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Original Research Article

Cytological spectrum of subcutaneous nodules, a 3 year study

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ABSTRACT

Background: A wide range of inflammatory as well as neoplastic lesions can present as nodular, soft, mobile subcutaneous swellings all over the body. FNAC(fine needle aspiration cytology) is considered to be the first reliable technique for diagnosing them.
Aim: To study the cytomorphological patterns of subcutaneous nodular lesions and correlate with histopathology.
Materials and Methods: A three year prosective study of all palpable subcutaneous swellings presenting to cytology section with histopathological correlation.
Statistical Analysis: The data are expressed in descriptive statistics measures such as percentages and proportions. A continuous data was presented as mean and standard deviation (SD).
Results: Out of 1427 total cases, most common were benign lesions (97.4%) including lipomas (35.24%) followed by benign spindle cell lesions (17.02%). Malignant cases comprised only 2.7%. Many rare lesions like gouty tophi, calcinosis cutis, filariasis, myositis ossificans were also encountered. Biopsy correlation could be done in 12% of cases.
Conclusion: Small subcutaneous swellings though appear benign in most of the cases, can be due to an interesting and grave aetiology which must be kept in mind of clinicians as well as cytopathologists.

1. Introduction

Patients with nodular swellings below skin surface is a very common presentation in cytology outdoors. The underlying causes may vary from inflammatory to infectious to neoplastic in nature. Clinical presentation also differ widely from painless to tender, slow growing to rapidly enlarging mass, small sized lesion to quite large in dimension, consistency differing from solid to cystic to hard, number may be single or more. Though proper history taking, assessment of clinical symptoms and signs and local clinical examination followed by FNAC helps in correctly predicting and diagnosing most of the cases, some cases need histological confirmation as well as radiological correlation due to the complexity of the lesion itself.[1] The aim of this study was to assess the range of such lesions, to study their diverse cytomorphological patterns and correlate with histology.

2. Materials and Methods

This was a prospective 3 year study of all nodular subcutaneous lesions referred by treating clinicians to the cytopathology section of our institute from January 2017 to December 2019. In each case, a detailed history like patient's age, gender, onset and progression of clinical symptoms and clinical examination findings including location, size, shape, consistency and number of swelling were noted with duly signed consent form. Aspirations were done using mostly 22-gauge needle and a 10-mL plastic syringe with a detachable syringe holder (Franzen Handle). In each case, minimum two to three passes were made and both dry and alcohol-fixed smears were prepared as routinely practised in our centre. So for each case one leishman stained slide, one hematoxylin and eosin stained

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(H&E) slide and one Papanicolaou stained slide was made for study. Other special stains were used wherever needed. Histological correlation was done whenever available. Inclusion criteria for our study was nodular skin swellings in any part of body of any age group advised for FNAC. Exclusion criteria were deep intramuscular swellings and flat and papular skin lesions.

2.1. Statistical analysis

The data are expressed in descriptive statistics measures such as percentages and proportions. A continuous data was presented as mean and standard deviation (SD).

3. Results

Total number of cases were 1427. Male to female ratio was 1:1.4 (Figure 1). The age range was 1 year to 88 years with a mean of 37.62 ± 15.6 years. Maximum 502 cases (35.1%) belonged to 21-40 yr age group, followed by 406 (28.4%) cases in 41-60 age group, 306 (21.4%) cases in 1-20 age group and 214 (14.9%) cases in 61-80 yr age group (Figure 2). Only 2.7% of lesions were malignant, majority were benign (97.3%) (Table 1). Among malignant lesions 64% were metastatic deposits and 36% were primary malignancies of different types (Tables 2 and 3). The age range of malignant lesions was 17 to 90 years with mean age of 43 ± 12 yrs. In 69 cases (4.83%) repeated aspiration yielded scanty material, so no definite opinion could be given. Upper extremities were the most common sites (41.6%) of benign or nonneoplastic subcutaneous nodules followed by trunk (25.2%) whereas opposite trend was noticed in malignant nodules (Table 4). Lipomas, epidermoid cysts, benign spindle cell tumors, benign cystic lesions and GCT tendon sheath lesions were located mostly in upper extremity whereas most of benign vascular lesions, benign appendageal lesions and inflammatory lesions were located in head and neck region. Fungal abscesses were mostly confined to lower extremity and malignant lesions were dominantly aspirated from trunk region. Lipomas (60.7%) were most common benign neoplastic lesions followed by epidermoid cysts. Histopathological correlation was done in 12% of cases (Table 5). Benign spindle cell tumors were neorofibromas, schawannomas, dermatofibroma protuberance, benign fibrous histiocytomas, keloids and hypertrophic scars. Benign cystic lesions included thyroglossal cysts, branchial cysts, mucous retention cysts, synovial cysts, inflammatory cysts and lymphatic cysts. Mostly hematomas, few hemangiomas and angiomyomas were the benign vascular lesions encountered in our study. Benign appendageal tumors seen in our study were trichilemmal cysts and pilomatricomas.

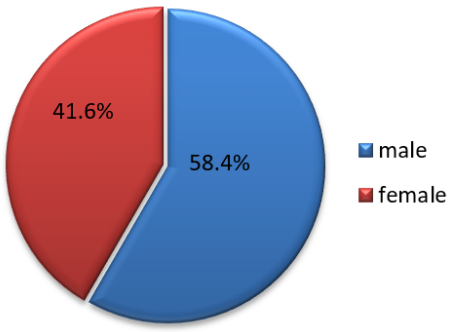

Fig. 1: Patients according to gender

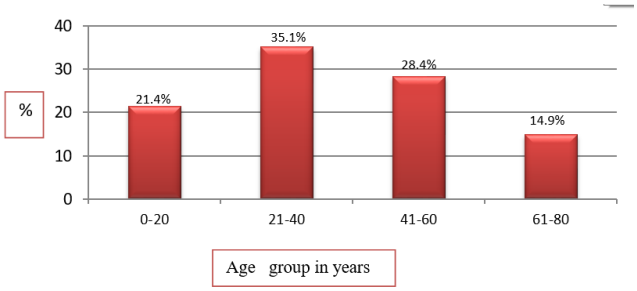

Fig. 2: Distribution of cases according to age group

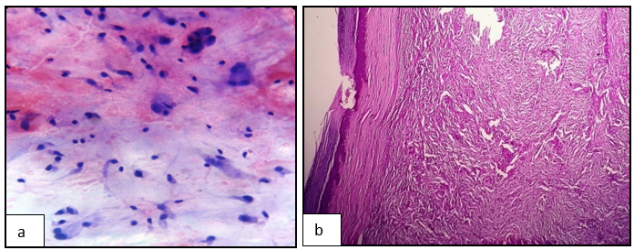

Fig. 3: a: Spindloid cells in clusters and singly in cytosmear of Benign spindle cell lesion, Leishman stain, 40x; **b:** Dermatofibrosarcoma protuberance (DFSP) in histology section, H&E stain,40x

4. Discussion

Our study showed that nodular skin lesions affect mostly the middle age groups and as the patients ranged from <5 years to > 80 years of age, these lesions can present in any age group. Similar results were observed by A Siddiqua et al.[2] The most common lesions observed in benign neoplasm category were lipomas (35.24%), that was identical with the study done by Beg et al. and Orell et al.[3,4] Benign spindle cell lesions (17.02%) were the second most common lesions encountered similar to Dash A et al. (Figure 3 a, b). 2.7% of our lesions were malignant.[5] Jain M et al. in their study have reported 3.1% of malignant skin nodules by FNAC.[6] The wide age range of malignant lesions were 17 to 90 years with mean age of 43 ± 12 yrs was similar to Bansal R et

Table 1: Distribution of nonneoplastic lesions

Types of lesions	No of cases	Percentage (%)
Epidermoid cyst	237	16.6%
Benign cystic lesion	88	6.1%
Inflammatory lesion	84	5.8%
No opinion possible	69	4.83%
Benign vascular lesion	42	2.94%
Fungal abscess	19	1.33%
Gouty tophi	5	0.35%
Calcinosis cutis	4	0.28%
Filariasis	3	0.21%
Rheumatoid nodule	1	0.07%
Myositis ossificans	1	0.07%
Scar endometriosis	1	0.07%

Table 2: Distribution of benign neoplastic lesions

Types of lesions	No of cases	Percentage
Lipoma	503	35.24%
Benign spindle cell tumor	243	17.02%
Benign appendageal tumor	71	4.97%
GCT tendon sheath	17	1.19%

Table 3: Distribution of malignant neoplastic lesions

Types of lesions	No of cases	Percentage
Adenocarcinoma	11	0.77%
Squamous cell carcinoma	9	0.54%
Pleomorphic sarcoma	2	0.14%
Synovial sarcoma	1	0.07%
Metastatic germ cell tumor	1	0.07%
Undifferentiated tumor	3	0.21%
Melanoma	2	0.14%
Granular cell tumor	1	0.07%
Plasmacytoma	1	0.07%
Desmoid tumor	1	0.07%
Basal cell carcinoma	1	0.07%
Others	6	0.42%

al.[7] Majority of these malignant nodules were present in the head & neck region (41%) followed by trunk (30.7%). This is similar to Beg et al, but in contrast with the study by Karki et al. who have observed the most common site of involvement of metastatic skin nodules to be the chest and abdomen region (Figures 4 and 5).[3,8] Adenocarcinomas from different organs were the commonest malignancies followed by squamous cell carcinomas in our study similar to Sharma et al. and Karki et al. (Figure 6).[8,9]

In the present study, the 3 cases of filariasis were clinically suspected to be inflammatory lesions initially, similar findings were noted by Prasant Goyal et al. (Figure 7).[10] Inflammatory lesions were either suppurative (bacterial or traumatic), mixed inflammatory, granulomatous (may be foreign body induced), immune mediated or fungal abscesses (19 cases). In 69 cases no opinion could be given due to scant cellularity which may be due to nature of lesion itself (including cases of keloid, hard fibrous lesions) or faulty technique. 12% (118 in number) cases had histopathological correlation in our study. They were mostly for the confirmation of spindle cell lesions, malignancies and unusual lesions. Most of the malignant lesions were confirmed by histopathology which showed high degree of concordance with cytology. The diagnostic accuracy of FNAC in our study was 89.2%. Roy et al. have reported 91.3%, Rekhi et al. 98% and Kilpatrick et al. 84% diagnostic accuracy of FNAC in malignant lesions.[11–13] Histopathological correlation of other benign cases also showed fair degree (72%) of accuracy of FNAC. Roy et al. have reported diagnostic accuracy of FNA in 90.6% benign lesions. The reasons for slightly low accuracy were many. For example 1) Fibrous tissue of long standing inflammatory lesions when aspirated in clusters were diagnosed as benign spindle cell tumors

Table 4:

Types of Lesions	UE*	LE†	Trunk	Head & Neck	Total
Lipoma	220(43.7%)	26(5.1%)	208(41.3%)	49(9.7%)	503
Epidermoid cyst	102(42.6%)	46(19.4%)	53(22.1%)	36 (15%)	237
Benign spindle cell tumors	131(55.9%)	67(27.5%)	24(9.8%)	21(8.6%)	243
Benign cystic lesion	45(51.1%)	14(15.9%)	13(14.7%)	16(18.1%)	88
Inflammatory lesion	28(33.3%)	15(17.8%)	5(5.9%)	36(42.8%)	84
Benign appendageal tumors	16(22.5%)	5(7.04%)	5(7.04%)	44(61.9%)	71
No opinion possible	21(30.4%)	9(13.04%)	24(34.7%)	15(21.7%)	69
Primary malignancy or metastatic deposits	06(15.3%)	05(12.8%)	12(30.7%)	16(41%)	39
Benign vascular lesion	6(14.2%)	2(4.7%)	11(26.1%)	23(54.7%)	42
Fungal abscess	3(15.7%)	11(57.8%)	4(21%)	1(5.2%)	19
GCT tendon sheath	12(70.5%)	5(29.4%)	0	0	17
Gouty tophi	3(60%)	2(40%)	0	0	5
Calcinosis cutis	0	1(25%)	3(75%)	0	4
Filariasis	1(33.3%)	1(33.3%)	1(33.3%)	0	3
Rheumatoid nodule	1(100%)	0	0	0	1
Myositis ossificans	0	1(100%)	0	0	1
Scar endometriosis	0	0	1(100%)	0	1
Total	601(41.6%)	236(16.3%)	364(25.2%)	243(16.8%)	1427

*UE: Upper extremity †LE: Lower extremity

Table 5: Comparison of cytopathology (FNAC) with histopathology diagnosis

No of cases	FNAC diagnosis	No of cases	Histological diagnosis
503	Lipoma	28	Lipoma, atypical lipoma,fibrolipoma
243	Benign spindle cell tumors	21	DFSP, BFH, Schwnnoma, Neuofibroma, nodular fasciitis, nonspecific, inflammatory lesion
88	Benign cystic lesion	10	Ganglion, Thyroglossal Cyst, mucocele
71	Benign appendageal tumors	18	Pilomatricoma, Trichilemmal cyst, Nodular hidradenoma, Chondroid syringoma
39	Primary or metastatic malignancy	22	Primary or metastatic malignancy
17	GCT tendon sheath	11	GCT tendon sheath
5	Gouty tophi	2	Gouty tophi
4	Calcinosis cutis	1	Tumoral calcinosis
2	Melanoma	1	Melanoma
1	Rheumatoid nodule	1	Rheumatoid nodule
1	Myositis ossificans	1	Myositis ossificans
1	Granular cell tumor	1	Granular cell tumor
1	Scar endometriosis	1	Scar endometriosis

in some cases, 2) small hemorrhagic subcutaneous nodules which on cytosmear showed small clusters of epithelial cells appearing like appendageal tumors did not correlate with histology study (Figure 8a, b), 3) Reactive fibroblasts of a healing inflammatory lesion mimicked atypical cells.

5. Advantage of the Study

Most of the benign lesions were diagnosed correctly in cytology.

6. Limitations

Biopsy correlation could be done in few cases and many cases were lost in follow- up.

7. Conclusion

Subcutaneous nodular lesions though appear mostly innocuous, can be of very unusual and significant aetiology with diversity in location and presentation. So cytopathologists should be careful while interpreting them. FNAC is an easy, quick and cheaper method for their

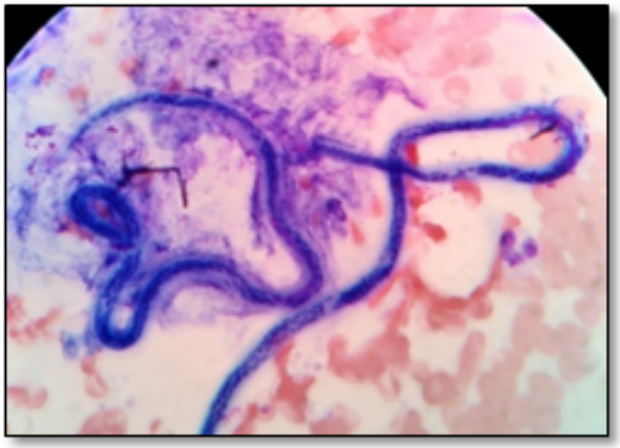

Fig. 7: Microfilarias in cytosmear, Leishman stain, 40x

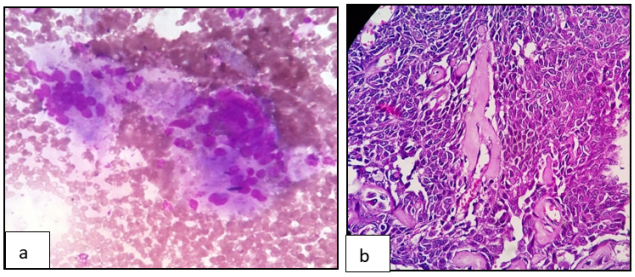

Fig. 8: a: Benign appendageal tumor in cytosmear, Leishman stain, 40x; **b:** Nodulrar hydradenoma in histology section, H&E stain, 40x

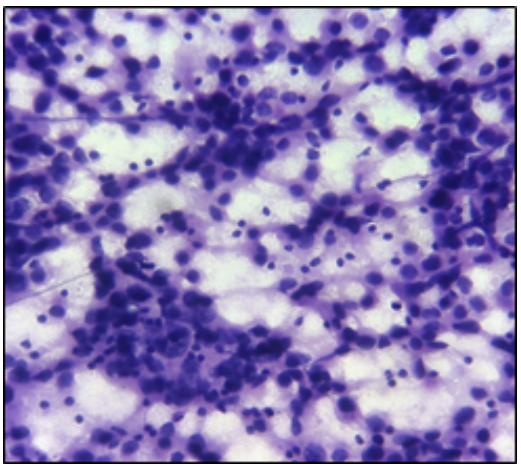

Fig. 4: Metastatic germ cell tumor in cytology, Leishman stain, 40x

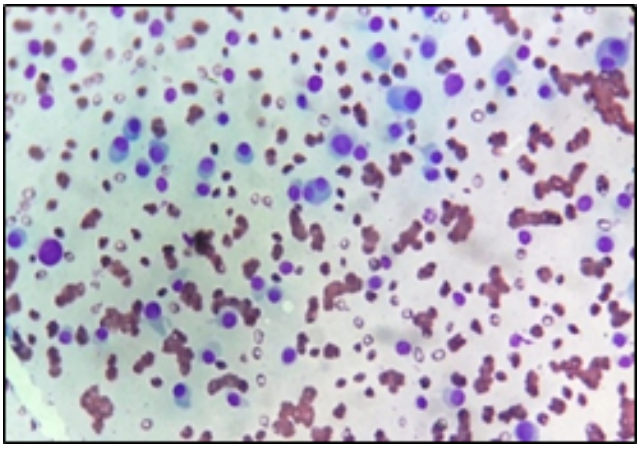

Fig. 5: Cytosmear shows immature and binucleated plasma cells in Plasmacytoma, Leishman stain, 40x

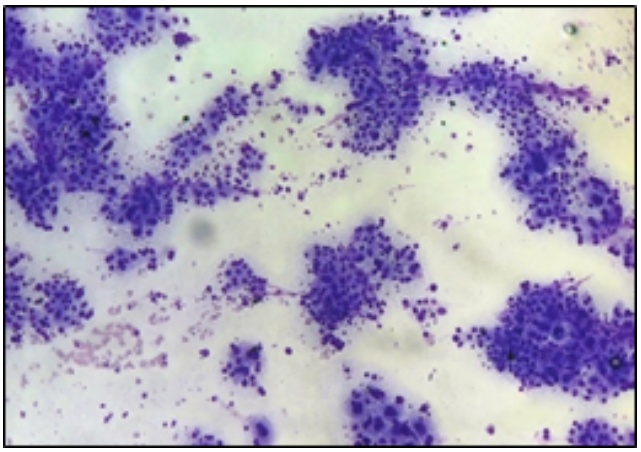

Fig. 6: Clusters of malignant cells in cytosmear of Adenocarcinoma case, Leishman stain, 40x

diagnosis. In doubtful cases also it is helpful to clinicians by suggesting disease categorisation and possible differential diagnosis, thereby guiding them for quick management.

8. Source of Funding

Nil.

9. Conflict of Interest

None.

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