

Role of FNAC in Diagnosis of Superficial Soft Tissue Lesions and Analysis of Morphological Variants: A Retrospective Study

Dr. Nirali Shah¹, Dhvani Shah²

Abstract: *Fine needle aspiration cytology (FNAC) provides a rapid, minimally invasive, and economical approach to the initial assessment of soft tissue lesions. This retrospective study evaluated the practical utility of FNAC in 69 patients with superficial soft tissue lesions examined at a tertiary care centre in Vadodara, Gujarat. The lesions were classified on cytological examination as neoplastic or non-neoplastic and, where applicable, as benign or malignant. Of the 69 cases, 46 were neoplastic and 23 were non-neoplastic. Benign neoplastic lesions accounted for 59.4% of all cases, while malignant lesions represented 7.2%. Lipoma was the most common lesion, comprising 42% of cases, followed by benign cutaneous or keratinous cysts at 23.1%. Most patients were aged 31 to 40 years, with a slight male predominance. The neck was the most frequently affected site, followed by the upper limb. FNAC proved useful for distinguishing inflammatory and non-neoplastic lesions from neoplastic lesions and for the initial separation of benign and malignant tumours. Its diagnostic value, however, was limited by the small number of cases available for histopathological confirmation and the absence of routine ancillary testing. FNAC can therefore serve as a useful first-line and triage procedure for superficial soft tissue lesions, while histopathology and ancillary techniques remain necessary for definitive diagnosis, grading, and accurate subtyping of malignant tumours.*

Keywords: Fine needle aspiration cytology, Soft tissue lesions, Lipoma, Benign tumours, Malignant tumours

1. Introduction

Soft tissues are the non epithelial, extra skeletal structures and thus form the supportive tissue of various organs. They include adipose tissue, fibrous connective tissue, skeletal muscle, blood vessels, and the peripheral nervous system. Somatic soft tissue made up 50% of adult body weight and 25% of weight in children.^[1]

Though this large bulk theoretically runs the same risk of developing cancers, it is a curious biological paradox that this large body mass is blessed with very low incidence of cancer. Soft tissue lesions have a large heterogeneous spectrum which includes non- neoplastic, benign and malignant lesions. The benign soft tissue tumours are about ten times more common than that of malignant ones.^[2] In general, benign soft-tissue tumours outnumber their malignant counterparts by ratio of about 100:1 in hospital population with annual incidence of 300/100,000 population.^[3,4] Among benign tumours, lipoma is the commonest soft tissue tumor^[5]. Fine needle aspiration cytology (FNAC) is a rapid diagnostic technique with limited patient morbidity. It may be preferred for the superficial soft tissue lesions. This, combined with its relatively low cost, makes it important alternative compare to traditional biopsy technique in the rapid work up of palpable soft tissue tumour^[6]. FNAC offers several advantages as it can provide a predictive diagnosis of a benign or malignant soft tissue neoplasm and thus helps in further intervention management, especially in lipomatous, spindle cell, and vascular lesions^[7]. FNAC has certain limitations. Its interpretation depends on the adequacy of aspirated material, tumour heterogeneity, and the cytopathologist's expertise^[8]. Subtyping of sarcomas is particularly challenging, as overlapping cytological features between spindle cell sarcomas, fibrous lesions, and reactive proliferations can lead to misdiagnosis^[9]. Furthermore, low-grade sarcomas may yield paucicellular smears, contributing to false negatives^[10]. As FNAC is being increasingly used for cutaneous and subcutaneous lesions, we attempted to assess the utility of FNAC for practical purpose in soft tissue lesions,

in this study. Though there seems nothing new in this study, the purpose of doing this study is to highlight the least touched topic of soft tissue lesions for cytology study from both the clinician as well as pathologist in compare to other lesions like FNAC of Breast, Thyroid and Lymphnodes.

2. Material and Method

The present study was a retrospective study conducted in the department of Pathology, Medical College, Baroda, S.S.G.H. Vadodara, Gujarat between period from August 2024 to July 2025. A detailed clinical history of all 69 patients were taken including examination findings, radiological investigations. A total of 69 patients were included in the study.

Inclusion Criteria

- All the cases of superficial soft tissue lesions present at cytology section
- All suspected soft tissue lesion on radiological findings.

Exclusion Criteria

- Inadequate smears with 'no' or scanty cells.
- Haemorrhagic aspirate and smears with other obscuring factors

3. Procedure and Technique

Before taking FNAC, written consent was taken from the patient and procedure was explained to patients. FNAC was done under aseptic precautions with 22/23G needle attached to 10 ml disposable plastic syringe and smears fix with 95% methanol were stained with MGG stain and Papanicolaou stain if required. A detail clinical history, blood investigations and radiological investigations was taken. For deep seated lesions USG guided or CT guided FNAC was done. The smears were studied for cytological detail for diagnosis and were categorized as benign, suspicious of malignancy and malignant along with specific subtyping of lesion. The smears were also assessed for the principal pattern shown by tumor

Volume 15 Issue 8, August 2026

Fully Refereed | Open Access | Double Blind Peer Reviewed Journal

www.ijsr.net

cells. In histopathology section the excised tissue specimen received after surgical excision of 5 cases from the above mentioned cases were fixed by neutral buffered 10% formalin. Gross examination was done of received tissue specimen. All the tissue sections were processed by fixation, dehydration and clearing followed by impregnation in wax. The wax blocks will be cut in 3-4 micron sections and was stained with hematoxylin and eosin stain and examined under microscope.

4. Result

A total number of 69 cases of soft tissue tumours were studied during a period of one year, i.e. August 2023 to July 2024 from which only one case was available for histopathological examination. Out of total 69 cases only 5 were reported as malignant tumour (7.24%) and out of 5 only one came for histopathology which turned to be Spindle cell variant of Rhabdomyosarcoma. Other 64 were Benign lesions (92.75%) out of them 41 were Neoplastic (59.4%) and 23 were Non-neoplastic (33.33%). Out of 23 Non-neoplastic, 7 were Inflammatory and 16 were simple cystic lesions. I have included Tuberculosis which was clinically presented as soft tissue lesion and after FNAC it turned to be Tuberculous Lymphadenitis, in 3 cases. Other 4 of total 7 inflammatory conditions, there were Ganglion and granulomatous inflammation. Benign Neoplastic lesions included majority of Lipoma – 29 out of total 69 (42.0%). Other benign neoplastic lesions included Schwannoma, Paraganglioma, Giant cell tumour of Tendon Sheath, Hematoma, benign Fibrohistiocytic Tumour, and Benign spindle cell tumour which could not be classified on the basis of cytology alone. These lesions were most commonly seen between 31 to 40 years, the youngest was 3 years old male patient, who was diagnosed as having malignant spindle cell tumour. The eldest one also was having a rare site (arm swelling) at the age of 77, which was diagnosed as primary adnexal malignancy. Unfortunately of them did not turn for histopathology. Male outraged female by 1.1: 1 (37/69 Male patients, 32/69 Female patients)

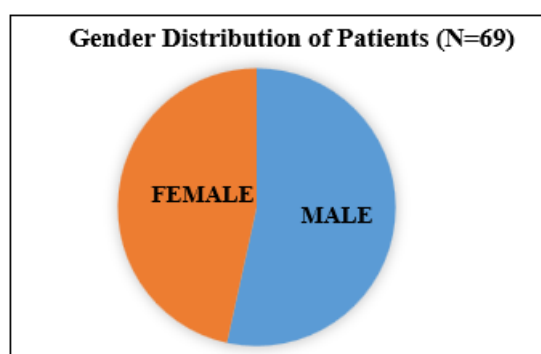


Chart 1

Table 1: Age Wise Distribution

Age in Years	No. of Patients (n=69)
1-10	03 (4.1%)
11-20	05 (7.2%)
21-30	07 (10.1%)
31-40	18 (26%)
41-50	15 (21.7%)
51-60	11 (15.9%)
61-70	07 (10.1%)
>70	03 (4.1%)

Table 2: Distribution of Soft Tissue Lesions by Site (n=69)

Group 1 (Above Diaphragm)	Group 2 (Below Diaphragm)
Scalp -----09	Abdomen -----01
Neck -----22	Lower back-----03
Face -----06	Lower Limb-----07
Chest ----02	
Upper back----06	
Upper limb----13	
Total -----58	Total -----11

Table 3: Classification of Lesions Taken for Study according to Morphology (n=69)

Category	No. of Patients	Category	No. of Patients
Neoplastic	46	Benign	41 (59.4%)
		Malignant	05 (7.2%)
Non-Neoplastic	23	Inflammatory	07 (10.1%)
		Non- Inflammatory	16 (23.1%)

Table 4: Lesions taken for Study (n=69)

Name of Lesion	No. of Cases
Lipoma	29 (42%)
Benign keratinous cyst/ Benign cutaneous cyst	16 (23.1%)
Benign Fibrohistiocytic tumor	01 (1.4%)
Benign spindle cell tumor	05 (7.2%)
Ganglion	03 (4.1%)
Giant cell tumour of tendon sheath	02 (2.9%)
Paraganglioma	01 (1.4%)
Hematoma	02 (2.9%)
Schwannoma	01 (1.4%)
Granulomatous inflammation	01 (1.4%)
Tuberculosis	03 (4.1%)
Rhabdomyosarcoma	01 (1.4%)
Primary adnexal malignant tumour	01 (1.4%)
Malignant spindle cell tumour	03 (4.1%)

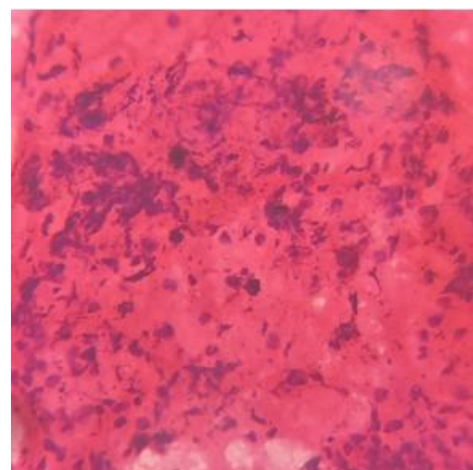


Figure 1: Malignant Spindle Cell Tumor

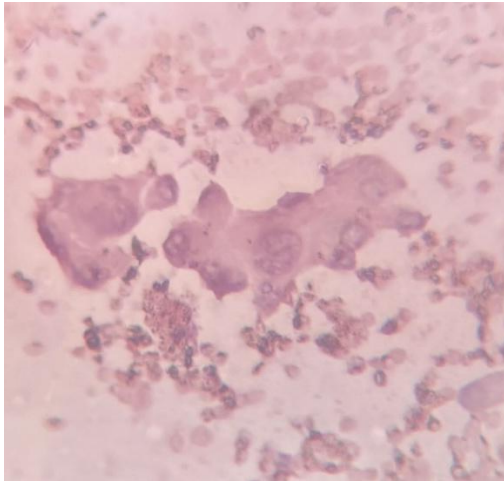


Figure 2: Adnexal Tumor

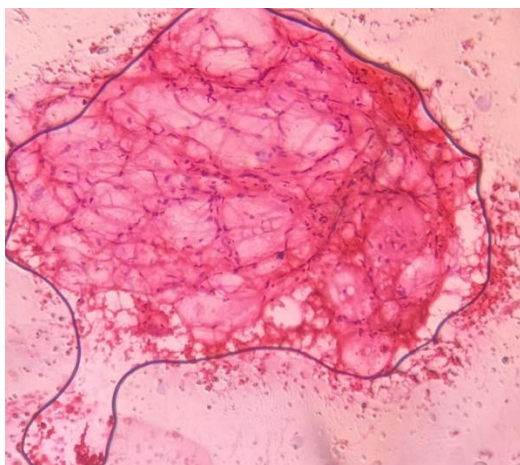


Figure 3: Lipoma

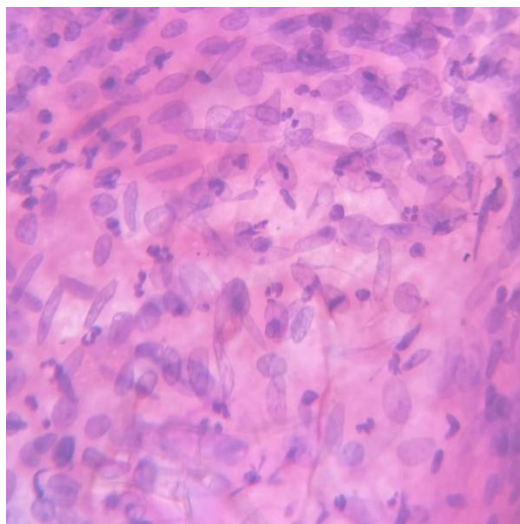


Figure 4: Granulomatous Inflammation

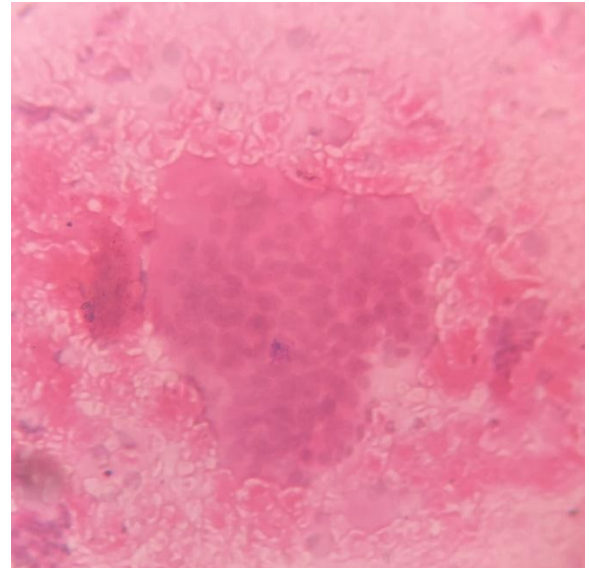


Figure 5: Giant Cell Tumor of Tendon Sheath

5. Discussion

The usefulness of FNAC in the diagnosis of soft tissue tumors has been a matter of controversy and this very fact became the aim of this study so as to assess the importance of fine needle aspiration cytology as an initial diagnostic tool for the diagnosis of superficial soft tissue lesions.

Strength of FNAC

FNAC has many advantages over conventional open incisional biopsy including little or no risk of tumour cell contamination of the biopsy track, cost effective, rapid, minimally invasive making it ideal as OPD procedure. This is especially relevant in resource limited places where unnecessary surgical procedures can be avoided. Moreover, it is particularly useful in categorizing the lesion as inflammatory and neoplastic whether benign or malignant.

In present study, total 69 cases of superficial soft tissue lesions underwent FNAC over a period of one year (August 2023 to July 2024). Out of these maximum number of cases were in the age group between 31-40 years followed by 21-30 years while in a study by Sharma et al, maximum number were between 20-30 followed by 30-40 years^[11]. Rekhi et al observed the commonest age group between 21-30 years^[12]. There is male predominance in our study with male: female ratio is 1.1: 1, which matches with Sharma et al study in which the ratio is 1.3: 1. In Dash et al study this ratio is 1.4: 1 with male predominance like my study^[13]

The benign tumours are more common than malignant tumours^[14] and this correlated with present study. (Benign 59.4% and malignant 7.2%) Lipoma were the commonest (42%) among the benign tumours. It coincides with the study done by Kumar et al which showed 74. 51% of Benign tumours out of which 33.33 % was Lipoma^[15]. In a study by Sharma et al Lipoma was the commonest – 38.14%^[11]. Dey et al observed similar result with 40% of Lipoma among all soft tissue tumours^[16]. A study done by Deepali et al Lipoma was the commonest benign tumour. (40%)^[20] and same was found in a study by Madhuri Dindalkoppa, et al (54%)

TABLE 5

Study	Kumar et al	Sharma et al	Dey et al	Deepali et al	Madhuri et al	Present study
LIPOMA (IN %)	33.33%	38.14%	40%	40%	54%	42%

Other benign neoplastic lesions included Giant cell tumour of tendon sheath 2.9% in present study while study by Siddiqie et al showed 7% of GCT of tendon sheath ^[17] and study by Sharma et al had 0.43% of GCT of tendon sheath ^[11]

Among the non –neoplastic group, Benign cutaneous cyst/ Benign keratinous cyst were maximum in number (16/69-23.1%). This finding is very close to 24% of Epidermal cyst in a study by Sharma et al ^[11]. We found out other non –neoplastic lesions form which 3 (4.1%) cases of Tuberculosis were there. Similar findings were seen in as study of Sharma et al ^[11] which has 3.1% cases of tuberculosis. Present study shows 3 cases (4.1%) of Ganglion which matches with 2 cases/106 total cases (1.9%) in a study by Siddiqie Hassan Adil et al ^[17]

In present study, the commonest site of occurrence was Neck region (22/69 cases- 31.9%) followed by upper limb (13/69-18.9%) while the study by Vaishali Gaikwad et al showed Foot as commonest site (25%) followed by hand (14%) ^[18]. In a study by Siddiqie et al the commonest site was Thorax (31%) followed by extremities (28%) ^[17]. In study by Kumar et al majority of cases were found in extremities followed by trunk ^[15].

Significance: FNAC is a reliable, simple cost effective method in variety of reactive inflammatory to neoplastic conditions related to regional to systemic diseases.

6. Limitations of the Study

Our study had a few limitations. First, patients came for FNAC and diagnosed as having malignant lesions did not turn out for histopathology examination as patient compliance is very poor. So, we were not able to typifying the tumour and also the sensitivity and specificity of the FNAC as a technique. Second, the sample size though adequate was relatively modest compared to larger multi centric studies ^[6,12]. Moreover, ancillary techniques such as Immunocytochemistry and molecular studies were not routinely applied which could have improved subtyping accuracy even though patient did not turn for histopathology. Finally, the study was conducted at a single tertiary centre, which may limit generalizability.

7. Conclusion

We conclude from our observation that FNAC is highly reliable as an initial diagnostic tool for the diagnostic workup of superficial soft tissue lesions

FNAC can serve as a triaging tool – helping in differentiating between neoplastic and non-neoplastic lesions as well as in case of neoplastic lesions, helping clinicians decide between conservative management for benign lesions and aggressive management for malignant ones. It can also aid in planning the extent of surgery and selecting patients for further ancillary testing. FNAC is a simple, rapid and reliable method

especially in a country like India where facility for frozen section are available only at few centres. However, histopathology remains essential for definitive diagnosis, grading and subtyping, ancillary techniques like immunocytochemistry, FISH and DNA cytometry are recommended to increase the specificity of malignant lesions.

References

- [1] Padmanabhan A, Saraf SR, Singh V, Patel NA. Utility of fine needle aspiration cytology in the diagnosis of soft tissue tumours. *Ind J Pathol Oncol*. 2018; 5: 277-82.
- [2] Soni PB, Verma AK, Chandoke RK, Nigam JS. A prospective study of soft tissue tumorshistocytology correlation. *Pathol Res Int*. 2014; p. 678628. doi:10.1155/2014/678628.
- [3] González-Cámpora R, Muñoz-Arias G, Otal-Salaverri C, Jorda-Heras M, García-Alvarez E, Gomez-Pascual A, et al. Fine needle aspiration cytology of primary soft tissue tumors. Morphologic analysis of the most frequent types. *Acta Cytol* 1992; 36: 905-17.
- [4] Bennert KW, Abdul-Karim FW. Fine needle aspiration cytology vs. needle core biopsy of soft tissue tumors. A comparison. *Acta Cytol* 1994; 38: 381-4.
- [5] Tailor HJ, Bhagat VM, Kaptan K, Italiya SL, Balar HR, Agarwal MP, et al. Diagnostic accuracy of fine needle aspiration cytology in soft tissue tumors: our institutional experience. *Int J Res Med Sci*. 2013;1(4):443–7.
- [6] Chatura KR, Katyal A, Hiremath SS. Fine needle aspiration cytology in soft tissue tumour: how far we go? *J Adv Clin Res Insight*. 2015; 2:1-5.
- [7] Domanski HA. Fine-needle aspiration cytology of soft tissue lesions: diagnostic challenges. *Diagn Cytopathol*. 2007;35(12):768–73.
- [8] Wakely PE Jr. Fine-needle aspiration cytopathology of soft tissue sarcomas. *Pathology*. 2014;46(6):455–69.
- [9] Layfield LJ, Liu K, Dodge RK, Harrelson JM. Fine-needle aspiration cytology of primary soft-tissue lesions. *Cancer*. 1995;76(4):664–73.
- [10] Nagira K, Yamamoto T, Akisue T, Marui T, Hitora T, Nakatani T, et al. Reliability of fine-needle aspiration biopsy in the initial diagnosis of soft-tissue lesions. *Diagn Cytopathol*. 2002;27(6):354–61.
- [11] Cytological diagnosis of soft-tissue lesions: A study of variation in site of occurrence Santosh Kumar Sharma¹, Praveen Prakash¹, Rupinder Kalra¹, Roshina Naeem¹, Aarzoo Jahan¹, Namrata Sarin¹, Sompal Singh¹ *Indian Journal of Medical Sciences • Volume 73 • Issue 3 • September-December 2021*
- [12] Rekhi B, Gorad BD, Kakade AC, Chinoy R. Scope of FNAC in the diagnosis of soft tissue tumors-a study from a tertiary cancer referral center in India. *Cyto J*. 2007; 4: 20. doi:10.1186/1742-6413-4-20.
- [13] Dash AK, Mohanty S, Tripathy M, Silal S. Role of FNAC in the diagnosis of skin and subcutaneous lesions. *Int J Med Res Prof* 2019; 5: 272-9.
- [14] Rosenberg AE. “Bones, joints, and soft-tissue tumorseditors,” in Robbin’s and Cotran Pathologic Basis of Disease. In: Kumar V, Abbas A, Fausto N, Aster J, editors. 8th Edn. Saunders, Philadelphia, Pa, USA; 2010. p. 235–49.

- [15] Diagnostic efficacy of fine needle aspiration cytology in soft tissue tumors and cytohistological correlation Hemant Kumar*, Abha Patni, Laxmi Kumari, Harish Chandra Katara International Journal of Research in Medical Sciences | August 2023 | Vol 11 | Issue 8
- [16] Dey P, Mallik MK, Gupta SK, Vasishta RK. Role of fine needle aspiration cytology in the diagnosis of soft tissue tumours and tumour-like lesions. *Cytopathology* 2004; 15: 32-7.
- [17] Role of Fine Needle Aspiration Cytology in the Initial Diagnosis of Superficial Soft Tissue Lesions Siddique Hassan Adil1, Banday Musharaf Bilal2, Sharma Poonam3, Suri Vijay International Journal of Contemporary Medical Research ISSN (Online): 2393-915X; (Print): 2454-7379 | ICRV: 77.83 |
- [18] Spectrum of soft tissue lesions in upper and lower extremities on fine needle aspiration cytology: A three years' experience from Western Indian population Vaishali P Gaikwad1, Sneha Sisodiya1,*, Leena Naik
- [19] Khalbuss WE, Teot LA. Diagnostic accuracy and limitations of fine-needle aspiration cytology of soft tissue and bone lesions. *Cancer Cytopathol.* 2010;118(1):24–32.
- [20] Deepali et al. Role of FNAC in Diagnosing Soft Tissue Tumors and Tumor-Like Lesions International Journal of Current Pharmaceutical Review and Research 2025; 17(11); 101-105
- [21] Usefulness of fine needle aspiration cytology in diagnosis of soft tissue tumors and its correlation with histopathological features Madhuri Dindalkoppa, et al *CytoJournal* • 2026 • 23(1)