Correlations Between Core Needle Biopsy and Excisional Biopsy Findings in Suspected Breast Lesions: A Single Center Study

Tima Davidson[1,5], Michal M. Ravid[2], Ella Nissan[5], Mirriam Sklair-Levy[2,5], Johnatan Nissan[3,5] and Bar Chikman[4,5]

[1]Departments of Nuclear Medicine and [2]Diagnostic Imaging, Sheba Medical Center, Tel Hashomer, Israel
[3]Rappaport Faculty of Medicine, Technion–Israel Institute of Technology, Haifa, Israel
[4]Division of Surgery, Assaf Harofeh Medical Center, Zerifin, Israel
[5]Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

ABSTRACT: **Background:** When a breast lesion is suspected based on a physical exam, mammography, or ultrasound, a stereotactic core needle biopsy (CNB) is usually performed to help establish a definitive diagnosis. CNBs are far less invasive than excisional biopsies, with no need for general anesthetics or hospitalization, and no recovery period. However, since only samples of the mass are removed in a CNB and not the whole mass, sampling errors can occur.

Objectives: To compare the degree of agreement between the pathological data from CNBs and excisional biopsies from a single tertiary referral hospital.

Methods: The concordance of pathological data was compared in patients who underwent CNBs and had their surgical procedures at the same medical center.

Results: From the 894 patients who underwent CNBs, 254 (28.4%) underwent subsequent excisional biopsies at our medical center. From the total of 894 patients, 227 (25.3%) who underwent a CNB were diagnosed with a malignancy, with the rest of the CNBs being diagnosed as benign pathologies. The pathological findings in the CNBs and in the excisional biopsies concurred in 232/254 (91.3%) of the cases.

Conclusions: A CNB to confirm mammographic or clinical findings of breast lesions is an accurate method to establish a pathological diagnosis of breast lesions. The accuracy is higher for invasive carcinomas than for non-invasive cancers. Excisional biopsies are necessary for lesions with anticipated sampling errors or when the core needle biopsy findings are discordant with clinical or mammographic findings.

IMAJ 2018; 20: 401–404

KEY WORDS: biopsy, breast cancer, diagnosis, mammography, screening

A clinical breast examination, mammography, and breast ultrasound are the initial steps in evaluating breast pathologies [1,2]. In cases of suspected breast lesions, stereotactic core needle biopsy (CNB) technology can establish a definitive diagnosis for clinically occult and palpable breast lesions [3-5].

CNB is a well-established technique for diagnosing breast lesions. Imaging technology is used to guide a special biopsy needle to the lesion so that a sample can be obtained without surgery. A CNB requires no general anesthetic, no hospitalization, and no recovery period. It costs much less than an excisional biopsy and can possibly even replace an excisional biopsy [5]. CNBs can help in identifying the histological type of the lesion before surgery is actually conducted. This biopsy gives an indication for the type and extension of the subsequent surgery [3-11].

Generally, abnormalities detected by mammographies are presented as microcalcifications, lumps, or distortions of breast architecture [1,5]. Suspected lesions detected by mammographies and ultrasounds are indications for CNB [3-9]. In these cases, the maximum cancer yield is approximately 33% and stereotactic procedures are the ideal initial interventional technique [3,4].

For the other two-thirds of the patients with benign biopsy results, and with the exception of atypical hyperplasia, no further intervention is required [1,9-11].

In a palpable breast mass, a CNB can help provide presurgical knowledge about the histological type and grade of the invasive carcinoma, presence of ductal carcinoma in situ (DCIS) in the lesion, immunohistological staining of estrogen and progesterone receptors, and HER2 expression, and may be useful in planning the surgical procedure.

Nevertheless, CNBs only remove samples of a mass and not the entire area of concern; therefore, sampling errors should be taken into consideration whenever performing a CNB. Understanding both the benefits and limitations of CNBs have important practical implications.

PATIENTS AND METHODS

All CNBs were performed by the Department of Breast Imaging at Sheba Medical Center. The setup of both stereotaxic and ultrasound-guided procedures was previously described [3-5,8].

In all cases of malignant lesions, carcinoma in situ or atypical ductal hyperplasia (ADH), surgical excision was recommended. Most of the surgical procedures were performed at the Tel Hashomer Medical Center. The concordance of pathological data from the CNB and from the excisional biopsy was studied in these patients. The patients who underwent surgery in other medical facilities were not included in this study. Whenever the radiologist had persistent concerns after a CNB with benign histological findings, a repeat core or excisional biopsy was performed. Whenever benign CNB results were congruous with the imaging findings, a follow-up mammography at 6 months was recommended. At follow-up, patients with no change in the mammographic findings resumed annual screening, whereas those with substantial changes in the lesion, such as an increase in the size of the mass or an increase in the number of calcifications, underwent a repeat CNB or an excisional biopsy.

RESULTS

Of the 894 patients who underwent CNB, 254 underwent subsequent surgery in our hospital.

The histological findings of the CNBs are summarized in Table 1, Table 2, Table 3. Table 1 summarizes the histological types of invasive carcinoma. Table 2 summarizes the in situ carcinoma and Table 3 demonstrates the distribution of non-malignant lesions in the CNBs.

Out of 894 CNBs, 215/894 (24.0%) were diagnosed as having invasive malignancies [Table 1]. An additional 12 patients were diagnosed with DCIS or lobular carcinoma in situ [Table 2].

Table 1. Histological types of invasive carcinomas detected by core needle biopsy

Histological type	Number of patients	Percent of total core needle biopsies (n=894)
Infiltrating duct carcinoma	171	19.1%
Infiltrating lobular carcinoma	25	2.8%
Infiltrating mucinous carcinoma	9	1.0%
Infiltrating papillary carcinoma	3	0.3%
Tubular carcinoma	5	0.6%
Lymphoma	2	0.2%
Total	215	24.0%

Table 2. Histological types of non-invasive carcinomas detected by core needle biopsy

Histological type	Number of patients	Percent of total core needle biopsies (n=894)
Ductal carcinoma in situ	10	1.1%
Lobular carcinoma in situ	2	0.2%
Total	12	1.3%

In total, 227/894 patients (25.3%) who underwent a CNB were diagnosed with some kind of a malignancy [Figure 1].

The proportion of non-invasive cancers to all the malignancies detected by CNB was 5.3% (12/227).

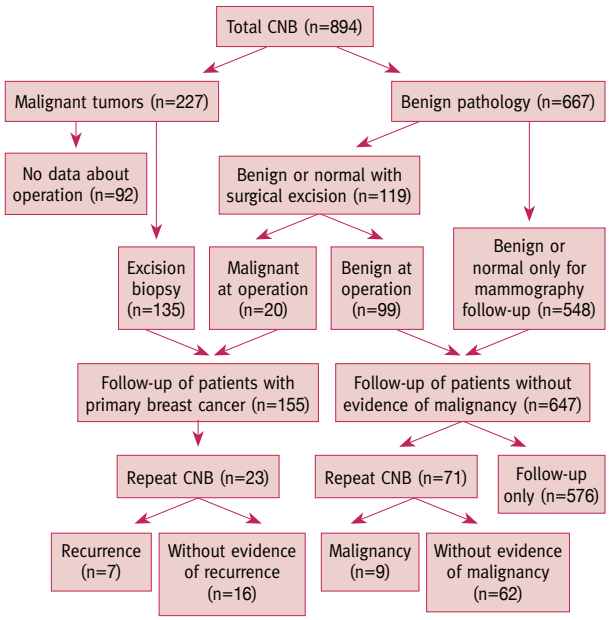
Non-malignant benign pathologies were diagnosed in 74.7% (667/894) of CNBs [Table 3]. The most frequent benign lesion was a fibroadenoma (124/894, 13.9%).

In our medical center, 254/894 patients (28.4%) underwent surgery. In 135/254 patients (53%), surgery was ordered because of the pathological diagnosis of malignancy in the CNB, and in 119/254 cases, excisional biopsy was conducted after no malig-

Table 3. Non-malignant lesions in the core needle biopsies

Histologic finding	Number of patients	Percent of total core needle biopsies (n=894)
Atypical ductal hyperplasia	2	0.2%
Atypical lobular hyperplasia	2	0.2%
Ductal hyperplasia	135	15.1%
Hamartoma	5	0.6%
Fibroadenoma	124	13.9%
Papilloma	24	2.7%
Radial scar	9	1.0%
Other benign pathology	5	0.6%
Fibrocystic disease	361	40.4%
Total	667	74.7%

Figure 1. Distribution of patients according to CNB findings and subsequent follow-up



CNB = core needle biopsy

nancy was diagnosed in the CNB [Figure 1]. In 61.3% (548/894), benign findings from CNBs allowed omission from unnecessary surgery [Figure 1]. The pathological findings in the CNBs and in the excisional biopsies concurred in 232/254 (91.3%) of the cases. In 22/254 patients (8.7%), the pathological findings in surgery were different from the pathological findings in CNB [Figure 1].

Twenty of the 22 patients with disagreement were diagnosed as having a benign lesion in the CNB and were found to have a malignancy after surgical excision of the lesion. Among these 20 patients with benign lesions at CNB, three out of four patients diagnosed as having atypical ductal or lobular hyperplasia in the CNBs were found to have carcinoma in subsequent excisional biopsies. An invasive carcinoma was detected in one patient with a radial scar and in three patients with a papillary lesion in the CNB.

In two patients, an invasive carcinoma was diagnosed in the CNB and no carcinoma was identified in the excisional biopsy. In one patient, a corrected diagnosis was reissued but the excisional biopsy was already performed, and in one patient, despite undergoing a thorough histological examination of the resected specimen, no tumor was found.

Out of the 155 patients with malignant tumors (135 diagnosed with breast cancer in CNBs and 20 patients diagnosed with malignancy after excisional biopsy performed after a CNB benign pathology), 23 patients had a repeated CNB during the follow-up period (mean 18 months) and in seven patients, local recurrences were identified. The rate of recurrences, diagnosed by CNB during the mean follow-up of 18 months was 4.5% (7/155 patients).

DISCUSSION

CNBs were performed in 894 patients with suspicious breast lesions. This study is one of the largest single-institution series and is comparable with current trials [3-8,10]. The CNBs were diagnostic for an invasive carcinoma in 24.0% of the CNBs (215/894 patients) and in 1.3% of the cases for non-invasive breast carcinomas (12/894 patients). The remaining 667/894 (74.7%) of CNBs were benign. In 119/667 (17.8%) of clinically or mammographic suspicious lesions, an open biopsy was performed.

In 20/119 (16.8%) of these cases, the excisional biopsy showed a malignancy that was not diagnosed by the CNB. It is evident that a negative CNB in mammographically suspicious lesions requires an excisional biopsy as well to exclude a malignancy [9].

Conversely, the diagnostic efficacy of CNB in breast cancer is very high and in our series it was as high as 91.9% (227/247 patients). The false negative rate was 8.1% (20/247 patients). Similar data has been reported other studies [6,8].

For invasive carcinomas, the yield of CNBs in our series was higher than for carcinoma in situ: 215/226 patients (95.1%) vs. 12/21 (57.1%). The clinical significance of isolated LCIS is debatable, but LCIS is frequently associated with another malignant pathology [12-17]. The interpretation of core needle findings in papillary lesions is difficult [18]. In our series, the most prominent rate of disagreement was among patients with papillary cancer with only 3/5 patients (60%) having papillary cancer and proven as having a carcinoma after a CNB.

In cases with clinical or mammographic suspected findings, an excision is the only means available to validate the CNB findings and exclude a possible malignancy.

Our data is in accordance with the published results of an outcome of 103 papillary lesions diagnosed by CNBs in a public screening program. Subsequent excision biopsies led to an increase in detecting malignancy in 30% of the cases [18].

Atypical hyperplastic lesions (atypical ductal or lobular hyperplasia) in our study were frequently associated with an invasive carcinoma in excisional biopsies, and this kind of diagnosis with CNB must be an indication for excisional biopsies. In the literature, it was also reported that in cases of atypical ductal hyperplasia, the frequency of finding breast cancer (upgrading) with surgical excision is 15–30% or even higher [19-23]. Hartmann and colleagues [19] emphasized that both types of atypical hyperplasia, atypical ductal hyperplasia and atypical lobular hyperplasia, as classified on the basis of microscopic appearance occur with equal frequency and confer similar risks of later breast cancer.

Radial scars are benign breast lesions of uncertain clinical significance [24,25]. The radial scars are being detected with increased frequencies in women who undergo mammographic screening. In our study, all patients with radial scars had some associated pathology with a prevalence of fibroadenomas (66.7%). An invasive carcinoma was detected in 1/9 patients (11.1%) with a radial scar. The association of fibroadenomas with radial scars was not described. CNBs were also an effective diagnostic method for recurrences during follow-up after definitive treatment of malignant tumors. Seven out of the 23 CNBs (30%) performed during follow-up showed disease recurrence.

CONCLUSIONS

The CNB of mammographic or clinical findings is an accurate method to establish a pathological diagnosis of breast lesions. Additional surgery is necessary for lesions with anticipating sampling errors or when the CNB findings are discordant with clinical or mammographic findings. Excision of papillary lesions is necessary to validate the CNB findings and exclude a possible malignancy. Atypical hyperplasia in CNB material is associated with a high risk of a concordant malignancy and is an indication for the surgical removal of the lesion.

Correspondence
Dr. T. Davidson
Dept. of Nuclear Medicine, Sheba Medical Center, Tel Hashomer 5265601, Israel
Fax: (972-3) 530-2744
email: tima.davidson@sheba.health.gov.il

References

1. McDonald ES, Clark AS, Tchou J, Zhang P, Freedman GM. Clinical diagnosis and management of breast cancer. *J Nucl Med* 2016; 57: 9S-16S.
2. Kolb TM, Lichy J, Newhouse JH. Comparison of the performance of screening mammography, physical examination, and breast US and evaluation of factors that influence them: an analysis of 27,825 patient evaluations. *Radiology* 2002; 225: 165-75.
3. Cangiarella J, Waisman J, Symmans WF, et al. Mammotome core biopsy for mammary microcalcification: analysis of 160 biopsies from 142 women with surgical and radiologic followup. *Cancer* 2001; 91: 173-7.
4. Margolin FR, Kaufman L, Jacobs RP, Denny SR, Schrumpf JD. Stereotactic core breast biopsy of malignant calcifications: diagnostic yield of cores with and cores without calcifications on specimen radiographs. *Radiology* 2004; 233: 251-4.
5. Liberman L. Percutaneous image-guided core breast biopsy. *Radiol Clin North Am* 2002; 40 (3): 483-500.
6. Verkooijen HM. Core Biopsy After Radiological Localisation (COBRA) Study Group. Diagnostic accuracy of stereotactic large-core needle biopsy for nonpalpable breast disease: results of a multicenter prospective study with 95% surgical confirmation. *Int J Cancer* 2002; 99 (6): 853-9.
7. Hoda SA, Rosen PP. Practical considerations in the pathologic diagnosis of needle core biopsies of breast. *Am J Clin Pathol* 2002; 118 (1): 101-8.
8. Kettritz U, Rotter K, Schreer I, et al. Stereotactic vacuum-assisted breast biopsy in 2874 patients. *Cancer* 2004; 100: 245-51.
9. Calhoun BC, Collins LC. Recommendations for excision following core needle biopsy of the breast: contemporary evaluation of the literature. *Histopathology* 2016; 68: 138-51.
10. Mooney KL, Bassett LW, Apple SK. Upgrade rates of high-risk breast lesions diagnosed on core-needle biopsy: a single-institution experience and literature review. *Mod Pathol* 2016; 29: 1471-84.
11. Monticciolo DL, Hajdik RL, Hicks MG, et al. Six-months short-interval imaging follow-up for benign concordant core needle biopsy of the breast: outcomes in 1444 cases with long-term follow-up. *Am J Roentgenology* 2016; 207: 912-17.
12. Nakhlis F, Gilmore L, Gelman R, et al. Incidence of adjacent synchronous invasive carcinoma and/or ductal carcinoma in-situ in patients with lobular neoplasia on core biopsy: results from a prospective multi-institutional registry (TBCRC 020). *Ann Surg Oncol* 2016; 23 (3): 722-8.
13. Sen LQ, Berg WA, Hooley RJ, Carter GJ, Desouki MM, Sumkin JH. Core breast biopsies showing lobular carcinoma in situ should be excised and surveillance is reasonable for atypical lobular hyperplasia. *AJR Am J Roentgenol* 2016; 207 (5): 1132-45.
14. Middleton LP, Grant S, Stephens T, Stelling CB, Sneige N, Sahin AA. Lobular carcinoma in situ diagnosed by core needle biopsy: when should it be excised? *Mod Pathol* 2003; 16 (2): 120-9.
15. Bauer VP, Ditkoff BA, Schnabel F, Brenin D, El-Tamer M, Smith S. The management of lobular neoplasia identified on percutaneous core breast biopsy. *Breast J* 2003; 9 (1): 4-9.
16. Renshaw AA, Cartagena N, Derhagopian RP, Gould EW. Lobular neoplasia in breast core needle biopsy specimens is not associated with an increased risk of ductal carcinoma in situ or invasive carcinoma. *Am J Clin Pathol* 2002; 117 (5): 797-9.
17. Shin SJ, Rosen PP. Excisional biopsy should be performed if lobular carcinoma in situ is seen on needle core biopsy. *Arch Pathol Lab Med* 2002; 126 (6): 697-701.
18. Armes JE, Galbraith C, Gray J, Taylor K. The outcome of papillary lesions of the breast diagnosed by standard core needle biopsy within a BreastScreen Australia service. *Pathology* 2017; 49: 267-70.
19. Hartmann LC, Degnim AC, Santen RJ, Dupont WD, Ghosh K. Atypical hyperplasia of the breast – risk assessment and management options. *N Engl J Med* 2015; 372: 78-89.
20. Menes TS, Kerlikowske K, Lange J, Jaffer S, Rosenberg R, Miglioretti DL. Subsequent breast cancer risk following diagnosis of atypical ductal hyperplasia on needle biopsy. *JAMA Oncol* 2017; 3: 36-41.
21. Yeh IT, Dimitrov D, Otto P, Miller AR, Kahlenberg MS, Cruz A. Pathologic review of atypical hyperplasia identified by image-guided breast needle core biopsy. Correlation with excision specimen. *Arch Pathol Lab Med* 2003; 127 (1): 49-54.
22. Renshaw AA, Gould EW. Long term clinical follow-up of atypical ductal hyperplasia and lobular carcinoma in-situ in breast core needle biopsies. *Pathology* 2016; 48 (1): 25-9.
23. Kohr JR, Eby PR, Allison KH, et al. Risk of upgrade of atypical ductal hyperplasia after stereotactic breast biopsy: effects of number of foci and complete removal of calcifications. *Radiology* 2010; 255: 723-30.
24. Jacobs TW, Byrne C, Colditz G, Connolly JL, Schnitt SJ. Radial scars in benign breast-biopsy specimens and the risk of breast cancer. *N Engl J Med* 1999; 340 (6): 430-6.
25. Visscher DW, Nassar A, Degnim AC, et al. Sclerosing adenosis and risk of breast cancer. *Breast Cancer Res Treat* 2014; 144 (1): 205-12.

Capsule

American College of Rheumatology provisional criteria for global flares in childhood-onset systemic lupus erythematosus

The objective of **Brunner** and colleagues was to validate the preliminary criteria of global flare for childhood-onset systemic lupus erythematosus (cSLE). Pediatricians experienced in cSLE care (n=268) rated unique patient profiles. The results of standard cSLE laboratory testing and information about the cSLE flare descriptors were presented as follows: global assessment of patient well-being, physician global assessment of disease activity (MD-global), Disease Activity Index score, protein/creatinine ratio (PCR), and erythrocyte sedimentation rate (ESR). Using rater interpretation of the course of cSLE (baseline vs. follow-up as the gold standard) and performance (sensitivity, specificity, area under the receiver operating characteristic curve [AUC]) of the preliminary flare, criteria were tested. An international consensus conference was held to rank the preliminary flare criteria as per the American College of Rheumatology recommendations and delineate threshold scores for minor, moderate, and major flares. The accuracy of the two highest-ranked candidate criteria that consider absolute changes (Δ) of the Systemic Lupus Erythematosus Disease Activity Index (SLEDAI) or British Isles Lupus Assessment Group (BILAG) (numeric scoring: A = 12, B = 8, C = 1, and D/E = 0), MD-global, PCR, and ESR were confirmed (both AUC › 0.93). For the SLEDAI-based criteria (0.5 × ΔSLEDAI + 0.45 × ΔPCR + 0.5 × ΔMD-global + 0.02 × ΔESR) flare scores ≥ 6.4/3.0/0.6 constituted major/moderate/minor flares, respectively. For the BILAG-based algorithm (0.4 × ΔBILAG + 0.65 × ΔPCR + 0.5 × ΔMD-global + 0.02 × ΔESR) flare scores ≥ 7.4/3.7/2.2 delineated major/moderator/minor flares, respectively. These threshold values (SLEDAI, BILAG) were all › 82% sensitive and specific for capturing flare severity.

Arthritis Care Res 2018; 70: 813

Eitan Israeli