Open Access

Original Article

Evaluation of Needle Core Biopsy Reporting Categories with Histopathological Findings on Breast Excision Specimens

Rubina Riaz, Tariq Sarfaraz, Salma Afzal, Yasmin Wahid, Rehana Ramzan, Saba Aneeq

Department of Histopathology, Foundation University Medical College, Islamabad Pakistan

ABSTRACT

Objective: To correlate histopathological outcome on breast excision specimens with reporting categories of Needle Core Biopsy, designated by the Royal College of Pathologists, London (UK), with special emphasis on B3 category lesions.
Study Design: Cross-sectional study.
Place and Duration of Study: Histopathology Department, Foundation University Medical College, Islamabad Pakistan, from Jul 2022 to May 2023.
Methodology: Data of 162 cases of Needle Core Biopsies (NCB) breast with subsequent excisions were collected through the Medix Online Histopathology Reporting System (MOHRS). The different categories on NCB were evaluated and compared with the outcome on subsequent excisions.
Results: Out of total cases of NCB, 18(11%) cases were B2 category, 16(10%) cases were B3 category, 4(2.5%) cases were B4 category, and 121(74.6%) cases belonged to B5 category lesions. Among the B5 category lesions, four cases were diagnosed as B5a, while the remaining 117(72%) were assigned B5b. In the B3 category, 11(68.75%) cases followed the diagnosis on further excision, while 5(31.25%) cases showed discordance. The overall positive predictive value (PPV) for malignancy in B3 lesions was 0.43, without statistical significance between subcategories. The B5b category lesions showed complete concordance with the diagnosis of invasive carcinoma on further excision.
Conclusion: Needle Core Biopsy is a powerful tool in the diagnosis of breast lesions for better treatment plan on radical surgery. However, the B3 category encompasses a wide range of lesions that have uncertain malignant potential, and their PPV for malignancy is quite variable. These are the lesions that need to be investigated further before any radical surgery.

Keywords: B category, Histopathology, Needle Core Biopsy.

How to Cite This Article: *Riaz R, Sarfaraz T, Afzal S, Wahid Y, Ramzan R, Aneeq S. Evaluation of Needle Core Biopsy Reporting Categories with Histopathological Findings on Breast Excision Specimens. Pak Armed Forces Med J 2025; 75(4): 768-772.*
DOI: https://doi.org/10.51253/pafmj.v75i4.10434

INTRODUCTION

Worldwide, breast cancer is the most frequently diagnosed malignancy among women and accounted for 2.3 million cases, approximately 11.7% of all malignant cases in the year 2020. With 685,000 cancer deaths, it stands fifth among all cancers in most of countries.[1] According to some studies, one in every eight women of Pakistan is at risk of developing Breast cancer. According to WHO, a total of 26000 new cases of breast cancer were reported in Pakistan in 2020.[2]

Besides awareness programs, early detection and precise treatment modalities are fundamental in improving the survival rate. Over the past few years, Needle Core Biopsy (NCB) has replaced Fine Needle Aspiration Cytology (FNAC) as a key diagnostic tool and is now considered an integral component of the triple assessment in the detection of breast disease.[3,4]

Depending upon the type of breast lesion and related possibility of malignancy, needle core biopsy is divided into five different reporting categories (B1-B5) by the Royal College of Pathologists (RC Path), London (UK). Among these, B1 category indicates normal breast tissue. An opinion of B2 category is reported when the histology suggests a benign abnormality. B3 category (lesions of uncertain malignant potential) includes: atypical intraductal epithelial proliferations (AIEPs), lobular neoplasia (LN), papillary lesions, radial scars (RS), and potential phyllodes lesions. B4 category includes lesions that are suspicious for malignancy, and B5 category lesions are out rightly malignant.[5]

One of the issues with needle core biopsy is the B3 category lesions (lesions with uncertain malignant potential). Previous studies have suggested that these lesions are related with a wide range of upgrade rates of malignancy.[6] Thus, the management of these lesions is highly debatable, and efforts are still being made for a better understanding and subsequent management of these lesions.[7] In 2021, a study was conducted by Mohamed Elsharkawy in Germany, which reported a

Correspondence: Dr Rubina Riaz, Department of Histopathology, Foundation University Medical College, Islamabad Pakistan
Received: 05 Jun 2023; revision received: 27 Dec 2023; accepted: 02 Jan 2024

concordance rate of 83.3% for B3 and 80.2% for B5a lesions.[8]

In Pakistan, limited data is available regarding the role of Needle core biopsy (NCB) in the management of breast lesions. This study aims to present a single-center experience with consecutive needle core biopsies and analyze the distributions of B3 lesion subtypes along with other categories and their upgrade rates at surgical excision. Therefore, this study can have beneficial effects in the diagnosis and further treatment of such lesions.

METHODOLOGY

The analytical cross-sectional study was conducted at the department of Histopathology, Fauji Foundation Hospital, Rawalpindi Pakistan, from June 2022 to May 2023. The study was approved by the Institutional Ethical Review Committee (Ref No. 572/RC/FFH/RWP/2022). The sample size was calculated using the WHO sample size calculator, keeping the prevalence of breast carcinoma as 11.7% and a confidence interval of 95%.2 One hundred and sixty-two samples were collected through non-probability, consecutive sampling.

Inclusion Criteria: It's a female-oriented study, so all female patients aged >30 years undergoing Needle Core Biopsy (NCB) and subsequent surgical excision for breast lesions were included in the study. Surgical specimens included lumpectomy, breast conservation surgery, wide local excision, simple mastectomy, and modified radical mastectomy.

Exclusion Criteria: Specimens received without formalin and specimens with incomplete hospital data/records were excluded from the study.

In the Foundation University Medical College (FUMC) Histopathology laboratory, the NCB was entirely submitted and processed. Surgical specimens were fixed in 10% formalin, and representative sections were processed. Hematoxylin and eosin-stained slides were used for the morphological examination. B-Category was assigned to the Needle Core Biopsies. Final diagnosis on surgical excision specimen of the same patients was also recorded. Data was analyzed by Statistical Package for the Social sciences (SPSS) 28:00. For quantitative variables, like age was measured as Mean±SD. Histopathological features, including B categories on NCB and diagnoses on surgical excision, were measured as frequency and percentage. Positive Predictive Value, concordance, and discordance were calculated for NCB and Chi-square test was applied to observe the association between B3 subcategories and final diagnosis on subsequent excision. The *p*-value of ≤0.05 was taken as statistically significant.

RESULTS

A total of 162 patients were included in this study. The mean age of patients was 53.81±12.92 years (ranging from 15-88 years). Distribution of the B-categories on NCB is shown in Figure.

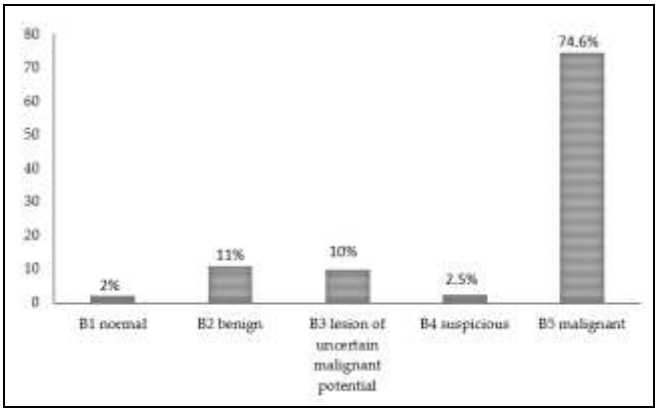

Figure: Distribution of B Categories on Needle Core Biopsy (NCB) (n=162)

Three lesions of B1 category on NCB were re-biopsied due to discordance between imaging and histopathological results. In all these cases, results changed from B1 to B5 category.

Among eighteen (18) B2 category cases on NCB, most commonly diagnosed lesion was mastitis 8(44.5%), followed by fibroadenoma 6(33.3%). Three (03) cases (16.7%) were of fibrocystic change and only 01(5.6%) of fat necrosis. Three of the B2 lesions were not followed by excision. However, due to high suspicion of malignancy on mammography in four cases further excision was done. Out of these four cases, two diagnosed as chronic nonspecific mastitis on NCB were upgraded to invasive ductal carcinoma and metaplastic carcinoma. The rest of two lesions were diagnosed as fibrocystic change.

The frequently detected lesion in B3 category included Phyllodes 6(37.5%) followed by atypical intraductal epithelial proliferations 5(31.3%) and papillary lesions 4(25%). Least common was flat epithelial atypia 1(6.3%). The histological outcome of these B3 lesions on subsequent excision is shown in Table-I. For B3 lesions, when compared with diagnosis on excision, concordance was found in 11(68.75%) cases and discordance in 5(31.25%).

Four cases were diagnosed as B4 lesions on Needle core biopsy. Among these, 3 were upgraded to invasive ductal carcinoma and single to invasive lobular carcinoma.

benign lesion in our setup, with fibroadenoma in second place and fibrocystic change in third place. Our 11% upgraded rate of malignancy in B2 lesions is quite comparable with the 14% upgraded rate.[9] The B3

Table-I: Histological Outcomes on Surgical Excision using Needle Core Biopsy for B3 Subcategory Lesions (n=16)

B3 Subcategories	Histological Outcome on Excision						
	Benign Phyllodes	Malignant Phyllodes	Invasive ductal carcinoma	Intraductal papilloma	Atypical ductal hyperplasia	Mucinous carcinoma	Solid papillary carcinoma
Benign Phyllodes Tumor	5(31.25%)	1(6.25%)	0	0	0	0	0
Atypical Intraductal Epithelial Proliferations	0	0	3(18.75%)	0	2(12.5%)	0	0
Papillary Lesion	0	0	0	2(12.5%)	0	1(6.25%)	1(6.25%)
Flat Epithelial atypia	0	1(6.25%)	0	0	0	0	0

In the B5 category, 117 cases were given a B5b lesion and showed complete concordance with the diagnosis on excision. However, all the B5a lesions were upgraded to malignant lesions on subsequent excision. Table-III shows a comparison of B5 subcategories on NCB with the diagnosis on excision.

Table-II: Comparison Between Needle Core Biopsy on B3 Subcategories and Post-Excision Malignancy (n=16)

B3 Subcategories	Histological Outcome on Excision (n=16)		*p*-value
	Benign n(%)	Malignant n(%)	
Phyllodes Tumor	5(31.25%)	1(6.25%)	0.167
Atypical Intraductal Epithelial Proliferation	2(12.5%)	3(18.75%)	0.100
Papillary Lesion	2(12.5%)	2(12.5%)	0.100
Flat Epithelial Atypia	0	1(6.25%)	

category comprises lesions that are benign but have uncertain malignant potential. Furthermore, these lesions can coexist with malignancy. The rate of B3 lesions in our study was 10 percent, which was aligned with the findings of the literature.

In other studies, the percentage for B3 lesions was 5-14 percent. Overall, 31 percent of B3 lesions were upgraded to malignancy, a finding of 35 percent reported in a study by Catanzariti *et al*.[10] The reason for this higher percentage could be the reason that our study included only NCB, which has a comparatively higher upgrade risk than Vacuum Assisted Biopsy (VAB) as reported by Willers *et al.,* and Giannotti *et al*.[11,12]

Table-III: Histological Outcome of Surgical Excision using Needle Core Biopsy on B5 Subcategory Lesions (n=121)

B5 Subcategories	Histological Outcome on Excision							
	Invasive ductal carcinoma	Invasive lobular carcinoma	Mucinous carcinoma	Malignant phyllodes	Metaplastic carcinoma	Medullary carcinoma	Solid papillary carcinoma	Mixed carcinoma
B5a	3(2.5%)	1(0.8%)	0	0	0	0	0	0
B5b	98(81%)	6(5%)	5(4.1%)	3(2.5%)	2(1.7%)	1(0.8%)	1(0.8%)	1(0.8%)

DISCUSSION

The findings of this study indicated that the positive predictive values (PPVs) for malignancy among B3 lesions did not differ significantly between subgroups. Phyllodes tumor diagnoses on needle core biopsy demonstrated near-complete concordance with histopathological findings on excision. Atypical ductal epithelial proliferations (ADEPs) within B3 subcategories were associated with a high PPV for malignancy.

The females who underwent Needle Core Biopsy (NCB) for various breast lesions in our study were between 15-88 years of age. In a study conducted by Preibsch *et al.,* the commonest B2 lesion was fibroadenoma, followed by fibrocystic change. However, mastitis was the most frequently diagnosed

In our study among the B3 category, phyllodes tumor (37.5%) was the most frequently diagnosed lesion, followed by ADEP (31%) and papillary lesions (25%). Santucci *et al.,* found ADH to be the most common B3 lesion with a PPV of 36%.[13] However, most of the Grippo *et al.,* investigated that papillary lesions were the most common, with ADH in second place, but the PPV for malignancy in papillary lesions was very low in all these studies.[14] Kulka *et al.,* determined that currently the term Atypical Ductal Epithelial Proliferation (ADEP) is preferably used instead of Atypical Ductal Hyperplasia (ADH), for which accurate diagnosis is not possible on needle core biopsy.[15] The ADEP also includes other atypical proliferative lesions besides ADH, which could be the reason for the higher percentage of these lesions in our study.

Tan *et al.*, also explained the similar results as those proven by the authors of this study.[16] The highest PPV for malignancy was found to be associated with ADEP (60%) and papillary lesions (50%). This finding was in agreement with the Lucioni *et al*.[17] However, the PPV of Lobular neoplasia was found to be higher than papillary lesions. A common finding in most studies is the association of ADEPs with a high upgrade rate to malignancy and near complete concordance of the phyllodes tumor among B3 lesions with the diagnosis on excision specimen.[18]

Literature has reported 5.6 percent B5a lesions on NCB, and out of these, 82.5% were upgraded to invasive carcinoma on excision. Almost similar findings were in our study i.e., 3% B5a lesions with upgradation to invasive malignancy in all cases.

This study has certain limitations. Vacuum-assisted biopsy (VAB) was not included alongside needle core biopsy (NCB), and the number of patients with B3 lesions was relatively small. Further subdivision of these lesions limited the ability to determine statistical significance. Given the substantial variability in reported rates of B3 lesion upgradation to malignancy across different institutions, it is recommended that these lesions be further evaluated using vacuum-assisted biopsy or excision before considering radical treatment.

CONCLUSION

Needle Core Biopsy offers superior diagnostic utility over traditional surgical excision by enabling accurate preoperative tissue characterization using the given standard provided by the Royal College of Pathologists, facilitating minimally invasive sampling, and reducing patient morbidity. It allows targeted evaluation of suspicious lesions with faster turnaround times and lower healthcare costs. These advantages make it a preferred initial diagnostic approach in treatment planning for patients with debilitating carcinomas.

Conflict of Interest: None.

Funding Source: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

RR & TS: Data acquisition, data analysis, critical review, approval of the final version to be published.

SA & YW: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

RR & SA: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 2018; 68(6): 394-424. https://doi:10.3322/caac.21609
2. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin 2021; 71(3): 209-249. https://doi:10.3322/caac.21660
3. Asogan AB, Hong GS, Arni PSK. Concordance between core needle biopsy and surgical specimen for oestrogen receptor, progesterone receptor and human epidermal growth factor receptor 2 status in breast cancer. Singapore Med J 2017; 58(3): 145-149. https://doi:10.11622/smedj.2016062
4. Damodaran D, Naidu BK, Varghese JC, Rajan P, Kuruvilla R, Kuruvilla S, et al. A Prospective Study on Level of Concordance Between Core Needle Biopsy and Surgical Specimen for Assessing Oestrogen Receptor, Progesterone Receptor, and Her2/Neu Receptor Status in Carcinoma Breast and Its Implications on Treatment Decisions. Indian J Surg Oncol 2020; 11(3): 446-450. https://doi:10.1007/s13193-020-01146-y
5. Lee AH, Anderson N, Carder P, Cooke J, Deb R, Ellis IO, et al. Guidelines for non-operative diagnostic procedures and reporting in breast cancer screening. The Royal College of Pathologists 2016; G: 150(1). Available from: www.rcpath.org
6. Pozzi G, Castellano I, D'Anna MR, De Matteis A, Milanesio L, Durando M, et al. B3-lesions of the breast: Risk of malignancy after vacuum-assisted breast biopsy versus core needle biopsy diagnosis. Breast J 2019; 25(6): 1308-1309. https://doi:10.1111/tbj.13476
7. Rageth CJ, O'Flynn EAM, Pinker K, Kubik-Huch RA, Mundinger A, Decker T, et al. Second International Consensus Conference on lesions of uncertain malignant potential in the breast (B3 lesions). Breast Cancer Res Treat 2019; 174(2): 279-296. https://doi:10.1007/s10549-018-05071-1
8. Elsharkawy M, Vestring T, Raatschen HJ. A ten-year, single-center experience: Concordance between breast core needle biopsy/vacuum-assisted biopsy and postoperative histopathology in B3 and B5a cases. PLoS One 2020; 15(5): e0233574. https://doi:10.1371/journal.pone.0233574
9. Preibsch H, Wanner LK, Staebler A, Hahn M, Siegmann-Luz KC. Malignancy rates of B3-lesions in breast magnetic resonance imaging - do all lesions have to be excised? BMC Med Imaging 2018; 18(1): 27. https://doi:10.1186/s12880-018-0271-7
10. Catanzariti F, Avendano D, Cicero G, Garza-Montemayor M, Sofia C, Venanzi Rullo E, et al. High-risk lesions of the breast: concurrent diagnostic tools and management recommendations. Insights Imaging 2021; 12(1): 63. https://doi:10.1186/s13244-021-01005-6

11. Willers N, Neven P, Floris G, Colpaert C, Oldenburger E, Han S, et al. The Upgrade Risk of B3 Lesions to (Pre)Invasive Breast Cancer After Diagnosis on Core Needle or Vacuum Assisted Biopsy. A Belgian National Cohort Study. Clin Breast Cancer 2023; 23(4): e273-e280. https:// doi:10.1016/j.clbc.2023.03.006
12. Giannotti E, James JJ, Chen Y, Sun R, Karuppiah A, Yemm J, et al. Effectiveness of percutaneous vacuum-assisted excision (VAE) of breast lesions of uncertain malignant potential (B3 lesions) as an alternative to open surgical biopsy. Eur Radiol 2021; 31(12): 9540-9547. https://doi:10.1007/s00330-021-08157-5
13. Santucci D, Faiella E, Calabrese A, Favale L, Zobel BB, de Felice C. Our Radiological Experience on B3 Lesions: Correlation Between Mammographic and MRI Findings With Histologic Definitive Result. Clin Breast Cancer 2019; 19(5): e643-e653. https://doi:10.1016/j.clbc.2019.06.004
14. Grippo C, Jagmohan P, Clauser P, Kapetas P, Meier A, Stöger AM, et al. External Validation of a Risk Stratification Score for B3 Breast Lesions Detected at Ultrasound Core Needle Biopsy. Diagnostics 2020; 10(4): 181. https://doi:10.3390/diagnostics10040181
15. Kulka J, Madaras L, Floris G, Lax SF. Papillary lesions of the breast. Virchows Arch 2022; 480(1): 65-84. https://doi:10.1007/s00428-021-03182-7.
16. Tan E, Arachchi A, Cheng M, Lockie D. Indeterminate (B3) Breast Lesions and the Ongoing Role of Diagnostic Open Biopsy. Int J Breast Cancer 2021; 5555458. https://doi:10.1155/2021/5555458
17. Lucioni M, Rossi C, Lomoro P, Ballati F, Fanizza M, Ferrari A, et al. Positive predictive value for malignancy of uncertain malignant potential (B3) breast lesions diagnosed on vacuum-assisted biopsy (VAB): is surgical excision still recommended? Eur Radiol 2021; 31(2): 920-927. https://doi:10.1007/s00330-020-07161-5
18. Elfgen C, Leo C, Kubik-Huch RA, Muenst S, Schmidt N, Quinn C, et al. Third International Consensus Conference on lesions of uncertain malignant potential in the breast (B3 lesions). Virchows Arch 2023; 483(1): 5-20. https://doi:10.1007/s00428-023-03566-x