Section: Pathology

Original Research Article

SPECTRUM OF SOFT TISSUE LESIONS IN UPPER AND LOWER EXTREMITIES ON FINE NEEDLE ASPIRATION CYTOLOGY (FNAC) AT TERTIARY CARE CENTRE

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Abstract

Background: Benign, malignant, and non-neoplastic lesions are all included in the broad spectrum of soft tissue lesions. FNAC serves as a preliminary diagnostic test that predicts whether a soft tissue tumor is benign or malignant, facilitating further intervention. This study discusses the spectrum of FNAC of soft tissue lesions in upper and lower limbs. **Materials and Methods:** It was a retrospective study was done in the cytology section of Department of Pathology at tertiary care hospital. Institutional ethical committee sanction was obtained. The study included the cytology smears of soft tissue lesions of both upper and lower limbs received in cytology section over a period of one year. Informed consent were taken before performing each FNAC. **Result:** Total 210 patients visited cytology section for FNAC of soft tissue swellings of extremities over the study period, of these, 130 cases of lipoma and keratinous cysts were excluded. Thus total 80 cases were included in this retrospective analysis with male to female ratio being 1:1. As per gender in males lower limbs are most commonly involved for neoplastic lesions and in females upper limbs are involved and it was found to be statistically significant ($p<0.05$). In the upper limbs, 35.9 % lesions were present in hands compared to rest of upper limb lesions while in lower limbs, 52.5% lesions were present in feet compared to lower limb lesions. Neoplastic lesions were more common in hands (N=14) compared to feet. The commonest diagnosis in hand and feet was GCT of tendon sheath (9 and 5 respectively). **Conclusion:** To assist patients in receiving additional care, FNAC of soft tissue lesions can be helpful in distinguishing between different lesions and neoplasms in the extremities.

INTRODUCTION

Soft tissues comprise the extra skeletal structures that are not epithelial, serving as the supporting tissue for different organs. Soft tissue lesions exhibit a wide range of heterogeneities, comprises benign, malignant, and non-neoplastic lesions.[1] Approximately ten times as prevalent are benign soft tissue tumors compared to cancerous ones. Lipoma is one type of benign tumor is the most typical tumor of soft tissues.[2] Aspiration with a fine needle FNAC (cytology) is a quick, painless, safe, and easy procedure and economical diagnostic instrument in the first classification of cancers. In terms of diagnosis, it is reasonably sensitive and specific of cancers that are primary, recurring, or metastatic.[3]

FNAC offer several advantages as it can provide a predictive diagnosis of a benign or malignant soft tissue neoplasm and thus helps in further intervention management. The relevance of FNAC in the diagnosis of soft tissues tumors (STT) is still up for debate, yet it is utilized as a first line examination for malignancies of the breast, thyroid, and lymph nodes.[4,5] The primary tool in STT for identifying questionable metastases or recurrences is FNAC. FNA cytopathology of soft tissue is still debatable worldwide for a number of reasons. The range of soft tissue lesions, particularly in the upper and lower limbs, will be covered in this study using fine needle aspiration cytology (FNAC). Over the course of a year, a tertiary health care centre, reactive non-neoplastic and neoplastic lesions will be included.

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Depending on the availability, we also attempted to correlate with the histology data. Therefore, we made an effort to evaluate the applicability of FNAC in soft tissue diseases of extremities.

MATERIALS AND METHODS

It was a retrospective study was done in the cytology section of Department of Pathology at tertiary care hospital. Institutional ethical committee sanction was obtained. The study included the cytology smears of soft tissue lesions of both upper and lower limbs received in cytology section over a period of one year. Informed consent were taken before performing each FNAC.

Methodology

Excluded were cases of lipoma and epidermal cysts, which accounted for the bulk. Both non-neoplastic and neoplastic soft tissue lesions from the upper and lower limbs were seen. Neoplastic tumors were additionally divided into three categories: malignant, benign, and possibly neoplastic. Lesions classified as inflammatory and infectious were not cancerous. A 10 mL disposable plastic syringe fitted with a 23/24G needle was used for FNAC, and the substance was split into two equal portions. Giemsa stain was used on the air-dried smears, while Papanicolaou stain was applied to the 95% ethanol-fixed smears. The cytology smears were examined and classified as non-neoplastic, benign, malignant, and unclassifiable, in addition to the lesion's specific subtyping. The diagnostic FNAC results from patients who underwent a subsequent surgical excision were compared for diagnostic concordance using histological parameter.

The study protocol was reviewed and approved by the Institutional Review Board (IRB) of the participating institution. Patient confidentiality was maintained, and all data were anonymized.

Statistical Analysis

Statistical analyses were performed using SPSS software version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables were expressed as frequencies and percentages. Chi-square test or Fisher's exact test for categorical variables and Student's t-test for continuous variables were used to compare patients who required conversion to those who did not. P-values <0.05 were considered statistically significant.

RESULTS

As per [Table 1] Total 210 patients visited cytology section for FNAC of soft tissue swellings of extremities over the study period, of these, 130 cases of lipoma and keratinous cysts were excluded. Thus total 80 cases were included in this retrospective analysis with male to female ratio being 1:1. The age of patients vary from minimum of 8 years to the maximum of 80 years. The most common age range belonged to 31-40 years with the mean age being 43 years. The cases were classified broadly as neoplastic (59%) and non-neoplastic lesions (41%). The neoplastic lesions were further categorized as benign (65.2%), malignant (28.3%), suspicious for neoplasm (6.5%). The benign tumours were the most common in 11 to 20 years of age group (6 out of 6 tumours) while malignant tumours were the most common in 61 to 70 years of age group. Also, the non-neoplastic lesions were the most common in 51 to 60 years of age group.

As per [Table 2] upper limb is most commonly involved extremity (60%) while lower limbs are 40% involved. As per gender in males lower limbs are most commonly involved for neoplastic lesions and in females upper limbs are involved and it was found to be statistically significant ($p<0.05$).

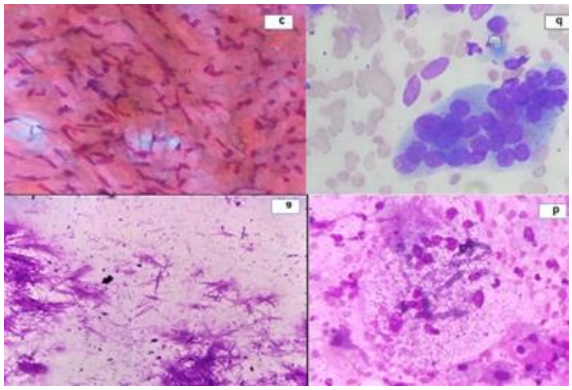

Figure 1 (a,b,c,d): Soft tissue tumor involving finger with cytological features of myxofibrosarcoma [Papanicolaou stain 400x]; c & d: Soft tissue tumor involving fingers with cytological features of low grade sarcoma. [Papanicolaou stain 400x].

As per [Table 3] we studied separate lesions for hand and feet with separately classifying them as neoplastic and non-neoplastic lesions. In the upper limbs, 35.9 % lesions were present in hands compared to rest of upper limb lesions while in lower limbs, 52.5% lesions were present in feet compared to lower limb lesions. Neoplastic lesions were more common in hands (N=14) compared to feet. The commonest diagnosis in hand and feet was GCT of tendon sheath (9 and 5 respectively). There were 2 cases of low grade sarcoma in hands while only one case of low grade sarcoma was observed in foot.

As per [Table 4] out of 80 cases of lesions 48.3% lesions were available for histopathological lesions with 80% of concordant rate, followed by discordant rate of 14% and around 2% were inadequate.

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Table 1: Age and Gender wise distribution.

Age range	Sex		Neoplasm(N=56)			Non-neoplastic lesions (N=24)	Total
	Male	Female	Benign	Malignant	Suspicious for malignancy		
1-10	0	1	0	0	0	1	1
11-20	5	3	6	0	0	2	8
21-30	7	3	6	1	0	3	10
31-40	9	15	10	1	5	6	22
41-50	6	6	3	1	1	3	8
51-60	4	5	1	7	1	4	13
61-70	7	6	3	7	0	5	15
71-80	2	1	1	2	0	0	3
Total	40 (50%)	40 (50%)	30 (42.8%)	19(18.6%)	7 (4.3%)	24(34.3%)	80

Table 2: Gender distribution based on extremities and Cytology diagnosis

Cytology diagnosis (80)		Males		Females	
		(UL) 15(37.5%)	Limb(LL) 25(62.5%)	UL 32(73.3%)	Limb(LL) 8(26.7%)
Neoplastic lesions (56)	Benign (30)	6	10	12	2
	Suspicious for malignancy (7)	1	0	5	1
	Malignancy (19)	6	5	4	4
Non- Neoplastic lesions (24)	Infections (08)	2	3	3	0
	Inflammatory(12)	2	6	3	1
	Regenerative/Reactive(4)	1	1	1	1

Chi square= 4.56, p-value-0.03*

Table 3: Cytology diagnosis of lesions in hand and feet

FNAC diagnosis		Hand	Feet	Total
Neoplastic lesions	GCT of tendon sheath	9	5	14
	Benign spindle cell tumor	3	1	4
	Benign adnexal tumor	0	1	1
	Low to intermediate grade sarcoma	1	0	1
	Low grade sarcoma, myxofibrosarcoma favored	1	1	2
Non–neoplastic lesions	Ganglion cyst	1	1	2
	Fungal abscess	1	2	3
	Osteoid forming lesion	1	0	1
	Bursal cyst	0	3	3
	Gouty tophus	0	1	1
	Degenerative/reactive lesion	0	1	1
Total		17	16	33

Table 4: Histopathological changes soft tissue swellings of extremities

	Total cases	HP available	Concordant	Discordant	Inadequate
Benign tumors	30	24 (70%)	22	2	0
Suspicious for malignancy	07	2	1	1	-
Malignant tumor	19	7 (38.5%)	3	4	0
Infections	8	3 (37.5%)	1	1	1
Inflammatory lesions	12	2 (16.7%)	2	0	0
Reactive lesions	4	1 (25%)	0	0	1
Total	80	39 (48.3%)	29 (80%)	8 (14%)	2 (6%)

DISCUSSION

Because it is more affordable and produces higher yields than open biopsy, FNAC offers a number of benefits. Additionally, its turnaround time facilitates quick diagnosis. As a diagnostic workup, it can also be utilized as a substitute for excision biopsy of soft tissue malignancies. Additionally, using numerous FNAC runs in different directions of the swelling aids in covering nearly all representative tumor locations and aids in identification.[6] However, there is still debate concerning the relevance of FNAC in the initial diagnosis of soft tissue malignancies. Soft tissue tumors can cause diagnostic difficulty and distress due to their heterogeneous cellular composition. Therefore, it requires more education and strong experience.

Although the diagnosis of cytopathology might be difficult, FNAC is a highly helpful tool for separating benign from malignant soft tissue tumors. Even so, precise classification might not be achievable. Even so, FNAC atleast aids in distinguishing initial malignant soft tissue tumors from benign lesions as well as other cancers such as dermal appendageal tumors, carcinoma, metastasis, and lymphomas.[7]

According to Bharadwaj3, benign STT were more common after the third decade of life, but in the current study, they were more common between the fourth and fifth decades. The current study and A singh et al.'s observation that the most common age group for STT is 21–30 years old are connected. 5 Kilpatrick et al,[8] found that for benign and malignant STT, the most common age groups were

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21–30 years and 40–50 years, respectively. In the current study, benign and malignant soft tissue sarcoma most commonly affected individuals aged 21–40 and 60–80, respectively.

The most frequent benign tumor in the current investigation was a giant cell tumor of the tendon sheath. It is the second most frequent lesion of the hand and wrist in particular, and one of the most common benign tumors after lipoma as determined by cytology.[9] This result was consistent with the other research as of right now, as lipoma has been ruled out.[10]

In this study, benign spindle cell tumors accounted for 18% of the total. According to Mitra S et al,[11] 8.57% of the lesions were benign soft tissue lesions. Neurofibromas are among the benign nerve sheath tumors that are frequently aspirated to diagnose. In most cases, aspiration from neurofibromas hurts. Both schwannomas and neurofibromas frequently have spindle cells with moderate cellularity in a fibrillary background, according to smears.

FNAC frequently aids in benign versus malignant differentiation instead of a specific histology diagnosis. Its fundamental principles include necrosis, mitosis, nuclear pleomorphism, and cellularity. To differentiate a benign spindle cell neoplasm from a low-grade sarcoma, careful examination is required.[12]

Malignant soft tissue tumor aspirates exhibit high cellularity spindle cell fragments, nuclear pleomorphism, hyperchromatic nuclei or anisonucleosis, mitotic figures, and perhaps necrosis. Any one of the aforementioned characteristics ought to result in an unresolved report, necessitating a histological study for a clear diagnosis.[13,14]

CONCLUSION

In conclusion, the spectrum of soft tissue lesions in the upper and lower extremities identified through fine needle aspiration cytology (FNAC) is diverse, ranging from benign to malignant conditions. FNAC proves to be a valuable diagnostic tool due to its minimally invasive nature, rapid turnaround time, and ability to provide crucial information for the clinical management of patients. The findings highlight the importance of FNAC in distinguishing between various types of lesions, aiding in early and accurate diagnosis, which is essential for appropriate therapeutic decisions. However, while FNAC is highly effective, certain limitations, such as sampling errors and the need for further histopathological correlation in ambiguous cases, should be acknowledged.

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