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Original Article

DCIS Diagnosed via Core Needle Biopsy: Upstaging Rate, Microinvasion and Axillary Lymph Node Metastasis

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Abstract

Objective: **To determine the upstaging rate of core needle-diagnosed ductal carcinoma in situ (DCIS) to invasive breast cancer, as well as to identify risk factors for upstaging; and to relate DCIS with or without microinvasion to the rate of axillary lymph node metastasis.**

Methods: **Records of breast cancer patients with core needle biopsy (CNB) diagnosis of DCIS with or without microinvasion who subsequently underwent definitive surgery during the years 2008 to 2010 were reviewed. Data on clinical findings, mammographic findings, CNB findings, breast surgical procedures, axillary lymph node procedures, nodal metastasis, and final pathological diagnosis were collected. Upstaging rates were calculated and compared between DCIS groups and attempts were made to identify risk factors for upstaging and axillary lymph node metastasis.**

Results: **CNB-diagnosed pure DCIS were upstaged to any invasive breast cancer in 42% (25/59) of patients, and to macro-invasive cancer only in 19% (11/59). DCIS with microinvasion was upstaged to macro-invasive cancer in 34% (10/29). No risk factors were identified which could predict upstaging. Final diagnoses of pure DCIS, DCIS with microinvasion and macro-invasive breast cancer were associated with axillary lymph node metastasis rates of 0 (0/33), 5% (1/20) and 24% (5/21), respectively. No set of risk factors could identify patients with a high likelihood of axillary metastasis.**

Conclusion: **CNB-diagnosed DCIS with or without microinvasion had a relatively high upstaging rate. No high-risk group for invasive cancer or axillary lymph node involvement could be identified.**

Key words: **ductal carcinoma in situ; microinvasion; upstaging; prediction; axillary lymph node metastasis**

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Introduction

The diagnosis of ductal carcinoma in situ (DCIS) of a breast lesion when obtained via core needle biopsy (CNB) is often upgraded or upstaged to invasive cancer when the lesion is completely excised and fully examined. This may occur in 5% to over 40% of cases depending on the definition of upstaging and various other factors[1,2] . If the prediction of upstaging can be accurately made before the lesion is completely excised then a single-stage surgical treatment can be contemplated. In particular, sentinel lymph node (SLN) biopsy can be done in conjunction with breast conserving surgery if it can be predicted that upstaging is very likely.

The aim of the present study was to estimate the upstaging rate of DCIS diagnosed via CNB to micro- or macro-invasive cancer, and to determine some important factors which might predict upstaging. A secondary objective was to relate these factors to the probability of axillary lymph node metastasis, thus directly answering the question of the need for SLN biopsy.

Patients and Methods

Medical charts of female breast cancer patients who were initially diagnosed as having DCIS with or without microinvasion via CNB during the years 2008 to 2010 and who subsequently underwent definitive breast surgery were reviewed. Patients with or without breast symptoms were included. The hospital's research ethics committee approved the study. The outcomes of the pathological examination of the completely resected specimen were recorded. Data on the axillary lymph node status of patients who underwent axillary lymph node surgery were also documented. These data included the type of axillary procedure, the number of lymph nodes removed, and the number of metastatic nodes. Factors related to diagnostic upstaging and axillary lymph node metastasis were collected. These factors included age, clinical presentation, size of the breast tumor, CNB diagnosis and the presence of microinvasion, the breast imaging recording and data system (BIRADS) classification, presence of radiologic calcification, and the radiologic evidence of breast architectural distortion. In addition, the type of breast surgery performed was recorded in some detail. Grade of DCIS and comedo necrosis were not consistently reported and were therefore omitted from the present study. Data on the size of core needles used and number of cores removed were not collected for the present study.

The relations between CNB diagnosis, final pathological diagnosis, and axillary lymph node status were tested using the chi-square test. Factors related either to the upstaging or to the presence of axillary lymph node metastasis were tested using unpaired *t*-test, rank test, or chi-square test as appropriate, and a multiple logistic regression modeling approach was used to obtain a final set of independent factors. All statistical analyses were performed using Stata version 9 (Stata Corp, College Station, TX, USA). Statistical significance was set at two-sided p-values of 0.05 or less.

Results

There were 88 patients with sufficient information for analysis. The clinical characteristics and the summary of procedures and pathological findings are provided in Table 1. Only 37% (33/88) of patients presented with a palpable breast mass. Almost 90% (78/88) had abnormal calcifications on mammography, while most of the rest had architectural distortion. Core needle biopsy results showed pure DCIS in 67% (59/88) of patients, and DCIS with microinvasion in 33% (29/88). Most patients underwent total mastectomy with some form of axillary lymph node dissection (81% or 71/88). Final pathological diagnoses revealed that 24% (21/88) of patients had macro-invasive breast cancer. Six patients (7% or 6/88) had known metastasis to axillary lymph nodes.

Upstaging rates of CNB-diagnosed DCIS are presented in Table 2. If the initial CNB diagnosis was pure DCIS, it was upstaged to macro-invasive cancer in 19% (11/59) and to any invasive (micro- and macro-invasive) breast cancer in 42% (25/59) of patients. Micro-invasive DCIS was upstaged to macro-invasive disease in 34% (10/29) of patients. In patients with known axillary lymph node status (74/88), there was no clear difference in the rate axillary lymph node involvement between CNB-diagnosed pure DCIS (6% or 3/47) and CNB-diagnosed micro-invasive disease (11% or 3/27), as shown in Table 3. This was because some CNB-diagnosed pure DCIS cases were actually invasive cancer cases. When the final breast pathology

Table 1 Characteristics of patients, procedures and findings (n = 88)

Characteristic	Summary
Age (years): mean (SD)	52.5 (9.8)
Side of lesion (right) (%)	35 (50)
Palpable mass (%)	33 (37)
Microcalcification (%)	78 (89)
Architectural distortion (%)	7 (8)
BIRADS category (%)	
1	1 (1)
2	3 (3)
3	3 (3)
4A	16 (18)
4B	16 (18)
4C	20 (23)
5	29 (33)
CNB diagnosis (%)	
Pure DCIS	59 (67)
DCIS with microinvasion	29 (33)
Surgery (%)	
Wide excision alone	5 (6)
Wide excision with SLNB	4 (5)
Mastectomy alone	8 (9)
Mastectomy with SLNB	57 (65)
Mastectomy with ALND	14 (16)
Surgical pathology (%)	
Pure DCIS	34 (39)
DCIS with microinvasion	33 (38)
Macro-invasive ductal carcinoma	21 (24)
Pathological tumor size (cm.) (%)	
Mean (SD); median (range)	1.8 (1.5); 1.5 (0 to 9)*
Axillary lymph node status (n = 87)† (%)	
No nodal involvement	68 (78)
Positive nodal involvement	6 (7)
No axillary dissection was performed	13 (15)
Total number of nodes from ALND (n = 14)	
Median (range)	12 (8 to 16)
Total number of nodes from SLNB (n = 60)†	
Median (range)	2 (1 to 9)
Number of positive nodes (n = 6)‡	
One (1)	4 (67)
Four (4)	1 (17)
Eleven (11)	1 (17)

* A size of 0 cm refers to no residual tumor: there were three patients with no residual tumor after CNB; † one patient who underwent mastectomy and SLNB had missing data on SLN status; ‡ all 4 patients with a single positive ALN and one patient with 11 positive ALNs had IDC, one patient with 4 positive ALNs had DCIS with microinvasion; CNB: core needle biopsy; DCIS: ductal carcinoma in situ; SLNB: sentinel lymph node biopsy; ALND: axillary lymph node dissection; SD: standard deviation.

was tabulated against axillary lymph node status (Table 4), it was apparent that patients with pure DCIS had no axillary lymph node involvement (0/33), patients with micro-invasive disease had a 5% (1/20) involvement rate, and patients with macro-invasive breast cancer had a 24% (5/21) rate, which were all significantly different.

Table 2 Upstaging of core needle biopsy (CNB)-diagnosed ductal carcinoma in situ (DCIS) (n = 88)

Surgical pathology	CNB finding of pure DCIS (%)	CNB finding of DCIS + microinvasion (%)
Pure DCIS	34 (58)	-
DCIS + microinvasion	14 (24)	19 (66)
Macro-invasive cancer	11 (19)	10 (34)

Chi-square test for upstaging to macro-invasive cancer p-value = 0.101

Table 3 Core needle biopsy (CNB)-diagnosed ductal carcinoma in situ (DCIS) and axillary lymph node involvement (n = 74)*

ALN involvement	CNB finding of pure DCIS (%)	CNB finding of DCIS + microinvasion (%)
No cancer metastasis	44 (94)	3 (6)
Cancer metastasis	24 (89)	3 (11)

Chi-square test p-value = 0.473; * includes only patients who had axillary lymph node sampling or dissection performed

Table 4 Final surgical pathology and axillary lymph node involvement (n = 74)*

ALN involvement	Pure DCIS (%)	DCIS+ microinvasion (%)	Macro-invasive cancer (%)
No cancer metastasis	33 (100)	19 (95)	16 (76)
Cancer metastasis	0	1 (5)	5 (24)

Chi-square test p-value = 0.006; * includes only patients who had axillary lymph node sampling or dissection performed; DCIS: ductal carcinoma in situ

To identify significant factors related to upstaging and axillary lymph node involvement, multiple logistic regression analyses were performed. No factor examined in the present study was significantly related to upstaging to macro-invasive cancer, or to any invasive cancer, or to axillary lymph node involvement (analysis not shown).

Discussion

For a breast cancer patient who wishes breast conserving surgery, a core needle diagnosis of DCIS presents the surgeon and the patient with a difficulty.

The upstaging rate of CNB-diagnosed DCIS is appreciable in all series[2-8], including that of the present study, which ideally implies the need for the excision of the breast lesion prior to definitive surgery. This is a potential waste of time and resources and a source of anxiety to patients. If this intermediate biopsy step can be avoided, then the number of procedures some of the patients will have to undergo, and the time to completion of definitive surgery, will be reduced.

Because the only essential information the surgeon actually needs from a complete excision of the lesion is whether the lesion is an invasive cancer, if this information is available at the time of CNB then an excisional biopsy step can be avoided. That is, if a prediction of invasiveness at the time of CNB is accurate, the surgeon can proceed to a wide excision of the breast lesion and perform a sentinel lymph node biopsy, if indicated, at one setting[2-6] .

In addition, there is some controversy as to the significance of microinvasion, defined as cancer invasion of 1 mm or less in extent, in an otherwise pure DCIS lesion. Although guidelines usually define micro-invasive DCIS as invasive breast cancer[9], evidence points to a significantly lower prevalence of axillary lymph node involvement, and a better prognosis of micro-invasive cancers, as compared with macro-invasive cancers[10,11]. In the present study, DCIS with micro-invasion was compared with pure DCIS and macro-invasive cancers, and axillary lymph node involvement was explicitly examined for each category of invasiveness.

The upstaging of CNB-diagnosed pure DCIS to any invasive cancer in 42% of cases in the present study was rather high, but was similar to a recent study from the same institution[12], as well as within the limits of previous studies done outside the present institution[1,7]. However, macroinvasion was found in 19% of patients, which, although not very high, was probably sufficiently high for a recommendation of routine excisional biopsy, if no other predictive factors were present. Similar recommendation would be made for a CNB-diagnosed DCIS with microinvasion, with an even higher (although not significantly different) macro-invasive cancer upstaging rate of 34%.

While no significant risk factors for upstaging were found in the present study, other studies have found several important candidate factors. These factors were not all consistently found to be good predictors, however. Among the factors which increased the risk include: younger age[2], palpable tumors[3,5,6], larger tumor size (pathological or mammographic)[2-4,8], smaller core needle size (e.g. 14-gauge needle)[1], fewer number of cores obtained[7,8], certain mammographic findings such as mass lesions and architectural distortion[3-6], presence of microinvasion (for upstaging to macro-invasive cancers)[4], higher tumor grade[1,2], presence of comedonecrosis[1,7], and positive excision margins[7].

The present study could not define a subset of patients in whom upstaging could be accurately predicted and in whom SLN biopsy could be performed without a preliminary excisional biopsy. However, it was found that axillary lymph nodes were unlikely to be involved if the final pathology was DCIS or DCIS with microinvasion.

In view of the results of the recent SLN trials[13,14] and the ACOSOG Z0011 trial[15], it is tempting to surgically treat patients with micro-invasive DCIS in similar manner to those with pure DCIS. In the present study, the axillary lymph node involvement rate was 5%, which might be safely ignored when one considers that the acceptable missed axillary metastasis rate in invasive breast cancers after SLN biopsy is 10% or less. Any missed tumor-containing lymph nodes might be partially treated by breast irradiation[15]. However, if no systemic therapy were to be given (such as in estrogen receptor-negative disease), it might not yet be safe to treat micro-invasive DCIS in the same way as pure DCIS until more research addressing this issue has been done.

The limitations of the present study include a small sample size and hence a lack of statistical power. This was probably one of the main reasons for the lack of any significant risk factors for upstaging and lymph node metastasis found in the present study. Another explanation might be that other potentially important risk factors such as tumor grade, size of core needle, and so on, were not obtained for the present study. These factors might be obtained in a future prospective study.

Conclusion

In patients with CNB-diagnosed DCIS, with or without microinvasion, no high-risk subgroup for upstaging could be identified in the present study.

Patients with a final diagnosis of pure DCIS or DCIS with microinvasion had a low risk of axillary metastasis. Nonetheless, there is insufficient evidence as to the safety of managing DCIS with microinvasion as if it were pure DCIS.

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