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Implications of diagnosing ductal carcinoma in situ in core needle biopsies of the breast

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Abstract

Objective: To study the implications of Ductal Carcinoma In Situ (DCIS) diagnosis in Core Needle Biopsies (CNBs) of the breast.

Method: The histology slides of 59 CNBs and BCS (Breast conserving surgery) /Mastectomy were reviewed for the presence and percentage of DCIS and 63 BCS were reviewed for positivity of the surgical margins. SPSS -13 and appropriate statistical tests were used for analysis.

Results: The sensitivity of CNB to predict DCIS in the surgical specimen was 45.65%. A positive relationship was established between DCIS positivity in CNB and DCIS percentage in the subsequent surgical specimen ($p=0.002$). A positive correlation exists between the number of positive margins and percentage of DCIS ($p<0.01$) in BCS specimens. The difference in the number of cores obtained was significant among the true DCIS positive and false negative cases ($p=0.006$).

Conclusion: DCIS in CNB is often associated with DCIS in BCS/mastectomy in a higher percentage of the same. A higher percentage of DCIS frequently has positive BCS margins, thus wider excisions are indicated for women with DCIS positive CNB's. Sensitivity of identifying DCIS in the CNB increases with number of CNB cores.

Key words: Carcinoma breast, DCIS, Core needle biopsy, Breast conserving surgery

Introduction

The presence of Ductal carcinoma in situ (DCIS) increases the risk of subsequent invasive carcinoma of the breast. Most DCIS are non palpable and are detected by mammography (1). Core needle biopsy (CNB) is widely used to obtain tissue for histological evaluation from mammographically detected, non palpable and palpable breast lesions (2,3). Following a CNB diagnosis of either in situ or invasive duct carcinoma, the type of surgery planned is influenced by therapeutic as well as cosmetic factors. Extensive intraduct component (EIC) refers to invasive carcinoma where DCIS represents 25% or more of the tumour and extending beyond the main tumour mass (4). The presence of EIC in the breast conserving surgical specimens (BCS) increases the risk for recurrence (5). DCIS has been observed at the surgical margins of these cases in some studies (4,5). Diagnosis of EIC requires pathological assessment of the BCS specimen. Therefore its usefulness in

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predicting positive margins is limited (4). However the absence of DCIS in CNB is documented to exclude the possibility of eventually identifying EIC in the subsequent surgical specimen (4). The presence of DCIS in the CNB may indicate otherwise. Carcinoma of the breast is the commonest malignancy among women worldwide, including Sri Lankan women (6,7).

Many women opt for BCS in view of its cosmetic superiority, though the risk of local recurrence is higher than with mastectomy (8). Margin negativity needs to be ensured when BCS is considered in order to reduce the need for rexcision and prevent local recurrence. CNB is becoming a common diagnostic modality in our setting and DCIS is often diagnosed with or without invasive carcinoma in the limited amount of material submitted.

Objective

To study the implications of ductal Carcinoma in situ (DCIS) diagnosis in Core Needle Biopsies (CNBs) of the breast.

Materials and methods

Histology slides of fifty nine CNBs with duct carcinoma, obtained from palpable/ non palpable breast lesions and the corresponding surgical specimens (BCS specimen or mastectomy) were analysed for the presence or absence of DCIS. The percentage of DCIS in the surgical specimen was documented independent of the relevant CNB. Histology slides of 63 BCS (including the cases without corresponding CNB) were reviewed for positive surgical margins. A positive surgical margin was defined as the presence of invasive carcinoma and/or DCIS present (focal or more) at the surgical margin or within 1mm. Linear extent of the positive margin, another predictor of local recurrence was not considered (9). SPSS -13 software package was used for data analysis. Sample means of quantitative data was compared by the student test while the Pearson correlation test was used to determine possible association between two variables (10).

Sensitivity was assessed as,

$$\text{Sensitivity} = \frac{\text{Number of true positives} \times 100}{\text{Number of true positives} + \text{Number of false negatives}}$$

Results

Of the 59 cases with both CNB and the definitive surgical specimen (BCS or mastectomy), 21 CNBs showed DCIS (true positives) (Table 1). Forty six surgical specimens had DCIS.

Sensitivity of CNB to predict the presence of DCIS in the definitive surgical specimen

$$= \frac{21 \times 100}{21+25} = 45.65\%$$

The 21 (47.6%) true positive cases showed >25% of DCIS in the subsequent surgical specimen. The 25 (8%) false negative cases showed >25% DCIS in the subsequent surgical specimen. This difference was statistically significant (p=0.002) (Table 2).

CNB	BCS / Mastectomy DCIS Present	BCS / Mastectomy DCIS absent
DCIS present 24	21 (True positives by CNB)	3 (False positives by CNB)
DCIS absent 35	25 (False negatives by CNB)	10 (True negatives by CNB)
Total 59	46	13

Table 1. DCIS positivity in CNB, BCS and mastectomy specimens

Of the 59 CNBs 8 had EIC in the corresponding surgical specimen.Seven out of the eight (87.5 %) EIC positive cases showed DCIS in the CNB.

Of the 59 CNBs 7 were identified to have "DCIS only" but four of them had invasive carcinoma and the remaining three had EIC in the definite surgical specimen.

DCIS in CNB	<25% DCIS at definitive surgery (BCS/Mastectomy)	>25% DCIS at definitive surgery (BCS/Mastectomy)	Significance*
positive	52.4% (n=11)	47.6% (n=10)	
negative	92% (n=23)	8% (n=2)	0.002

Table 2. Relationship between DCIS in the CNB, and the percentage of DCIS in the corresponding surgical specimen (BCS/Mastectomy)

*based on Pearson Chi-square significance test (p=0.002).

Of the three with EIC two had positive margins following mastectomy and BCS, while the other was completely excised at BCS. The mean number of tissue cores per patient, among the 21 true positive cases of DCIS in the CNB was 2.52(SD +/- 0.873) while it was 1.82(SD+/- 0.816) among the 25 false negative cases (Table 3). This difference was statistically significant. (p=0.006).

DCIS CNB	Number of patients	Mean Number of tissue cores per patient	Standard deviation	T value	Significance*
Present	21 (True positives)	2.52	0.873	2.902	0.006
Absent	25 (True negatives)	1.82	0.816	2.885	

Table 3. The number of tissue cores per patient among the true positive and true negative cases of DCIS in CNB

*based on 2 tailed test

Of the 63 BCS specimens 36 had DCIS and invasive carcinoma. Invasive carcinoma alone was seen in 23 and 4 cases had only DCIS. Of the 40 specimens with DCIS, 16 showed margin involvement by either DCIS or invasive carcinoma.The Number of margins involved per patient varied from 0 to 4. The number of margins involved increased with the percentage of DCIS in the tumour (Table 4). A significant positive correlation was observed between the number of involved margins and the percentage of DCIS in BCS specimens ($p<0.01$).

Discussion

The CNB demonstrated a sensitivity of 45.7% for predicting DCIS in the subsequent surgical specimen (BCS or Mastectomy) in this study, in comparison to a documented sensitivity of 10% (11). Though the sensitivity is <50%, a significant association was seen between DCIS positivity in the CNB and the percentage of DCIS (<25% or >25%)in the subsequent surgical specimen. Therefore patients with DCIS positive CNBs are more likely to have tumours with a higher percentage (>25%) of DCIS. According to Dzierzanowski et al (4), absence of DCIS in a core needle biopsy excludes the possibility of identifying EIC in subsequent definitive surgery. However seven out of eight EIC cases showed DCIS in the CNB in this study. Thus finding DCIS in the CNB makes it suspicious for harbouring EIC. This study further demonstrates that the percentage of DCIS in BCS specimens has an impact on the number of positive surgical margins in that there are increasing numbers of positive margins seen in cases with higher percentage of DCIS. This information is valuable to the surgeon when planning breast conserving surgery, as it enables to consider wider local excision to ensure negative margins. Though the number is limited, four out of seven women in the study whose CNB showed only DCIS, were found to have invasive carcinoma at

definitive surgery. More significantly, three of them showed EIC, including two with margin involvement. Therefore it is important to note that a "DCIS only" diagnosis in the CNB might turn out to be an invasive carcinoma with or without EIC, with possible margin involvement. Therefore, it is important to comment on this possibility in a CNB exclusively comprising DCIS.

Variable	Number of margins involved per patient	% of DCIS in tumour
	0 margins (n=24)	5-30%
	1 margin (n=10)	10-80%
	2 margins (n=4)	10-90%
	3 margins (n=1)	90%
	4 margins (n=1)	100%
Pearson co-efficient correlation	*0.603	*0.603
Significance (2-tailed)	<0.001	<0.001

Table 4. Correlation between the percentage of DCIS, and margin involvement (DCIS/invasive) in BCS specimens

The current study also provides an indication as to the number of tissue cores that should be obtained per individual undergoing CNB for identification of DCIS. Three tissue cores were shown to be more efficient in identifying DCIS than two. Most centers dealing with breast cancer attempt to take an average of 3 cores from symptomatic patients. The number of cores obtained is higher, as much as 10 for mammographically detected calcifications (12). Therefore, the sensitivity of identifying DCIS could be affected by inadequate sampling. Failure to target the periphery of the tumour involved by DCIS is documented as yet another significant factor contributing to inadequate sampling (11). These inadequacies could be partly overcome by increasing the number of tissue cores obtained per individual as done in this study. However, assessment of a larger sample may be necessary to decide on the optimum number of tissue cores that should be obtained per individual undergoing CNB. According to Gavin et al (12) the anatomically discontinuous growth pattern characteristic of in situ ductal lesions due to intra ductal spread could be responsible for margin involvement of BCS specimens by DCIS (12). The likelihood of having DCIS at the periphery of the tumour may contribute to the higher percentage of positive margins seen with DCIS. In keeping with this, documented studies have also shown a higher chance of having DCIS in re-excision specimens as opposed to invasive carcinoma; though the initial resection only demonstrated invasive carcinoma (12).

Mammographic facilities are now available in major hospitals in Sri Lanka. Awareness of breast cancer and a desire for less mutilating surgery have also increased among Sri Lankan women. Therefore CNBs from palpable and non-palpable breast lesions are expected to contribute significantly to the number of breast specimens received in pathology laboratories in Sri Lankan hospitals in the future. Currently there are no documented studies considering these aspects of DCIS in limited surgical specimens (CNBs) in Sri Lanka.

Thus it would be prudent to be aware of the results of this study from a centre where CNB specimens formed major part of the diagnostic work up of non palpable and palpable breast lesions.

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