|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||

Available online on http://www.ijmbs.info

International Journal of Medical and Biomedical Studies; 2024; 8(3); 219-223

Original Research Article

The Accuracy of Core Needle Biopsy in Determining Histological Type and Scarff- Bloom-Richardson Grade in Invasive Breast Cancer.

Sameer Kumar[1], Sujeet Kumar[2], Prashant Bhardwaj[3]

[1]Senior Resident, Department of Pathology, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar.

[2]Assistant Professor, Department of Pathology, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar.

[3]Associate Professor, Department of Pathology, Veerangana Awantibai Lodhi Autonomous State Medical College, Etah

Received: 26-04-2024 / Revised 19-05-2024 / Accepted 25-06-2024
Corresponding author: Dr.Prashant Bhardwaj
DOI: **https://doi.org/10.32553/ijmbs.v8i3.2848**
Conflict of interest: Nil

Abstract:

This 18-month retrospective study examined the accuracy of core needle biopsy (CNB) in diagnosing histological type and Scarff-Bloom-Richardson (SBR) grade in 110 invasive breast cancer patients at Rajshree Medical Research Institute, Bareilly. The study demonstrated 89.1% histological concordance between CNB and surgical specimens, with invasive ductal carcinoma identified with excellent accuracy. However, SBR grade concordance was moderate at 77.3%, suggesting CNB may not consistently reflect tumour aggressiveness. Statistics showed great sensitivity and specificity for histological typing, but CNB results should be interpreted cautiously, especially for grading and rare subtypes. CNB is still a useful diagnostic tool, although surgical examination may be needed to confirm and arrange treatment.

Keywords: Core Needle Biopsy, Invasive Breast Cancer, Histological Type, SBR Grade

Introduction

One of the most common cancers in women worldwide, invasive breast cancer requires precise diagnostic techniques to guide treatment [1]. Core needle biopsy (CNB) is a standard preoperative breast lesion diagnostic procedure that provides histopathological tissue samples [2]. Prognosis and treatment depend on accurate histological type and grade, especially Scarff-Bloom-Richardson (SBR) grade [3]. Histological typing divides breast cancer into subgroups with different biology and therapeutic responses [4]. By analysing tumour differentiation and aggressiveness, the SBR grading system, which analyses tubule formation, nuclear pleomorphism, and mitotic count, gives prognostic information. CNB must be reliable in delivering accurate and representative histology and grading information because these criteria are crucial [5,6].

Surgical excision is the gold standard for definitive histological examination, however CNB is less invasive, faster, and less morbid. In heterogeneous tumours, its capacity to adequately reflect the histological type and grade of the entire tumour is still questioned [7]. This study examines core needle biopsy's accuracy in

detecting histological type and SBR grade in invasive breast cancer patients. We compare CNB results to surgical specimens to evaluate concordance rates and identify any inconsistencies that may affect clinical decision-making.

Methodology

Study Design and Setting

From December 2021 to May 2023, Rajshree Medical Research Institute, Bareilly did this retrospective observational study. The study examined the accuracy of core needle biopsy (CNB) in detecting histological type and Scarff-Bloom-Richardson (SBR) grade in invasive breast cancer patients.

Study Population

The study included 110 invasive breast cancer patients who had core needle biopsy and surgical excision. Patients with complete CNB and surgical excision histopathology reports were chosen.

Inclusion and Exclusion Criteria

Patients with invasive breast cancer diagnosed by core needle biopsy and surgical excision were eligible. Patients with non-invasive breast lesions, inadequate histological data, or neoadjuvant therapy before surgery were excluded.

Data Collection

Data from 110 patients' medical records were retrospectively obtained. The surgical excision specimens and core needle biopsy samples were evaluated for histological type and SBR grade. The WHO classified histological categories, and SBR grading used conventional criteria for tubule formation, nuclear pleomorphism, and mitotic count.

Statistical Analysis

Statisticians analysed the histological type and SBR grade concordance between CNB and surgical specimens. Kappa statistics assessed method agreement. Also calculated were CNB's sensitivity, specificity, PPV, and NPV in detecting histological type and grade.

Results

The study comprised 110 invasive breast cancer patients aged 30–75. Patients averaged 52 years old. Most patients were postmenopausal (60%), with 40% premenopausal. The core needle biopsy (CNB) and surgical excision specimen histological types were highly concordant. The same histological type was found in 98 (89.1%) of 110 cases by CNB and surgical excision. The most common histological type was invasive ductal carcinoma, which CNB diagnosed in 85 of 92 cases (92.4%). Invasive lobular carcinoma and mixed carcinoma similarly had strong CNB concordance rates, with 10 out of 12 (83.3%) and 3 out of 6 (50%) cases correctly recognised.

The Scarff-Bloom-Richardson (SBR) grading from CNB demonstrated moderate concordance with the grading from surgical specimens. Of the 110 cases, 85 (77.3%) showed concordant SBR grades between CNB and surgical excision. The breakdown of the concordance rates by grade was as follows:

- Grade I: 28 out of 35 cases (80%)
- Grade II: 40 out of 55 cases (72.7%)
- Grade III: 17 out of 20 cases (85%)

The CNB-surgical specimen histological type concordance kappa statistic was 0.82, showing high agreement. Kappa for SBR grade concordance was 0.67, showing moderate agreement. CNB had 89.1% sensitivity, 95.0% specificity, 98.0% PPV, and 75.0% NPV in detecting histological type. For SBR grading, sensitivity, specificity, PPV, and NPV were 77.3%, 90.0%, 85.0%, and 82.0%. Histological type and SBR grade differences between CNB and surgical specimens were 12 (10.9%) and 25 (22.7%), respectively. In mixed and lobular carcinomas, when the CNB sample did not capture tumour

heterogeneity, histological type inconsistencies were most common. SBR grade discrepancies were largely attributable to mitotic count and nuclear pleomorphism, which are harder to assess in smaller CNB samples.

These results summarise the study's findings, demonstrating core needle biopsy's accuracy and limitations in invasive breast cancer assessment.

Histological Type Concordance

	Histological Type	CNB Cases	Surgical Cases	Concordance Rate (%
1	Invasive Ductal Carcinoma	92	85	92.4
2	Invasive Lobular Carcinoma	12	10	83.3
3	Mixed Carcinoma	6	3	50.0
4	Other	0	0	0.0

SBR Grade Concordance

	SBR Grade	CNB Cases	Surgical Cases	Concordance Rate (%
1	Grade I	35	28	80.0
2	Grade II	55	40	72.7
3	Grade III	20	17	85.0

Statistical Analysis Results

	Parameter	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Kappa Statistic
1	Histological Type	89.1	95.0	98.0	75.0	0.82
2	SBR Grade	77.3	90.0	85.0	82.0	0.67

Discussion

This study shows that core needle biopsy (CNB) is a reliable preoperative method for invasive breast cancer evaluation, particularly histological type. CNB's 89.1% concordance rate with surgical specimens and 0.82 kappa statistic demonstrate its accuracy in histological type identification [8]. Invasive ductal carcinoma had a 92.4% concordance rate, consistent with prior CNB investigations for this frequent histological subtype. The study also shows that CNB has limits, especially in rare histological forms such invasive lobular carcinoma and mixed carcinoma, where concordance rates were lower [9]. These subtypes have reduced accuracy due to the difficulties of collecting heterogeneous tumours, where CNB's limited sample size may not adequately represent the tumor's complexity. This shows that while CNB is helpful for most breast cancer cases, a subpopulation of tumours may be less trustworthy, requiring surgical excision [10]. The Scarff-Bloom-Richardson (SBR) grade concordance between CNB and surgical specimens was moderate, at 77.3%, with a kappa statistic of 0.67. This supports prior studies that found CNB less exact than histological type in grading [11]. The restricted tissue in CNB made mitotic count and nuclear pleomorphism

assessment difficult, causing SBR grading disparities. The tumor's grade and prognosis depend on these characteristics. The intermediate agreement shows that CNB provides significant preliminary information but may not always capture the tumor's aggressiveness, which could affect treatment decisions [12].

CNB's sensitivity and specificity rates of 89.1% and 95.0% for histological typing and 77.3% and 90.0% for SBR grading justify its clinical use. The strong positive predictive value (PPV) of CNB for histological type (98.0%) suggests that surgical removal will confirm a CNB diagnosis [13]. However, the lower negative predictive value (NPV) for histological typing (75.0%) and SBR grading (82.0%) suggests that a negative or low-grade CNB result should be interpreted with caution because the surgical specimen may reveal a more aggressive or different tumour type. This study emphasises the importance of CNB in invasive breast cancer diagnosis, particularly for histological type determination. The findings further emphasise the need for caution when interpreting CNB data, especially for grading and rare histological subtypes. CNB alone may not be enough, hence surgical excision should be undertaken to guarantee correct diagnosis and optimal treatment planning [14,15].

Conclusion

Core needle biopsy (CNB) is a highly effective diagnostic method for invasive breast cancer histological type, with high concordance rates with surgical specimens, especially for common subtypes like invasive ductal carcinoma. CNB provides helpful first insights but may not always fully reflect the tumor's aggressiveness due to its moderate Scarff-Bloom-Richardson (SBR) grade accuracy. CNB is essential in the initial diagnostic procedure, but cautious interpretation and, in some circumstances, extra surgical examination are necessary to assure correct cancer diagnosis and treatment planning.

References

1. Elmore JG, Longton GM, Carney PA, Geller BM, Onega T, Tosteson AN, et al.Diagnostic concordance among pathologists interpreting breast biopsy specimens. JAMA. 2015;313(11):1122-32.
2. 2. Rakha EA, El-Sayed ME, Lee AH, Ellis IO. The role of core needle biopsy in the assessment of patients with screen-detected breast lesions. Histopathology. 2010;57(5):636-44.
3. 3. Brenner RJ, Bassett LW, Fajardo LL, Dershaw DD, Evans WP 3rd, Hunt R, et al.Stereotactic core-needle biopsy of breast calcifications: a multicenter study. Radiology. 2001;218(3):866-72.
4. 4. Verkooijen HM, Peeters PH, Buskens E, van Vroonhoven TJ, Witkamp AJ. Diagnostic accuracy of large-core needle biopsy for nonpalpable breast disease: a meta-analysis. Br J Cancer. 2000;82(5):1017-21.
5. 5. Jackman RJ, Nowels KW, Shepard MJ, Finkelstein SI, Marzoni FA Jr. Stereotactic, automated, large-core needle biopsy of nonpalpable breast lesions: false-negative and histologic underestimation rates after long-term follow-up. Radiology. 1999;210(3):799-805.
6. 6. Renshaw AA, Cartagena N, Derhagopian RP, Gould EW. Accuracy of histologic grade of fine-needle aspiration of the breast. Am J Clin Pathol. 1997;107(5):695-8.
7. 7. Rosen PP, Lesser ML, Kinne DW, Beattie EJ Jr. Discrepancies in the diagnosis of mammary carcinoma. Analysis of 10-year frequency. Cancer. 1982;49(7):1294-8.
8. 8. Pisano ED, Fajardo LL, Caudry DJ, Sneige N, Frable WJ, Berg WA, et al. Fine-needle aspiration biopsy of nonpalpable breast lesions in a multicenter clinical trial: results from the Radiologic Diagnostic Oncology Group V. Radiology. 2001;219(3):785-92.
9. 9. Liberman L, Abramson AF, Squires FB, Glassman JR, Morris EA, Dershaw DD. The relationship of core biopsy to

surgical biopsy of the breast: initial experience with stereotactic vacuum-assisted biopsy. AJR Am J Roentgenol. 1998;170(4):937-42.
10. 10. Berg WA, Sun CC, Birdwell RL. Diagnostic breast imaging: mammography, sonography, and magnetic resonance imaging. In: Harris JR, Lippman ME, Morrow M, Osborne CK, editors. Diseases of the breast. 4th ed. Philadelphia: Lippincott Williams & Wilkins; 2010. p. 285-327.
11. 11. Jacobs TW, Connolly JL, Schnitt SJ. Nonmalignant lesions in breast core needle biopsies: to excise or not to excise? Am J Surg Pathol. 2002;26(9):1095-110.
12. 12. Dillon MF, Hill AD, Quinn CM, O'Doherty A, O'Higgins N, O'Brien M. The accuracy of ultrasound, stereotactic, and clinical core biopsies in the diagnosis of breast cancer, with an analysis of false-negative cases. Ann Surg. 2005;242(5):701-7.
13. 13. Hwang KT, Kim YS, Lee JM, Song BJ, Kang HJ, Kwon Y, et al. Accuracy of preoperative biopsy technique in diagnosing pure ductal carcinoma in situ (DCIS): analysis of 588 cases. Cancer Res Treat. 2016;48(4):1363-8.
14. 14. Ku NN, Fine RE, Hanahan EV, Boswell C, Wynveen CA, Mendenhall MA, et al. Concordance between core needle biopsy and surgical excision for invasive breast carcinoma. Arch Pathol Lab Med. 2015;139(10):1285-92.
15. 15. Weaver DL, Rosenberg RD, Barlow WE, Collins LC, Connolly JL, Schnitt SJ, et al.Pathologic findings from the breast cancer surveillance consortium: population-based outcomes in women undergoing biopsy after screening mammography. Cancer. 2006;106 (4): 732-42.