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Role of FNAC in soft tissue tumors with its clinicomorphological correlation

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Abstract
Aim and Objectives: To study the spectrum of soft tissue tumors, the diagnostic accuracy of cytology in soft tissue tumors and clinicomorphological correlation.
Material and Methods: This Hospital based cross sectional prospective study was conducted between Jan 2018 to May 2020 in the Department of Pathology, Subharti Medical College and associated Chhatrapati Shivaji Subharti Hospital, Meerut, India. A total number of 189 cases of FNAC amongst which 25 cases had both histo and cytopathological correlation were taken.
Results: In this study of 189 cases of fine needle aspiration cytology of soft tissue tumours, 25 cases underwent histopathological correlation. 4 cases were true positive, 20 cases were true negative, 1 case was false negative and no false Positive cases were seen. Hence, sensitivity of 80 % and specificity of 100% were noted in the diagnosis.
Conclusion: Fine Needle Aspiration Cytology of Soft tissue tumours can be used for primary diagnosis of Soft tissue tumours as it helps in distinction between benign and malignant cases and also for the diagnosis of metastatic soft tissue deposits in conjunction with relevant clinical data and radiological findings.

Keywords: FNAC, soft tissue tumour, clinicomorphological correlation

Introduction

The field of soft tissue tumors (STT) is enormously vast, and yet as cytologically, relatively undiscovered. The rarity of primary tumors of soft tissue and large range of different types of tumors, the diagnosis and classification of soft tissue tumors become most difficult area in surgical pathology [1]. Soft tissue refers to non-epithelial tissue excluding the skeleton, joints, central nervous system, hematopoietic and lymphoid tissue [2]. Benign tumours out number their malignant counterparts by a ratio of about 100:1 in hospital population [3]. Soft tissue tumours are classified on a histogenetic basis according to their similarity to adult tissue [4].

Fine Needle Aspiration Cytology is well established technique for evaluation of epithelial tumours for many years. Now, it has gained its reputation in the diagnosis work up of soft tissue tumours as well [5]. Its accuracy when applied by experienced and well trained practitioner matches that of histopathology in providing equivocal diagnosis [6].

Aim and objectives

The study was undertaken with objectives to analyse spectrum and cytologic diagnostic accuracy of soft tissue tumors with the help of clinical correlation.

Material and Methods

This Hospital based cross sectional prospective study was conducted in the Department of Pathology, Subharti Medical College and associated Chhatrapati Shivaji Subharti Hospital, Meerut, India.

A total number of 189 cases of FNAC amongst which 25 cases had both histo and cytopathological correlation were taken from Jan 2018 to May 2020. All cytopathological diagnosis were compared for diagnostic concordance using histopathological diagnosis as the gold standard where ever available.

Inclusion Criteria

All cases of direct and radiologically guided FNAC of Soft Tissue Tumors were included in this study.

Exclusion Criteria

Cases with inadequate aspirate were not included.

Detailed clinical data was recorded including history and physical examination. FNAC (Direct) was performed in supine position or sitting position whatever made the lumps/swelling more prominent. Under all aseptic conditions, FNAC was performed using a 21-23 gauge needle by aspiration using the syringe fitted holder or non-aspiration (direct needle puncture) technique.

Depending upon the aspirate obtained, both dry and wet slides were prepared. Air dried smears were stained with Leishman Giemsa stain and wet fixed (ethylalcohol) smears were stained with Papanicolau and Hematoxylin and Eosin (H & E) stain.

FNAC cases were divided into various categories according to Cytomorphological Details-Diagnostic Principles and Clinical Correlates- fourth edition.[7] FNAC results were analyzed for ability to recognize malignancy using statistical parameters of sensitivity, specificity, positive predictive value.

Fig 1: Equipment's used in FNAC.

Results

The present study comprised of 189 cases of Fine needle aspiration cytology of soft tissue tumors encountered in the department of Cytopathology, Subharti Medical College, Meerut during the period of Jan 18 to May 20.

Table 1: Cytopathological categories of soft tissue tumours

	Category	No. of cases	Percentage
01	Adipocytic And Lipogenic Neoplasm	152	80.4%
02	Spindle Cell Neoplasm	22	11.64%
03	Round Cell Neoplasm	03	1.58%
04	Vascular Neoplasm/Leisons	06	3.17%
05	Fibrohistiocytic Neoplasm	03	1.58%
06	Pleomorphic Neoplasm	02	1.05%
07	Suspicious Of Neoplastic Pathology	01	0.52%
Total		189	100%

It was observed that Adipocytic and lipogenic neoplasm constitute major portion of spectrum followed by Spindle cell neoplasm and vascular neoplasm. Age group of patients for FNAC of soft tissue tumours ranged from 7 yrs to 85 yrs. 71 % of cases belong to 21-50 yrs age group. Mean age came out to be 37.67 yrs. Male female ratio is 1.17:1, hence cases were more slightly more common in males than females.

Table 2: Distribution of cytopathological cases according to site

Location	No. of cases	Percentage
Head and Neck	37	19.57%
Upper Extremity	48	25.39%
Thorax/ Chest wall	15	7.93%
Axilla	02	1.05%
Abdomen and Retroperitoneum	35	18.51%
Back	24	12.69%
Lower Extremity	25	13.22%
Not mentioned	03	1.58%
Total	189	100%

It was seen that Upper extremity was site which is most common followed by Head and Neck overall. It was observed that benign tumour were more common than malignant. Among 189 cytopathological cases, 181 were benign and 8 were malignant.

In 76.41% of cases, clinical diagnosis show concurrence with cytopathological diagnosis whereas in 23.59% of cases, clinical diagnosis show discordance with cytopathological diagnosis. In this study of 189 cases of fine needle aspiration cytology of soft tissue tumours, 25 cases underwent histopathological correlation. 4 cases were true positive, 20 cases were true negative, 1 case was false negative and no false positive cases were seen. Hence, sensitivity of 80 % and specificity of 100 % were noted in the diagnosis.

A single false negative case of malignant spindle cell tumour reported as benign spindle cell tumour on cytology resulted in the sensitivity of 80% in the study. The positive predictive value was 100% and negative predictive value was 95.23% whereas overall diagnostic accuracy was 96% in this study.

Discussion

The diagnosis and classification of soft tissue tumours is one of the most difficult areas in surgical pathology. The relative absence of recognizable tissue architectural patterns in cytological preparation makes diagnosis by FNAC even more difficult. It is important to emphasize that the diagnosis of a soft tissue tumour by aspiration always require the intimate cooperation and interaction of surgeons, radiologists and pathologist [3].

In the present study, 21-30 yrs age group is most common followed by 31-40 yrs age group. Whereas in other study such as Gulzar J *et al* [3] and Chaithanya K *et al* [8] 31- 40 yrs age group was most common followed by 21-30 age group. It was also observed in the study by Tailor HJ *et al* [9], Dutta G *et al* [10] and Hemalatha *et al* [6] that most common age group was 31-40 yrs

In the present study and Gulzar J *et al* [3], Tailor HJ *et al* [9] it was observed that cases were seen slightly more common in males than females. Similar results were obtained in study by Hemalatha *et al* [6], Tailor HJ *et al* [9] and Dutta G *et al* [10]

Table 3: Site wise distribution of FNAC cases – comparative analysis

Site	Tailor HJ *et al* [9] (2013)		Gulzar J *et al* [3] (2017)		Present study (2020)	
	No of cases	Percentage	No of cases	Percentage	No of cases	Percentage
Head and Neck	32	22.86%	69	14.4%	37	19.89%
Upper Extremity	46	32.86%	168	35.1%	48	25.80%
Axilla					2	1.07%
Thorax/Chest wall	34	24.29%	26	5.4%	15	8.06%

Back			75	15.7%	24	12.90%
Abdomen and Retroperitoneum	09	6.43%	48	10.1%	35	18.81%
Lower Extremity	17	12.14%	93	19.4%	25	13.44%
Others	2	1.43%	-	-	-	-
Total	100%		100%		100%	

It was seen that in present study as well as above studies, upper extremity including axilla was the most common site for soft tissue tumours.

Similar results was obtained in the study by Hemalatha *et al* [6], but in study by Dutta G *et al* [10] Head and Neck was the most common site affected.

Table 4: Cytomorphological categories – comparative analysis

Cytomorphological categories		Gulzar J *et al*[3] (2017)		Dutta G *et al*[10] (2019)		Present study (2020)	
		No. of cases	Percentage	No. of cases	Percentage	No. of cases	Percentage
01	Adipocytic and lipogenic neoplasm	339	70.7%	209	37.12%	152	80.4%
02	Spindle cell neoplasm	88	18.4%	206	36.58%	22	11.64%
03	Round cell neoplasm	11	2.93%	25	4.44%	03	1.58%
04	Vascular neoplasm/leisons	-	-	60	10.65%	06	3.17%
05	Fibrohistiocytic neoplasm	-	-	-	-	03	1.58%
06	Myxoid tumours	04	0.83%	38	6.74%	-	
07	Pleomorphic neoplasm	36	7.51%	15	2.66%	02	1.05%
08	Epitheloid/Polygonal tumours	1	0.20%	10	1.77%	-	-
09	Suspicious of Neoplastic pathology	-	-	-	-	01	0.52%
Total		479	100	563	100%	189	100%

In present study, Adipocytic and lipogenic neoplasm was the most common cytomorphological category whereas same were also observed in study by Gulzar J *et al* [3], Dutta G *et al* [10]. and Soni PB *et al* [1]

It was seen that cases of benign tumours exceeds from malignant tumours by the ratio of 22.62:1 in present study, 11.44:1 and 4.74:1 in study by Chaithanya K *et al* [8] and Dutta G *et al* [10]

Table 5: Statistical values of FNAC cases – comparative analysis

Studies	Year	Sensitivity	Specificity
Layfield *et al* [11]	1986	95%	95%
Bommer *et al* [12]	1997	96%	99%
Wakely *et al* [13]	2000	100%	97%
Garcia-Solano *et al* [14]	2000	91%	100%
Amin *et al* [15]	2003	81%	100%
Kitagawa *et al* [16]	2003	100%	100%
Hirachand *et al* [17]	2007	25%	100%
Rekhi *et al* [18]	2007	100%	83 %
Soni PB *et al* [1]	2014	70%	100%
Jain V *et al* [4]	2017	100%	98.6%
Chaithanya K *et al* [8]	2017	100%	97.3%
Singh RK *et al* [19]	2018	80%	93.87%
Wankhede R *et al* [20]	2019	91.67%	100%
Present Study	2020	80%	100%

In present study, sensitivity and specificity are 80% and 100%, whereas positive and negative predictive value are 100% and 95.23%. Similar results was seen in Wankhede R *et al* [20] where positive and negative predictive values are 100% and 98.31%. In study by, Chaithanya K *et al* [8] positive and negative predictive values are 100% and 97.79%.

In the present study, only 1 false negative case was encountered. This case was reported as benign mesenchymal tumour could be of neural origin on cytology due to bland nuclear features. On histopathology, the lesion was diagnosed as Malignant spindle cell tumour with morphological features of Malignant Peripheral Nerve Sheath Tumour with satellite nodules This false negative case resulted in sensitivity of 80%. There were no false positives in the study. Hence the specificity was 100%. The overall diagnostic accuracy was 96%. Similar case was seen in the study by Soni PB *et al* [1], in which FNAC of malignant peripheral nerve sheath tumour with low malignant potential yielded blood admixed aspirate. Smears showed mainly tissue fragments, with few dispersed cells. Individual cells were ovoid to spindle shaped admixed with wavy cells. The case was labeled as benign mesenchymal lesion probably of neurogenic origin.

While performing FNAC, problems like poor localization of the lesions, poor aspiration techniques, tangential aspiration whereby the needle misses the tumour and only the inflammatory material are sampled, secondary changes like haemorrhage, necrosis and cystic change which makes cells difficult to aspirate are the different factors leading to difficulty in aspirating required material which came out to be main reason for histo-cytological non correlation many times.

Beside all of this, FNAC of soft tissue tumours along with relative clinical data and radiological findings can be used as initial investigation for diagnosis as it benefits in distinction between benign and malignant tumours and also for the diagnosis of metastatic soft tissue deposits. Specificity of FNAC of soft tissue masses was found to be high enough to permit surgical intervention after a clinical and cytodiagnosis.

Conclusion

Fine Needle Aspiration Cytology of Soft tissue tumours can be used for primary diagnosis of Soft tissue tumours as it helps in distinction between benign and malignant cases and also for the diagnosis of metastatic soft tissue deposits in conjunction with relevant clinical data and radiological findings.

Cytological categorization of tumours especially high grade will definitely help in early formulation of effective management protocol. Application of various techniques like immunocytochemistry, cytogenetics and electron microscopy to aspirate can result in further decrease in misdiagnosis and can considerably increase the diagnostic spectrum and helps in subtyping of soft tissue tumours.

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Conflict of interest
None declared

Ethical approval
The study was approved by the Institutional Ethics Committee.

References
1. Soni PB, Verma AK, Chandoke RK, Nigam JS. A prospective study of soft tissue tumours histocytopathy correlation. Pathology Research International http://dx. Doi.org/10.1155/2014/678628
2. Horvai A. Bones, Joints, and Soft Tissue Tumours. In; Kumar V, Abbas AK, Aster JC (eds), Robbins and Cotran, Pathologic Basis of Disease: South Asia Edition: Elsevier, 2014, 1219.
3. Gulzar J, Yasin SB, Khan SP, Bashir N. Role of fine needle aspiration (FNAC) in the diagnosis of soft tissue tumours. International Journal of Research in Medical Sciences. 2017; 5(10):4395-4399.
4. Jain V, Agarwal T. Role of FNAC in soft tissue tumours and its histopathological correlation. International Surgery Journal. 2017; 4(8):2632-2336.
5. Parajuli S, Lakhey M. Efficacy of fine needle aspiration cytology in diagnosing soft tissue tumours. Journal of Pathology of Nepal. 2012; 2:305-308.
6. Hemalatha P, Saritha Padmavathi, Sandhya A. Cytological and histopathological correlation of soft tissue tumours. Perspectives in Medical Research. 2018; 6(3):40-44.
7. Qian X. Soft Tissue. In; Cibas E, Ducatman BS (eds), Diagnostic Principles and Clinical Correlates: 4th ed: Elsevier, 2014, 471.
8. Chaithanya K, Dinesh US. Utility of fine needle aspiration cytology in diagnosing soft tissue tumors-experience in our institution. IP Journal of Diagnostic Pathology and Oncology. 2017; 2(4):76-81.
9. Tailor HJ, Bhagat VM, Kaptan KB, Italiya SL, Balar HR, Agarwal MP *et al*. Diagnostic accuracy of fine needle aspiration cytology in soft tissue tumours: our institutional experience. International Journal of Research in Medical Sciences. 2013; 1(4):443-447.
10. Dutta G, Nayak S, Mohapatra K, Agarwal KC. FNAC of Soft Tissue Tumour with Histopathological Correlation in western odisha- A 7 years prospective and retrospective study. GJRA- Global JournaL for Research Analysis. 2019; 8(2):20-22.
11. Layfield LJ, Anders KH, Glasbow BJ, Mirra JM. Fine needle aspiration of primary soft tissue lesions. Arch Pathol Lab Med. 1986; 110:420-424.
12. Bommer KK, Ramzy I, Mody D. Fine- needle aspiration biopsy in the diagnosis and management of bone lesions: a study of 450 cases. Cancer. 1997; 81(3):148-156.
13. Wakely PE, Kneisl JS. Soft tissue aspiration cytopathology: diagnostic accuracy and limitations. Cancer Cytopathol. 2000; 90(5):292-297.
14. Garcia-Solano J, Garcio-Rojo B, Sanchez-Sanchez C, Montalban Romero S, Martinez-Parra D, Perez-Guillermo M *et al*. On the utility and limitations of fine-needle aspiration of palpable lesions located in the hand. Diagn Cytopathol. 2000; 23(4):284-291.
15. Amin MS, Luqman M, Jamal S, Mamoon N, Anwar M. Fine needle aspiration biopsy of soft tissue tumours. J Coll Physicians Surg Pak. 2003; 13(11):625-628.
16. Kitagawa Y, Ito H, Sawaizumi T, Mataubara M, Yokoyama M, Naito Z *et al*. Fine needle aspiration cytology for soft tissue tumours of the hand. J Hand Surg Br. 2003; 28(6):582-585.
17. Hirachand S, Lakhey M, Singha AK, Devkota S, Akhter J. Fine needle aspiration (FNA) of soft tissue tumours (STT). Kathmandu University Medical Journal. 2007; 5(3):374-377.
18. Rekhi B, Gorad BD, Kakade AC, Chinoy R. Scope of FNAC in the diagnosis of soft tissue tumours-a study from a tertiary cancer referral centre in India. Cytojournal. 2007; 4:20.
19. Singh RK, Mridha J, Banerjee S, Shrivastava RK. A Cytological and Histological Correlational Study of Various Soft Tissue Tumours in Jharkhand Population. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS). 2018; 17(3):11-15.
20. Wankhede R, Barole SR. FNAC in the diagnosis of soft tissue tumours – A study from a tertiary hospital. International Journal of Pathology. 2019; 11(1):33-35.