



## Utility of Fine Needle Aspiration Cytology in Diagnosis of Soft Tissue Lesions with Histopathological Correlation

Rasool Zubaida\*, Bhat ML<sup>†</sup>, Samoon Nuzhat\*\*, Baba Khalil<sup>††</sup>,  
Rumana M\*\*\*, Reshi Ruby<sup>†</sup>, Shafi M<sup>\*\*\*</sup>

### ABSTRACT

100 cases of Soft tissue lesions were studied by Fine Needle Cytology (FNAC) and subsequently correlated by Histopathological examination and Immunohistochemical staining. The study revealed that 55% of the cases were benign soft tissue tumour masses, 34% were benign soft tissue tumour like masses and 11% were malignant soft tissue lesions. The accuracy determined by the histopathological examination for benign soft tissue masses was 94.38% and in 100% malignant soft tissue lesions. The discordance of 5.62% in the benign soft tissue masses was due to aspiration of inadequate material and loss of architectural pattern. Hence, excision with histopathological examination is mandatory in such cases.

**Keywords:** *Soft tissue tumours, FNAC, Histopathological examination*

### INTRODUCTION

Soft tissue is represented by the voluntary muscles, fat and fibrous tissues along with the vessels serving these tissues. It also includes the Peripheral Nervous Systems because tumours arising from Nerves present as soft tissues masses<sup>1</sup>. The true frequency of soft tissue lesions is difficult to estimate, as most of non-neoplastic and benign lesions are not removed. A conservative estimate is that benign tumours outnumber their malignant counterparts by ratio of about 100:1 in hospital population and their annual incidence is approximately 300 per 1,00,000 population<sup>2, 8, 9, 10</sup>. Soft tissue sarcomas can occur anywhere in the body. Approximately, 40% of soft tissue sarcomas occur in lower extremity, 30% in trunk/retro peritoneum, 20% in upper extremity and 10% in head and neck. Soft tissue sarcomas occur more commonly in males in comparison to female (1.4:1) but sex and age incidences vary among different histological types, approximately 40% develop in middle aged and elderly. There is no proven racial variation even

though the annual age adjusted, incidence rates have been reported to be higher for blacks than Whites in United States<sup>3</sup>

The role of FNAC in diagnosis of soft tissue lesions is one of the difficult areas in surgical pathology. The relative absence of recognizable tissue architectural pattern in cytological preparation makes diagnosis by FNAC even more difficult. However, it provides predictive diagnosis of benign or malignant neoplasm, or even in some case specific tumour type. Also, if the lesion is benign and the patient is elderly, risk of surgery can be avoided. In case of recurrences of malignancy a cytological diagnosis can help in the administration of palliative treatment<sup>4</sup>.

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\*Assistant Professor,

\*\*Research Scholar

\*\*\*Associate Professor

++Professor, Department of

Pathology

Sher-i-Kashmir Institute of Medical Sciences

Soura-190011. J&K, India

<sup>†</sup> Professor, Department of

Pathology, Government Medical

College, Srinagar-190001. J&K. India

+++ Professor, Department of

Surgery, Government Medical

College, Srinagar-190001, J&K, India

\*Corresponding Author

Zubaida Rasool

Department of Pathology, SKIMS,

Soura, Srinagar, India

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This study has been undertaken to increase our understanding about the soft tissue tumours, the accuracy of FNAC in diagnosing soft tissue tumours, its cyto-architectural features and to compare these findings with histopathological diagnosis<sup>11</sup>.

#### MATERIALS AND METHODS

The FNAC was conducted on 100 patients of which 59 were males and 41 were females in the Department of Pathology, Government Medical College, and Srinagar on patients having soft tissue lesions anywhere in the body. Special stains, Histopathological examination,

Immunohistochemistry were employed wherever necessary, to arrive at the final diagnosis. Aspiration was done with Franzen's handle, in which 20 ml disposable syringe was fixed with 20-25 gaugeneedles. Fixation of smears was done depending upon the type of stain needed. For Haematoxylin and Eosin and Papnicolaou stains, smears were wet fixed. Smears, which were to be stained by May-Grunwald Geimsa, were air-dried. Fixative used was equal parts of Ether and 95% Ethanol, 100% methanol or 85% Isopropyl alcohol. Fixation time was 10-15 minutes.

#### RESULTS

A total of 100 cases were included in the study on patients who presented with soft tissue masses on different sites of the body, superficial as well as deep. These hundred cases were evaluated cytologically for the cytomorphological nature of

the lesion and comprised of benign and malignant lesions including metastatic deposits. Out of 100 soft tissue masses, 89 cases were benign which comprised of 55 soft tissue tumour masses, 34 tumour like masses and 11 were malignant lesions. These Soft tissue masses appeared in Head & Neck (43%), Lower limb (16%), upper limb (15%), Abdomen and Thorax (14 and 12%) respectively (Table 1).

**Table 1 Site-wise Distribution of Benign and Malignant Tumors**

Tumours / Site	Head & Neck	Upper Limb	Thorax	Abdomen	Lower Limbs	Total Cases
Benign Soft Tissue Tumour Masses	17	10	8	10	10	55
Benign Soft Tissue Tumour Like Masses	19	5	2	2	6	34
Malignant Masses	7	-	2	2	-	11
<b>Total Cases</b>	<b>43</b>	<b>15</b>	<b>12</b>	<b>14</b>	<b>16</b>	<b>100</b>

Among 55 cases of benign soft tissue masses 56% were lipomas, which were present mostly in head and neck region (Table 2).

Out of 34 benign soft tissue tumour like masses, 76% were non neoplastic and 24% were Neoplastic

masses. In non-neoplastic masses, 47% were Keratinous cysts and mostly occurred in head and neck region whereas in neoplastic masses, out of 24% cases, adnexal tumour (11.5%) represented in head and neck region only (Table 3).

Table 2 Site-wise Distribution of Benign Soft Tissue Tumour Masses

Tumour Masses/ Site	Head & Neck	Upper Limb	Thorax	Abdomen	Lower Limbs	Total Cases	%ages
Lipoma	12	3	7	9	2	33	60
Schwannoma	1	4	1	1	2	9	16
Haemangioma	2	2	-	-	1	5	9
Neurofibroma	1	1	-	-	-	2	4
Pseudosarcomatous Proliferations	-	-	-	-	2	2	4
Angio-fibromyxoma	-	-	-	-	1	1	2
Cellular Fibroma	-	-	-	-	1	1	2
Giant Cell Tumour of T.S.	-	-	-	-	1	1	2
Fibromatosis Colli	1	-	-	-	-	1	2
<b>Total Cases</b>	<b>17</b> <b>(31%)</b>	<b>10</b> <b>(18%)</b>	<b>8</b> <b>(15%)</b>	<b>10</b> <b>(18%)</b>	<b>10</b> <b>(18%)</b>	<b>55</b>	

Table 3 Site-wise Distribution of Benign Soft Tissue Tumour-like Masses

Tumours / Masses Site	Head & Neck	Upper Limb	Thorax	Abdomen	Lower Limb	Total Cases	%ages
Keratinous cyst	8	2	2	2	2	16	47
Thyroglossal cyst	4	-	-	-	-	4	11.5
Ganglion cyst	-	3	-	-	-	3	9
Calcinosis	-	-	-	-	2	2	6
Chronic Sialadenitis	1	-	-	-	-	1	3
Adnexal Tumour	4	-	-	-	-	4	11.5
Pleomorphic Adenoma	2	-	-	-	-	2	6
Hamartoma	-	-	-	-	2	2	6
<b>Total Cases</b>	<b>7(63%)</b>	<b>0</b>	<b>2 (18%)</b>	<b>2(18%)</b>	<b>0</b>	<b>34</b>	

Among 11 malignant lesions, 45% cases were sarcomas present at various sites of the body and 55% were metastatic deposits of which 27% were present in lymph nodes which include Duct cell carcinoma, medullary carcinoma and mucin

secreting carcinoma (9% each); and 27% occurred in subcutaneous tissue of various sites which included malignant melanoma, basal cell carcinoma and squamous cell carcinoma (Table 4).

**Table 4 Site-wise Distribution of Malignant Tumours**

Tumours / Masses Site						Total Cases	%ages
	Head & Neck	Upper Limb	Thorax	Abdomen	Lower Limb		
Embryonal Rhabdomyo-sarcoma	1					1	9
Alveolar Rhabdomyo-sarcoma				1		1	9
Spindle cell sarcoma (Int Grade)			1			1	9
Clear Cell Sarcoma	1					1	9
Liposarcoma				1		1	9
Malignant Melanoma	1					1	9
Basal cell carcinoma	1					1	9
Squamous Cell Carcinoma			1			1	9
Mucous Secreting Carcinoma	1					1	9
Medullary Carcinoma of Thyroid	1					1	9
Duct cell carcinoma	1					1	9
<b>Total Cases</b>	<b>7 (63%)</b>	<b>0</b>	<b>2 (18%)</b>	<b>2 (18%)</b>	<b>0</b>	<b>11</b>	

## DISCUSSION

This study was conducted on one hundred patients attending SMHS and associated hospitals of Government Medical College, Srinagar.

The study was clinically evaluated and divided into two groups, benign and malignant. Among benign lesions, 89 cases were benign soft tissue masses, which were further categorized as benign soft tissue tumours masses and benign soft tissue tumour like masses (non-neoplastic and neoplastic). Benign soft tissue tumour masses comprised of 55 cases, whereas benign soft tissue tumour like masses comprised of 34 cases.

The comparative analysis of the benign soft tissue tumour masses as shown in (Table 5) revealed that out of 33 lipomas, (60%) cases of benign soft tissue tumour masses, 31 were histologically correlated and 2 cases were found to be fibrolipoma on histological diagnosis. The probable cause for discordance for these two cases was due to lack of

spindle cells in the smears which can occur because of insufficient and inappropriate material aspirated during the FNAC. The commonest site involved was head and neck region in males between the age group of 41-50 years and the diagnostic accuracy was 94%.

Neurilemoma also known as Schwannoma (16%) was the second common benign soft tissue tumour mass in this study and 100% correlation was observed between FNA and histopathology, thus acquiring 100% diagnostic accuracy. All the cases were mostly found in the upper extremity followed by lower extremity, predominantly in males between the age group of 51-60 years. Haemangiomas (9%) were mostly found in males in the age group of 31-40 and the commonest site was head and neck region. Out of 5 cases of haemangioma, 4 cases were diagnosed on FNA and subsequently confirmed on Histopathological examination and one false negative diagnosis of benign adnexal lesion was diagnosed as

haemangioma on histopathological examination. The disparity in diagnosis was due to hypercellularity of smears during aspiration, which

yielded surrounding benign epithelial cells causing the diagnostic dilemma. Thus the diagnostic accuracy achieved was 80%.

**Table 5 Comparative Analysis of FNAC and Histopathological Diagnosis**

<i>Concordance between FNAC and HPE</i>		<i>Discordance between FNAC and HPE</i>					
Type	Diagnosis	No. of Cases	FNAC Diagnosis	No. of Cases	H/P Diagnosis	No. of Cases	
Benign Soft Tissue Tumour Masses	Lipoma	31	Lipoma	2	Fibrolipoma	2	
	Neurolimoma	9	Benign Adnexal lesions	1	Hemangioma	1	
	Hemangioma	4	Benign Mesenchymal lesions	1	Cellular fibroma	1	
	Neurofibroma	2					
	Pseudosarcomatous lesions	2					
	Angiofibromyxoma	1					
	Giant Cell tumour of tendon sheath	1					
	Fibromatosiscolli	1					
	Benign Soft Tissue tumour like masses	Keratinous Cysts	16				
		Thyroglossal Cysts	4				
Ganglion Cysts		3					
Calcinosis		1	Lipoma	1	Calcinosis Cutis	1	
<i>(Non-neoplastic)</i>	Chronic Sialadenitis	1					
	Adnexal Tumours(pilomatricoma)	4					
<i>(Neoplastic)</i>							
Malignant Lesions	Pleomorphic adenoma	2					
	Hamartoma	1					
<i>(Sarcomas)</i>	EmbryonalRhabdomyosarcoma	1					
	Alveolar Rhabdomyosarcoma	1					
	Intermediate grade spindle cell sarcoma	1					
	Liposarcoma	1					
	Clear cell sarcoma	1					
	Malignant Melanoma	1					
	Squamous Cell Carcinoma	1					
	Basal cell carcinoma	1					
	<i>(Metastatic Deposits Lymphnode)</i>	Duct cell carcinoma	1				
		Medullary carcinoma thyroid	1				
Mucous secreting adenosarcoma		1					

One case, which was diagnosed as benign mesenchymal lesion on FNAC, proved to be cellular fibroma on histopathology. This false negative

diagnosis was due to loss of proper architectural pattern of the lesion, which is essential in diagnosing the cellular fibroma. Neurofibroma,

Pseudosarcomatous proliferations (Nodular Fasciitis and Proliferative Myositis), Angio-fibromyxoma, Giant cell tumour of Tendon sheaths and fibromatosis colli were histologically correlated and the diagnostic accuracy achieved was 100%.

The comparative study revealed that out of 34 benign soft tissue tumour like masses, 33 cases (97%) were diagnosed on FNAC and subsequently confirmed on Histopathology; only one case (3%), which was diagnosed as Lipoma on FNAC proved to be Calcinosis cutis. The discordance in the diagnosis occurred due to aspiration of mature adipose tissue only and no calcific material was aspirated. (Table 5)

Out of 100 cases, eleven (11%) malignant soft tissue masses were diagnosed, which were categorized into sarcomas (5 cases) and metastatic deposits in lymph nodes (3 cases) and subcutaneous tissue (3 cases). All eleven cases were correlated with HPE and proved to be diagnosed correctly on FNAC.

### CONCLUSION

In this study, correlation of 94% was observed in benign soft tissue lesions, and 100% in malignant lesions. 6% discordance in the diagnosis was due to inability to aspirate enough material on FNAC, on which observer interpretation varies. So it is obligatory, that enough material should be aspirated for interpretation of soft tissue lesions and an index of suspicion should always be kept in mind while dealing with larger masses in advance aged

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patients. In malignant lesions, whether primary or secondary, often moderately cellular smears can arrive at suspicious or confirmatory diagnosis compared from benign soft tissue lesions where it is at times difficult to report correct diagnosis. It is impressed here that excision of the lesion should be done where diagnostic dilemma arises on FNAC, so that on Histopathological Examination exact diagnosis is confirmed.

In the study of Akerman et al<sup>5</sup>, 85% benign tumours were reported as benign and 89% of sarcomas were classified as malignant soft tissue tumours. The results of Brosjo et al<sup>6</sup> were also similar. Wakely et al<sup>7</sup> found 96% accuracy in FNAC. Layfield LJ et al<sup>12</sup> presented FNAC study of 136 primary soft tissue tumours with comparative histopathology results in 58 malignant and 42 benign lesions. They showed diagnostic sensitivity of FNAC for malignant neoplasm as 95%. There was approximately 20% of false positive and false negative rate. Similar study of FNAC of soft tissue tumours in correlation with histopathology was done by Kulakarni DR et al<sup>13</sup>.

FNA is an accurate, cost effective, and well tolerated procedure in well trained and experienced hands<sup>11</sup>. It is concluded that accuracy rate of our study is at par with the available references and studies.

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