Showing palisades of spindle cells in fibrillary background with elongated nuclei (MGG,400x) (c): Neurofibroma (FNAC): Showing low cellularity, fibrillary background, dispersed spindle cells with wavy nuclei (MGG,400x) (d):Neurofibroma(HPE). Showing loosely arranged cells,with comma-shaped nuclei in a myxoid and collagenous background. (H & E,100x)

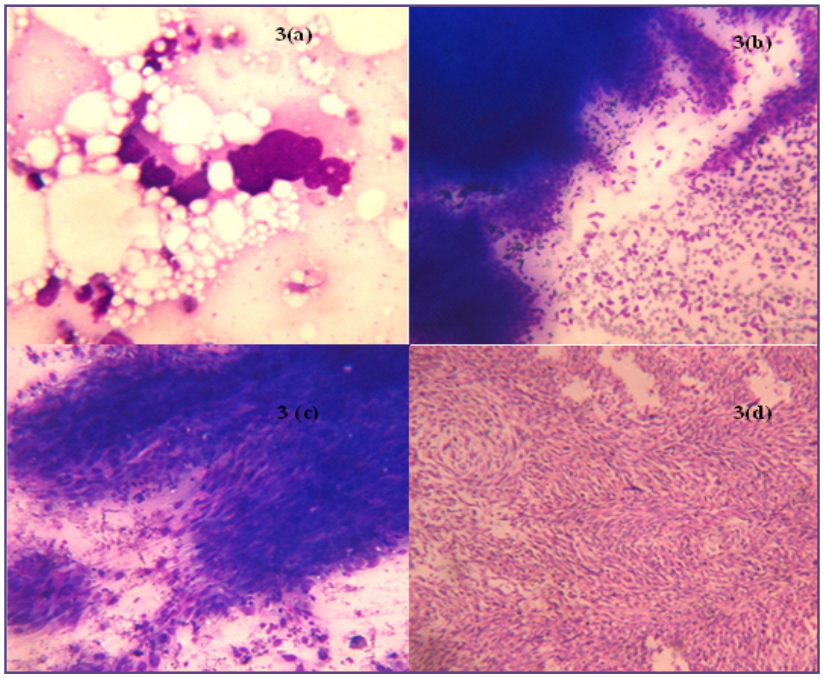

Fig.3(a):Atypical lipomatous tumor(FNAC). Showing moderatelyatypical, uni-and multivacuolated lipoblasts (MGG, 400x) (b): DFSP (FNAC). Showing cellular fragment and dispersed spindle shaped cells with stripped nuclei (MGG,100x)(c): MPNST(FNAC):Showing tightly packed and dispersed spindle cells with wavy nuclei in fibrillary background (MGG,100x) and (d): MPNST(HPE). Tumor cells arranged in fascicular as well as whorling pattern (H & E,100x)

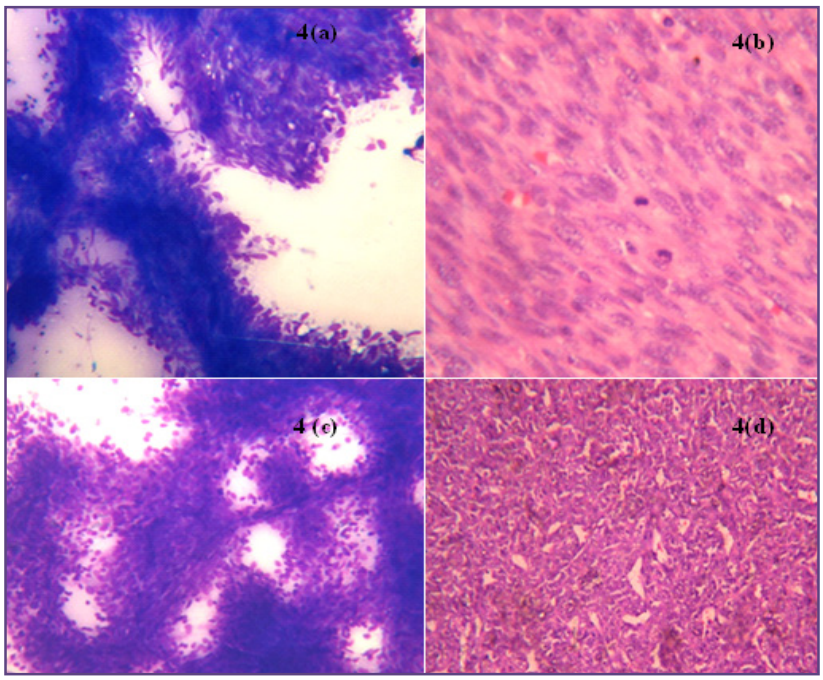

Fig.4(a): Leiomyosarcoma(FNAC). Showing fascicular tumor fragmentsand few dissociated spindle cells with blunt ended nuclei(MGG,100x)(b): Leiomyosarcoma (HPE). Showing fascicles of spindle cells with blunt ended nuclei. (H & E,400x)(c): Synovial sarcoma (FNAC). Showing branching capillaries with attached tumor cells and stripped nuclei (MGG,100x)(d): Synovial sarcoma (HPE). Showing fascicular architectureand branching vessels (H & E,100x)

Discussion

In the present study, a total of 100 cases were taken. Male to female ratio in case of benign soft tissue tumors was 1.4:1, which was almost similar to the study of Patel MM et al, who reported a ratio of 1.5:1. [2]. While in case of malignant soft tissue tumors, male to female ratio was 1.5:1, which was comparable to the study of Jain P et al, who reported a ratio of 1.9:1. [3].Hence supporting the fact that soft tissue tumors are more common in males as compared to females. Maximum number of cases in our study were seen in 2nd to 6th decade. This finding was dissimilar to that reported by Jain P et al and Tailor HJ et al, probably because certain lesions tend to appear in particular age groups. [3,4].

In our study, cytologically diagnosed benign soft tissue tumors were found to be more common in upper limb, as also reported by Tailor HJ et al and Soni PB et al. [4,5]. While in the study by Vijayabharathi et al, lower limb was the most common site. [6]. Cytologically diagnosed malignant soft tissue tumors were found to be more common in lower limb. Previous studies have also reported similar findings. [4,5,6].

The adequacy rate in our study was 95%. It was almost similar to the study of Roy S et al, who reported an adequacy rate of 93.4%.[7]. The cause for inadequacy could be excessive fibrosis or necrotic/cystic change in the tumors. Benign cases in our study were 65%, which was comparable to the study by Patel MM et al, who reported 66.3% cases as benign. [2]. Lipoma was the most common cytologically diagnosed benign lesion in our study. Tailor HJ et al and Arul P et al also reported lipoma as the most common benign lesion in their study. [4,8]. Malignant cases in our study were 30%, which was comparable to the study by Maitra et al, who reported 25% cases as malignant. [9]. Spindle cell sarcoma was the most common cytologically diagnosed malignant lesion in our study. Arul P et al and Sengupta et al had similar result of spindle cell sarcoma. [8,10].

Cyto-histological correlation in case of benign soft tissue tumors in our study was 93.3%, which was comparable to the study by Roy S et al, who reported 90.6% correlation. [7] In case of malignant soft tissue tumors cytohistological correlation in our study was 90.9%, which was almost similar to the findings of Roy S et al, who reported 91.3% correlation in malignant cases. [7]

Overall accuracy rate in our study was 92.7%, which was comparable to that reported by Roy S et al (90.8%). [7] Other authors have reported different accuracy rates. Accuracy rate in the study by Arul P et al was 97%, while it was 80% in the study by Hirachand S et al. [8,11] Sensitivity and specificity in our study were 83.3% and 96.6% respectively. These were very similar to the findings of Vijayabharathi et al, who reported 84.2% sensitivity and 97.7% specificity, but lower than those of Arul P et al, who reported91.7% sensitivity and 97.7% specificity. [6, 8] Positive and negative predictive value in our study were 90.9% and 93.3% respectively. The findings were comparable to the study by Vijayabharathi et al, who reported these values as 88.88% and 96.66% respectively. [6]. The P-value in our study was found to be 0.0001, on applying Fisher's exact test. Soni et al also reported P-value <0.0001, in their study. [5]

The problems that we encountered:1) It was difficult to make diagnosis when too much blood was present in the aspirates or material was insufficient. This fact was supported in the studies by Patel MM et al and Rasool Z et al. [2,12] 2)A great difficulty was faced in grading and sub-typing of spindle cell lesions based on cytological features. This was a common problem encountered in many series. [13-15] 3) One case of DFSP on cytology, was found to be benign fibrous histiocytoma on histology (false positive). The fact that DFSP can be confused with benign fibrous histiocytoma and schwannoma has already been mentioned in previous literatures. [1]

Conclusion

FNAC is a useful, rapid and non-traumatic procedure. It has several advantages. It is a reliable, diagnostic technique in the evaluation of soft tissue tumors and categorizing them into benign and malignant groups.

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