

A study on cytology of soft tissue spindle cell tumors with histopathological correlation wherever possible

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Abstract

Introduction: Spindle cell tumors constitute an important component of soft tissue tumors. Fine needle aspiration cytology provides a predictive diagnosis of type and nature of these neoplasms. **Methods:** This study was conducted for a period of four years. **Results:** A total of 124 cases were diagnosed as soft tissue spindle cell tumors cytologically. Of these, 86 (69.35%) cases were benign and 38 (30.64%) were malignant tumors. 52 cases were available for histopathological follow up of which 49 cases (94.23%) showed positive correlation. Though there are no specific tissue architectural patterns in cytological smears, they are helpful in providing predictive diagnosis of benign or malignant nature of the tumour and in many cases also of specific tumor type. However, histopathology is considered as “gold standard” in diagnosing spindle cell tumors. Ancillary techniques are helpful in providing definitive diagnosis thus increasing the diagnostic accuracy of FNAC. There were 2 false negative cases which were cytologically diagnosed as Schwannoma and Neurofibroma because of the presence of wavy spindle cells and blood but both cases were diagnosed as malignant peripheral nerve sheath tumor on histopathology. There was 1 false positive case cytologically diagnosed as malignant spindle cell tumor but histopathologically diagnosed as Pleomorphic lipoma. **Conclusion:** Cytological and histopathological correlation was available in 36 benign tumors and 16 malignant tumors. Among benign tumors, 94.44% (34 cases) showed positive correlation, 5.56% (2 cases) showed negative correlation. Whereas among malignant tumors, 93.75% (15 cases) showed positive correlation and 6.25% (1 case) showed negative correlation between cytologic and histopathologic diagnosis.

Keywords: Soft tissue, Spindle cell tumors, Cytology, Correlation.

Introduction

The field of soft tissue tumors is enormously vast, and yet as cytologically, relatively undiscovered. The large range of different types of soft tissue tumors, their diagnosis and classification becomes one of the difficult areas in pathology [1]. Spindle cell tumors constitute an important component of soft tissue tumors. The natural course of soft tissue tumours is unpredictable and very aggressive if not diagnosed early. Coupled with their inherently challenging microscopic nature, ranging from benign to borderline to malignant, and their generally hetero-geneous composition, spindle cell tumors can be a source of diagnostic confusion [2].

Fine needle aspiration cytology (FNAC) is a useful screening tool which is least invasive and cost-effective procedure. Though there are no specific tissue

architectural patterns in cytological smears, they are helpful in providing predictive diagnosis of benign or malignant nature of the tumour and in many cases also of specific tumor type. However, histopathology is considered as “gold standard” in diagnosing spindle cell tumors. Ancillary techniques are helpful in providing definitive diagnosis thus increasing the diagnostic accuracy of FNAC.

Methodology

Study period: Present study includes two years retrospective and two years prospective cases presented between June 2013 and May 2017

Study setting: The department of pathology, KIMS, Hubballi.

Study subjects: The study group constituted 124 cases with palpable soft tissue mass.

Data collection: After detailed history, clinical examination and informed consent of patient, fine needle

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aspiration was performed under aseptic precautions using disposable 22-gauge needle and 10 cc syringe. One air dried smear was subjected to adequacy evaluation under toluidine preparation on the site. Wet smears immediately fixed in isopropyl alcohol were stained with hematoxylin and eosin, PAP stain. Dry-fixed smears were Wright’s stained and studied for cytological details.

Inclusion criteria: Patients of all age groups and both sex were included in the study whereas patients with skin

infection at the site of aspiration, those with hemorrhagic diathesis were excluded from the study.

Excised surgical specimen and biopsies were processed routinely and stained with hematoxylin and eosin. Cytological results were correlated with histopathological findings wherever possible.

Results

A total of 124 cases of soft tissue spindle cell tumors were studied. Of these, 86(69.35%) cases were benign spindle cell tumors, 38(30.64%) cases were cytologically malignant. Males were more commonly affected with 55.64% (69 cases) and females accounted for 44.35% (55 cases). Male to Female ratio was 1.23:1.

Most common age group affected was 3rd decade (24.19%, 30 cases) followed by 5th decade (18.54%, 23 cases), 4th decade (17.74%, 22 cases), 7th decade (15.32%, 19 cases), 2nd decade (11.29%, 14 cases), 6th decade (9.67%, 12 cases) and least was in 1st decade (3.22%, 4 cases) (Table 1).

Table-1: Age distribution of spindle cell tumors

Age (Years)	Number of Cases	Percentage (%)
0-10	4	3.22
11-20	14	11.29
21-30	30	24.19
31-40	22	17.74
41-50	23	18.54
51-60	12	9.67
>60	19	15.32
Total	124	100

Lower extremities were the most common site for soft tissue spindle cell tumors (41.9%, 52 cases) followed by upper extremities (23.38%, 29 cases), abdomen (12.90%, 16 cases), back and chest (12.09%, 15 cases), head and neck (7.25%, 9 cases) and least were in multiple sites (2.41%, 3 cases) [Figure 1].

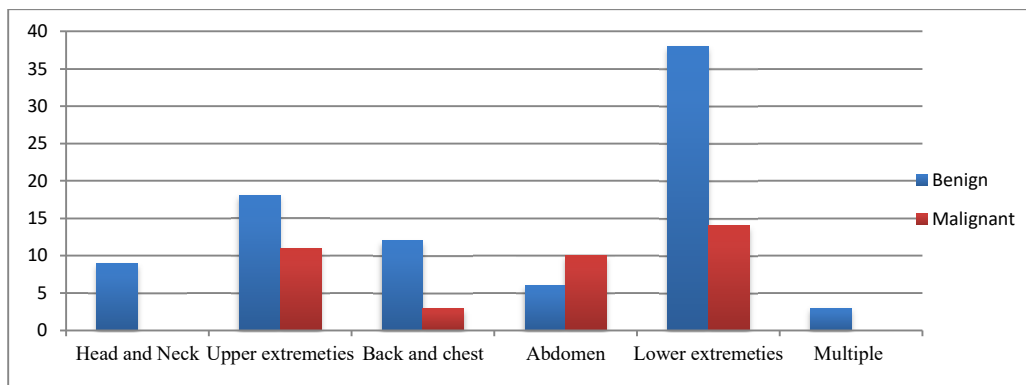


Figure-1: Bar graph showing site wise distribution of benign and malignant spindle cell tumors.

Cytological and histopathological correlation was available in 36 benign tumors and 16 malignant tumors. Among benign tumors, 94.44% (34 cases) showed positive correlation, 5.56% (2 cases) showed negative correlation. Whereas among malignant tumors, 93.75% (15 cases) showed positive correlation and 6.25% (1 case) showed negative correlation between cytologic and histopathologic diagnosis [Table 2 and 3].

Table-2: Cytology-histopathology correlation of benign spindle cell tumors.

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Cytologic diagnosis	No.	Follow up	Histo diagnosis	Positive correlation
Schwannoma	22	9	8 Schwannoma, 1 MPNST	88.88% (8)
Neurofibroma	20	11	9 Neurofibroma, 1 Neurilemmoma, 1 MPNST	90.90% (10)
Inflammatory myofibroblastic tumor	2	0		
Fibrous hamartoma of infancy	1	0		
Desmoid tumor	8	4	4 Desmoid tumor	100% (4)
Fibromatosis	3	1	1 Fibromatosis	100% (1)
Solitary fibrous tumor	1	0		
Benign spindle cell tumor (uncatergorised)	29	11	3 Neurofibroma, 2 Desmoid tumor, 2 BFH, 1 Neurilemmoma, 1 Nodular fasciitis, 1 Lieyomyoma, 1 Superficial fibromyxoid tumor	100% (11)
Total	86	36		94.44% (34)

Table-3: Cytology-histopathology correlation of malignant spindle cell tumors

Cytologic diagnosis	No.	Follow up	Histo diagnosis	Correlation
Synovial srcoma	5	2	2 Synovial sarcoma	100% (2)
DFSP	3	2	2 DFSP	100% (2)
Fibrosarcoma	4	2	2 Fibrosarcoma	100% (2)
MPNST	6	3	3 MPNST	100% (3)
Sarcoma	2	1	1 Leiyomyosarcoma	100% (1)
Malignant spindle cell tumor (uncategorized)	18	6	2 MPNST 1 Synovial sarcoma 1 GIST 1 Malignant epithelioid hemangioendothelioma 1 Pleomorphic lipoma	83.33% (5)
Total	38	16		93.75% (15)

There were 2 false negative cases which were cytologically diagnosed as Schwannoma and Neurofibroma because of the presence of wavy spindle cells and blood but both cases were diagnosed as malignant peripheral nerve sheath tumor on histopathology. There was 1 false positive case cytologically diagnosed as malignant spindle cell tumor but histopathologically diagnosed as Pleomorphic lipoma [Table 4].

Table-4: Statistical analysis.

Cytologic Diagnosis	Histopathologic diagnosis		Total
	Benign	Malignant	
Benign	34 True Negative	2 False Negative	36
Malignant	1 False Positive	15 True Positive	16
Total	35	17	52

Discussion

The application of FNAC has led to the reasonably accurate diagnoses of various types of soft tissue tumors. Complex heterogeneity is a challenging factor in the diagnosis of soft tissue spindle cell tumors.

Present study was conducted on 124 patients who presented with soft tissue mass. Of these 86 cases (69.35%) were cytologically diagnosed as benign spindle cell tumors and 38 cases (30.64%) as malignant spindle cell tumors.

Results were comparable with the reports of other authors. Beg S et al reported 34 (24 benign and 10 malignant) cases as spindle cell tumors on cytology. On histopathology, there were 43 (32 benign and 11 malignant) cases [3]. Soni PB et al found 62.5% (45/72) cases of benign, 37.5% (27/72) cases of malignant spindle cell tumors on cytology [4]. Dey et al reported 67.34% cases (33/49) as benign and 32.65% cases (16/49) as malignant tumors [5].

Majority of soft tissue spindle cell tumors in the present study were between 21-30 years followed by 41-50 years. This was comparable to study done by Beg S et al in which majority of cases were between 21-30 years while Soni PB et al and Vijayabharati et al found that the most common age group for these tumors was between 21-30 years [3, 4, 6].

We reported maximum number of spindle cell tumors in lower extremities 52 cases (41.9%) followed by upper extremities 29 cases (23.38%) and abdomen 16 cases (12.9%). Other authors like Dey et al, Vijayabharathi et al and Rekhi et al also found lower extremities as the most common site for spindle cell tumors [5, 6, 7]. Soni PB et al found upper extremities as most common site whereas Beg et al found head and neck as most common site [3, 4].

In the present study, Schwannoma was the most common benign spindle cell tumor, Synovial sarcoma was the most common malignant tumor. Vijayabharathi et al. also reported the most common benign tumor as Schwannoma, Fibrosarcoma as most common malignant tumor [6]. Soni PB et al. reported neurofibroma as most common benign spindle cell tumor, MPNST as most common malignant tumor [4].

The criteria for malignancy as described by Kilpatrick SE et al [8] was that an aspirate is designated as a sarcoma when the smear shows moderate to high cellularity, hyperchromatic nuclei in almost all the sampled cells and ill-defined edges of the neoplastic

fragments. Costa MJ et al [9] stated that in any aspirate from a spindle cell lesion, the main criteria to be assessed are cellularity, nuclear pleomorphism, mitosis and necrosis. Above criterias were considered in this study and majority of malignant spindle cell tumors diagnosed cytologically were uncatagorized followed by 6 cases each of synovial sarcoma, MPNST and 4 cases of fibrosarcoma. In the present study, there was 1 false positive case and 2 false negative cases on FNAC giving sensitivity of 88.23%, specificity of 97.14%.

Exact subtyping of spindle cell tumors was a limiting factor in present study as well as other studies. A study on 70 spindle cell tumors by Vijayabharathi et al. revealed a 4% false positive rate [6].

Study by Beg S et al yielded 1 false positive and 1 false negative case. The change in cytological diagnosis on biopsy included 1 case of malignant fibrous histiocytoma (MFH) to benign fibrous histiocytoma (BFH). One case diagnosed as benign spindle cell tumor turned out to be synovial sarcoma thus giving 98% sensitivity and 96.7% specificity [3]. Soni PB et al, achieved 70% sensitivity and 100% specificity while dealing with these lesions [4].

Dey et al found 2 false positive cases, one case each of fibromatosis and schwannoma were reported as sarcoma. 3 False-negative cases were fibrosarcoma (1), malignant nerve sheath tumour (2) and haemangi-opericytoma (1) [5].

This was in contrast to the study by Rekhi et al. Who identified low false positivity with a sensitivity of 100% and specificity of 87% [7], Whereas Wakely et al noticed 1 false negative case out of 72 cases [10].

Conclusion

The sensitivity, specificity and diagnostic accuracy of fine needle aspiration cytology in distinguishing benign from malignant soft tissue spindle cell tumors was good and at par with other similar studies. Thus, we conclude that FNAC has a definite role in forming the initial diagnosis of soft tissue spindle cell tumors.

What this study adds to existing knowledge?

This study revealed that FNAC has a definite role in forming the initial diagnosis of soft tissue spindle cell tumors, while histopathology with the aid of ancillary techniques provides the final diagnosis leading to effective management.

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Dr. Dhanya K.: Diagnosis collection of data and editing.

Dr. Sateesh Chavan S: Contributed in manuscript writing, editing and final review.

Findings: Nil; **Conflict of Interest:** None initiated

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