International Journal of Research in Medical Science
www.medicalpaper.net
Online ISSN: 2664-8741; Print ISSN: 2664-8733; Impact Factor: RJIF 5.42
Received: 15-06-2020; Accepted: 30-06-2020; Published: 16-07-2020
Volume 2; Issue 2; 2020; Page No. 01-05

Diagnostic utility of fine needle aspiration cytology in the evaluation of neoplastic cutaneous nodular skin lesions: Experience from tertiary care institute

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Abstract
Aim: to find out sensitivity, specificity and diagnostic accuracy of cytology in neoplastic cutaneous nodules.
Material and Methods: This prospective study was conducted for a period of one year from August, 2017 to August, 2018. Nodular skin lesions diagnosed clinically as neoplastic were assessed by FNAC and correlated with histopathology. The sensitivity, specificity and accuracy of FNAC were determined using histopathology as a gold standard.
Results: 82 cases with nodular skin lesions were subjected to cytological examination and biopsy. Aspiration was inadequate in 03 cases. For diagnosing neoplastic lesions, FNAC had a sensitivity of 98.7%, specificity of 94.6% and diagnostic accuracy of 97.4%.
Conclusion: FNAC is safe, rapid, cost effective, highly sensitive and specific for the diagnosis of neoplastic nodular skin lesions with high diagnostic accuracy.

Keywords: nodular skin lesions, neoplastic, FNAC

1. Introduction

Cutaneous nodules are the elevated skin lesions having diameter more than 5mm [1]. Nodular lesions of the skin occur due to various non-neoplastic and neoplastic conditions. It can develop as a result of benign and malignant proliferation of keratinocytes, melanocytes, dermal structures, metastatic neoplasm (from lung, breast, cervix, ovary, prostate, kidney and gastrointestinal tract), inflammatory and infectious lesions of skin including bacterial, fungal or parasitic etiology. Clinical history, age, sex and various sites of the lesion is important [2].

Cytology and skin biopsy forms the basis of differential diagnosis in clinically similar nodular lesions thereby yielding important information to the pathologist and dermatologist [3]. Skin biopsy is preferred over FNAC due to their access for excision. Now-a-days the utility of FNAC has been expanded to diagnose skin lesions to avoid wide excision biopsy.

FNAC technique is minimally invasive, produces speedy result and is inexpensive [4]. Multiple samples can be obtained in the same setting. Fine needle aspiration cytology helps to categorize surgical from non-surgical cases, thus avoiding unnecessary surgery.

Cytological diagnosis should be carried out in a stepwise manner, first is to ascertain whether the nodule is neoplastic or non-neoplastic and finally to decide neoplastic nodule is benign or malignant. In case of malignant nodule, whether it is primary or metastatic. In cases of postoperative recurrence, the consequent cytological test could quickly and precisely indicate the need for further interventions [5].

The complications of FNA procedure are rare and common ones are bruising and soreness. So, FNAC of skin lesions is nowadays gaining popularity as same as other sites [6]. FNAC can be used as complement to histopathology. But sometimes clinicans as well as patient are more concerned about the definite diagnosis and demands confirmation by histopathology.

2. Material and Methods

This prospective study was carried for a period of one year from August, 2017 to August, 2018. Cases for the study were selected from the patients attended skin, surgery OPDs as well as admitted patients who presented with nodular skin lesions.

A written informed consent was obtained in all cases. Patients who were clinically diagnosed with neoplastic cutaneous nodules were subjected to FNAC and biopsy. The diagnosis was made cytologically and further correlated with histopathology. Giemsa staining was performed for cytology and Haematoxylin and Eosin staining was done for biopsy. Special stains were used wherever required. The sensitivity, specificity and accuracy of FNAC were determined using histopathology as a gold standard.

3. Results

82 patients with clinically diagnosed neoplastic cutaneous nodule were subjected to FNAC followed by biopsy. Aspirate was inadequate in 03 cases. Patient's age ranged from 1 to 90 years. The majority of the patients (19 cases) were in the age group of 61-70 years. Slight female predominance was seen with male to female ratio of 1:1.17. The most common site was trunk (40.50%) followed by head and neck (30.38%). Spectrum of neoplastic nodular skin lesions has been shown in the table 1 to 4.

Table 1: Cytological spectrum of neoplastic nodular lesions (n=82)

Neoplastic lesions	No. of cases	Percentage
Benign tumor	44	53.65%
Primary Malignant	28	34.15%
Metastatic	07	08.54%
Inadequate	03	3.66%
Total	79	100%

Table 2: Cytological spectrum of benign tumors (n=44)

Category	No. of cases	Percentage
Lipoma	29	65.90%
Spindle cell lipoma	02	04.55%
Pleomorphic lipoma	01	02.27%
Benign adnexal tumor	07	15.91%
Benign spindle cell neoplasm	02	04.55%
Schwannoma	02	04.55%
Lipoblastoma	01	02.27%
Total	44	100%

Table 3: Spectrum of primary malignant tumors on cytology (n=28)

Category	No. of cases	Percentage
Suspicious for malignancy	02	07.14%
Squamous cell carcinoma	12	42.86%
Basal cell carcinoma	05	17.87%
Malignant adnexal Tumor -Porocarcinoma, AGDPA	02	07.14%
Malignant melanoma	03	10.71%
DFSP	02	07.14%
Undifferentiated pleomorphic sarcoma	01	03.57%
Atypical lipomatous Tumor	01	03.57%
Total	28	100%

AGDPA - Aggressive digital papillary adenocarcinoma DFSP - Dermatofibrosarcoma protuberans

Table 4: Spectrum of cutaneous metastatic nodules (n=7)

Category	No. of cases	Percentage
Metastatic adenocarcinoma	06	75%
Metastatic duct cell carcinoma	01	12.50%
Metastatic squamous cell carcinoma	01	12.50%
Total	08	100%

Correlation of cytology with histopathology has been depicted in table 5.

Table 5: Cytohistological correlation in neoplastic nodular lesions (n= 79)

Cytological Dx.	No. of cases	Histopathological Dx.	No. of cases
Lipoma	29	Lipoma Pleomorphic lipoma Angiolipoma	27 01 01
Spindle cell lipoma	02	Spindle cell lipoma	02
Pleomorphic lipoma	01	Pleomorphic lipoma	01
Lipoblastoma	01	Lipoblastoma	01
Schwannoma	02	Schwannoma	02
Benign adnexal tumor	07	Eccrine poroma Nodular hidradenoma Trichoblastoma Verrucous trichoadenoma Intradermal nevus Basal cell carcinoma	02 01 01 01 01 01
Benign spindle cell neoplasm	02	Dermatofibroma Fibromatosis	01 01
Atypical lipomatous tumor	01	Lipoma	01
Squamous cell carcinoma	11	Squamous cell carcinoma	11
Suspicious for Malignancy	02	Squamous cell carcinoma Basal cell carcinoma	01 01
Dermatofibrosarcoma protuberans	02	Dermatofibrosarcoma protuberans	02
Porocarcinoma Aggressive digital papillary adenocarcinoma	01 01	Porocarcinoma Aggressive digital papillary adenocarcinoma	01 01
Undifferentiated pleomorphic sarcoma	01	Undifferentiated pleomorphic sarcoma	01
Malignant melanoma	03	Malignant melanoma	03
Basal cell carcinoma	05	Basal cell carcinoma	05

Metastatic squamous cell carcinoma	01	Metastatic squamous cell carcinoma	01
Metastatic adenocarcinoma	06	Metastatic adenocarcinoma	06
Metastatic duct cell carcinoma	01	Metastatic duct cell carcinoma	01
Total	79		79

The comparison of the results obtained on cytohistological correlation has been depicted in table 6.

Table 6: Comparison of cytology and histopathology

Category	TP	TN	FP	FN
Neoplastic	76	35	02	01

TP – true positive, TN – true negative, FP – false positive, FN – false negative

Cytohistological correlation were obtained in 76 cases. Two cases were diagnosed as benign adnexal tumor on cytology but basal cell carcinoma and intradermal nevus on histopathology. 01 case was diagnosed as atypical lipomatous tumor on cytology but lipoma on histopathology. 03 cases (2.56%) with inadequate material on cytology were diagnosed as fibroma, trichoblastic carcinoma and metastatic adenocarcinoma. Using the above data, the sensitivity, specificity and diagnostic accuracy of FNAC in diagnosis of neoplastic cutaneous nodular lesions were calculated as 98.7%, 94.6% and 97.4% respectively.

4. Discussion

Cutaneous nodules are uncommonly subjected to FNA cytology because they can be easily excised and histopathologically examined. But cytological procedures are safe, cost effective and well tolerated as compared to biopsy. So it can serve as a useful modality for the diagnosis of nodular skin lesions.

Nodular skin lesions can be neoplastic or non-neoplastic. In our study the most common age group involved in neoplastic nodular skin lesions is between 61-70 years with age range from 1 to 90 years which was similar to age range of 7months to 83 years observed by Dey *et al.* [7]. Slight female predominance was seen in the study with male to female ratio of 1:1.17 which was similar in a study by Chauhan P *et al.* [8] with 1:1.18 sex ratio. The most common encountered site was trunk followed by head and neck. This was similar to the observations done by Gupta *et al.* [9]. In the present study, 53.65% of cutaneous nodules were benign tumor and 42.69% were malignant which was comparable to study by Patel S *et al.* [10].

The diagnostic accuracy of FNAC in the diagnosis of benign cutaneous nodule was 71.42% which was similar to study by Singh S *et al.* [11]. The most common benign cutaneous nodule was lipoma (70.45%) which was similar to study by Gupta *et al.* [9].

Five cases were diagnosed as benign adnexal tumor on cytology. However, further categorized as eccrine poroma (02 case), each of nodular hidradenoma, trichoblastoma and verrucous trichoadenoma on histopathology. Two cases that were reported as benign adnexal tumor on cytology were diagnosed as intradermal nevus and basal cell carcinoma on histopathology. Two cases diagnosed as benign spindle cell neoplasm were further categorized as dermatofibroma and fibromatosis on histopathology. To determine the exact type of tumor, histological examination of the excision biopsy was recommended by Layfield and Glasgow [12].

In the present study, the primary malignant tumor constituted 75.67% of the malignant cutaneous nodules and metastatic tumor constituted 24.33% which were comparable to study by Sabir *et al.* [3]. The most common primary malignant tumor was squamous cell carcinoma followed by basal cell carcinoma and malignant melanoma which was comparable to studies by Sabir *et al.* [3] and Chhadi T *et al.* [13]. Diagnostic accuracy in Squamous cell carcinoma was 83.33% similar to study by Sabir *et al.* [3]. Diagnostic accuracy of basal cell carcinoma was 71.43% which comparable to study done by Singh S *et al.* [11].

The fine needle aspiration findings of DFSP in our study was similar to fine needle aspiration findings in a series by Domanski & Gustafson [14]. There were 100% cytohistological correlation in malignant melanoma. 7.14% of cases that were diagnosed as malignant adnexal tumors on cytology were diagnosed as aggressive digital papillary adenocarcinoma and porocarcinoma on histopathology. FNAC can be used successfully as a very simple diagnostic investigation for eccrine adnexal tumors, as it can exclude or confirm malignancy. Similar observations made by Devanand B *et al.* [15]. The fine needle aspiration findings of DFSP in our study was similar to fine needle aspiration findings in a series by Domanski & Gustafson [14].

Cutaneous metastasis are usually detected in advanced stage of cancer. The most common cutaneous metastatic tumor was metastatic adenocarcinoma. Srivastava D *et al.* [16], Patel S *et al.* [10], Rastogi N *et al.* [17] also noticed adenocarcinoma as most common cutaneous metastatic tumor.

The sensitivity FNA in the diagnosis of neoplastic nodular lesions in our study was 98.7% which was slightly less than the study by Jain M *et al.* [18] while it is slightly more than study by Kusumastuti *et al.* [19]. The specificity and diagnostic accuracy of neoplastic nodular lesions was 94.6% and 97.4% respectively which was comparable to study by Jain M *et al.* [18].

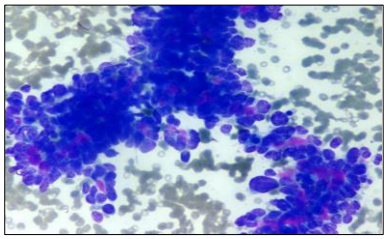

Fig 1: Aggressive digital papillary adenocarcinoma, Giemsa, 400X (tissue fragments of pleomorphic epithelial cells with scant cytoplasm, vesicular nucleus and prominent nucleoli).

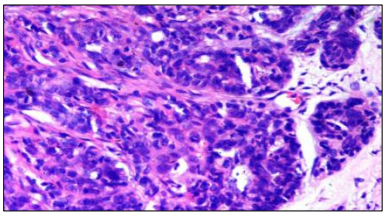

Fig 2: Aggressive digital papillary adenocarcinoma, H&E, 400X (solid areas with papillary projections and ductal structures).

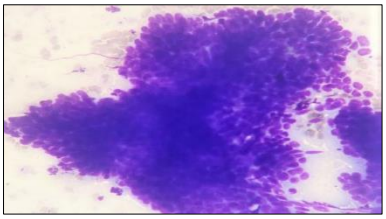

Fig 3: Basal cell carcinoma Giemsa stain, 400X (small basaloid cells with peripheral palisading)

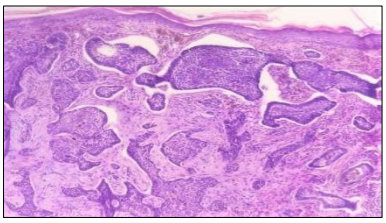

Fig 4: Basal cell carcinoma, H&E, 100X (nests of basaloid cells with peripheral palisading and retraction artifact).

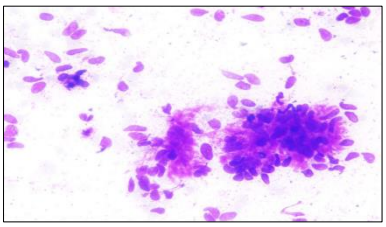

Fig 5: Dermatofibrosarcoma protuberans, Giemsa, 400X (spindled cells embedded in fibrillary matrix).

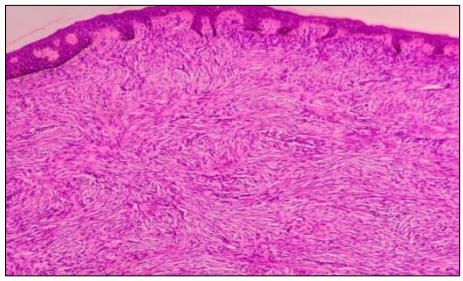

Fig 6: Dermatofibrosarcoma protuberans, H&E, 100X (spindled cells with storiform pattern)

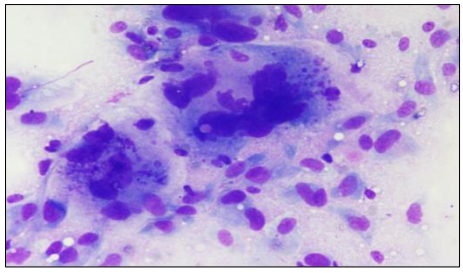

Fig 7: Undifferentiated pleomorphic sarcoma, Giemsa, 400X (spindle, epitheloid cells with cytologic atypia and tumor giant cells).

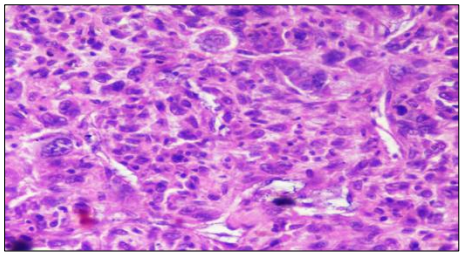

Fig 8: Undifferentiated pleomorphic sarcoma, H&E, 400X (epitheloid pleomorphic cells and tumor giant cells)

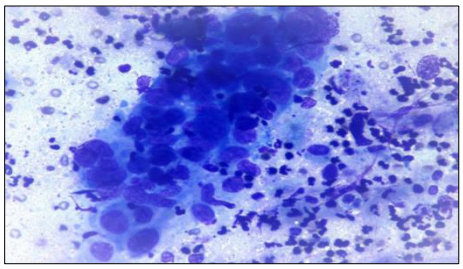

Fig 9: Metastatic squamous cell carcinoma, Giemsa, 400X (cohesive clusters of neoplastic squamous cells displaying cytologic atypia)

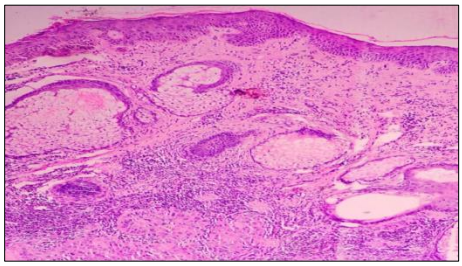

Fig 10: Metastatic Squamous cell carcinoma, H&E, 100X (nests of malignant squamous epithelial cells in deep dermis with normal overlying epidermis).

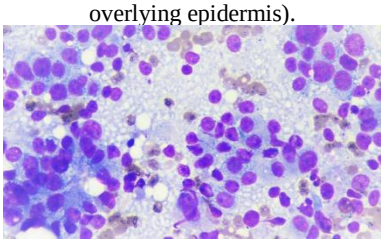

Fig 11: Metastatic duct cell carcinoma, Giemsa, 400X (loose cohesive clusters of tumor epithelial cells with prominent nucleoli)

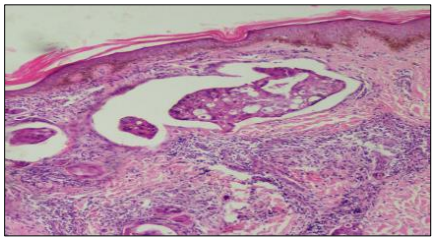

Fig 12: Metastatic duct cell carcinoma, H&E, 100X (nests of tumor cells with lymphovascular invasion in upper dermis)

5. Conclusion

In conclusion, FNAC is rapid, cost effective, risk free procedure and can be performed in outpatient clinic with minimal requirement and can be used to differentiate inflammatory lesions from neoplastic lesions and classify neoplastic as benign or malignant tumor, thus helpful in the diagnosis of nodular skin lesions. Exact subtyping of adnexal tumor is difficult on cytology but can be helpful to differentiate between benign and malignant adnexal tumor. Fine needle aspiration cytology (FNAC) is also very helpful in the diagnosis of metastatic tumors. In cases with occult primary, fine needle aspiration cytology (FNAC) can provide clue to primary sites of tumor and hence, helps in the early detection of metastatic tumors. Thus we conclude that FNAC is a highly sensitive and specific for the diagnosis of neoplastic nodular skin lesions with high diagnostic accuracy.

6. References

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