Journal of Medical and Health Studies (JMHS)
ISSN: 2710-1452
DOI: 10.32996/jmhs
Journal Homepage: www.al-kindipublisher.com/index.php/jmhs

JMHS
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

Ultrasound and Mammographic Features of Ductal Carcinoma in Situ: A Retrospective Review of 70 Ultrasound-Guided Core Needle Biopsy Cases at Ho Chi Minh City Oncology Hospital

Huynh Thi Do Quyen[1], Bui Thi Huong Giang[1], and Mai Yen Ngan[1]

[1]Department of Endoscopy and Ultrasound, Ho Chi Minh City Oncology Hospital, Ho Chi Minh City, Vietnam
Corresponding Author: Huynh Thi Do Quyen, **E-mail**: doquyenbvub0208@gmal.com

| ABSTRACT

Background: Ductal carcinoma in situ (DCIS) is a heterogeneous breast malignancy with variable mammographic and sonographic appearances. Although mammography remains the primary modality for detecting DCIS, especially calcified lesions, ultrasound is particularly useful in dense breasts, non-calcified lesions, and biopsy guidance. Upgrade from DCIS diagnosed on core needle biopsy (CNB) to invasive carcinoma on surgical pathology remains clinically important because it may alter surgical planning. Methods: We conducted a retrospective review of ultrasound-guided 14-gauge CNB cases diagnosed as DCIS at the Department of Endoscopy and Ultrasound, Ho Chi Minh City Oncology Hospital, from June 2024 to December 2024. Among 153 CNB-proven DCIS cases, 70 had complete ultrasound, mammography, CNB pathology, and surgical pathology data and were included in the final analysis. Results: Of the 70 included cases, 24 were upgraded to invasive carcinoma on surgical pathology, yielding an upgrade rate of 34.0%. On mammography, the most common presentation was a mass with calcifications (50.0%), followed by non-calcified mass lesions (21.4%) and calcifications alone (14.3%). On ultrasound, 55 lesions (78.6%) appeared as masses and 15 (21.4%) as non-mass lesions. Among upgraded cases, 21 of 24 (87.5%) were mass-forming lesions. Large lesion size (≥20 mm) and multifocality were the most notable features associated with upgrade. Conclusion: DCIS shows diverse mammographic and ultrasound appearances in ultrasound-guided biopsy practice, with a predominance of mass-forming lesions. Lesion size of at least 20 mm and multifocality appear to be useful clues for predicting upgrade from DCIS to invasive carcinoma.

| KEYWORDS

Ductal carcinoma in situ, DCIS, mammography, ultrasound, core needle biopsy, upgrade, breast cancer

| ARTICLE INFORMATION

ACCEPTED: 12 April 2026 **PUBLISHED:** 20 April 2026 **DOI:** 10.32996/jmhs.2026.7.6.6

1. Introduction

Ductal carcinoma in situ (DCIS) is a non-obligate precursor of invasive breast carcinoma and currently accounts for a substantial proportion of newly diagnosed breast cancers in screened populations (Bragg et al., 2021; Stomper et al., 1989). Mammography remains the first-line imaging modality for DCIS because it best depicts calcification morphology, distribution, and extent (Berg & Leung, 2019; D'Orsi et al., 1998). In most series, DCIS presents mammographically as suspicious calcifications, whereas non-calcified DCIS is less common but diagnostically more challenging (Bragg et al., 2021; Kim et al., 2009; Stomper et al., 1989).

Ultrasound plays a complementary role, especially in dense breasts, mammographic blind areas, non-calcified lesions, and real-time image-guided biopsy (Ban et al., 2020; Berg & Leung, 2019; Moon et al., 2002). Japanese breast ultrasound literature has emphasized that DCIS may appear either as a mass or as a non-mass lesion, with the latter including hypoechoic areas, ductal abnormalities, architectural distortion, clustered microcysts, and isolated echogenic foci (Ban et al., 2020; Watanabe et al., 2017).

Copyright: © 2026 the Author(s). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) 4.0 license (https://creativecommons.org/licenses/by/4.0/). Published by Al-Kindi Centre for Research and Development, London, United Kingdom.

However, sonographic findings may be non-specific and can overlap with benign fibrocystic change (Bragg et al., 2021; Lee et al., 2013).

Another major issue is underestimation at CNB. A lesion diagnosed as pure DCIS on biopsy may be upgraded to invasive carcinoma at surgery, with important implications for extent of surgery and possible sentinel lymph node biopsy (Brennan et al., 2011; Lamb et al., 2021; Villegas-Carlos et al., 2022). Reported upgrade rates vary widely across studies due to differences in imaging phenotype, histologic grade, biopsy technique, and case selection (Brennan et al., 2011; Lamb et al., 2021).

The present study aimed to describe the mammographic and ultrasound features of DCIS diagnosed on ultrasound-guided CNB at Ho Chi Minh City Oncology Hospital and to identify imaging characteristics associated with upgrade to invasive carcinoma on final surgical pathology.

2. Methods

2.1 Study design and setting

This retrospective case-series study was conducted at the Department of Endoscopy and Ultrasound, Ho Chi Minh City Oncology Hospital. We reviewed cases from June 2024 through December 2024. A total of 153 ultrasound-guided CNB cases diagnosed as DCIS were identified, and 70 cases met the inclusion criteria for final analysis.

2.2 Inclusion and exclusion criteria

Eligible cases were ultrasound-guided 14-gauge CNB specimens diagnosed as DCIS with complete ultrasound, mammography, CNB pathology, and final surgical pathology data. Cases biopsied under mammographic or MRI guidance, or cases lacking any of the required imaging or pathologic information, were excluded.

2.3 Imaging review

Mammographic findings were categorized as calcifications alone, mass with calcifications, non-calcified mass, focal asymmetry, architectural distortion, or negative mammography. Ultrasound findings were categorized as mass-forming or non-mass lesions.

2.4 Pathology review and outcome definition

CNB findings were correlated with final surgical pathology. Upgrade was defined as the presence of invasive carcinoma on the surgical specimen after an initial diagnosis of DCIS on ultrasound-guided CNB.

3. Results

3.1 Study population and upgrade rate

Among the 153 ultrasound-guided CNB cases diagnosed as DCIS during the study period, 70 had complete imaging and pathology data and were included in the final analysis. Of these 70 lesions, 24 were upgraded to invasive carcinoma on final surgical pathology, corresponding to an upgrade rate of 34.0%

3.2 Mammographic findings

Mammographic appearances were heterogeneous. The most common pattern was a mass with calcifications, seen in 35 of 70 cases (50.0%). Non-calcified masses accounted for 15 cases (21.4%), and calcifications alone were present in 10 cases (14.3%). Focal asymmetry was observed in 6 cases (8.6%), while 4 cases (5.7%) had negative mammography. No lesion presented primarily as architectural distortion in this cohort (Table 1).

3.3 Ultrasound findings

On ultrasound, 55 of 70 lesions (78.6%) were mass-forming and 15 (21.4%) were non-mass lesions (Table 2). This predominance of mass-forming lesions likely reflects the ultrasound-guided biopsy setting, in which sonographically visible lesions are more likely to undergo CNB.

3.4 Histologic grade

Among 66 evaluable cases with available mammographic-pathologic correlation, intermediate- and high-grade lesions predominated. Grade 2 and grade 3 lesions were more common in calcified DCIS than in non-calcified DCIS (Table 3).

3.5 Imaging features associated with upgrade

Among the 24 upgraded cases, 21 (87.5%) were mass-forming lesions and 3 (12.5%) were non-mass lesions. Among upgraded mass lesions, 14 were ≥20 mm, whereas only 1 measured <20 mm. All 3 upgraded non-mass lesions measured ≥20 mm. Multifocality was documented in 6 upgraded cases. Histologically, 11 of 24 upgraded lesions (45.8%) were high grade (Table 4).

4. Discussion

In this ultrasound-guided CNB cohort, DCIS most commonly appeared as a mass rather than as isolated calcifications. This pattern differs from classic mammography-dominant descriptions, in which calcifications alone are the leading presentation, but it is consistent with the selection effect of ultrasound-guided biopsy practice (Stomper et al., 1989; Bragg et al., 2021). In other words, lesions that can be targeted under ultrasound are more likely to be mass-forming or to have a sufficiently visible sonographic correlate.

Mammographically, calcifications remain central to DCIS diagnosis. However, our data show that the combination of a mass and calcifications was the most frequent pattern, while calcifications alone represented only 14.3%. This likely reflects the imaging pathway of this cohort rather than a true shift in DCIS biology. Mammography still remains essential because it is superior for assessing calcification morphology and distribution, both of which are critical for lesion characterization and preoperative assessment (Berg & Leung, 2019; D'Orsi et al., 1998).

On ultrasound, nearly four-fifths of lesions were mass-forming. This observation aligns with prior sonographic studies showing that a substantial subset of DCIS, especially ultrasound-detected or ultrasound-targeted lesions, can present as masses (Lee et al., 2013; Moon et al., 2002). Nevertheless, the non-mass subgroup remains important. On ultrasound, nearly four-fifths of lesions were mass-forming. This observation aligns with prior sonographic studies showing that a substantial subset of DCIS, especially ultrasound-detected or ultrasound-targeted lesions, can present as masses (Lee et al., 2013; Moon et al., 2002). Nevertheless, the non-mass subgroup remains important. Japanese ultrasound studies have shown that hypoechoic areas and ductal abnormalities are among the most relevant non-mass patterns in DCIS and may be easily overlooked if they are misinterpreted as benign change (Ban et al., 2020; Watanabe et al., 2017). As illustrated in Figure 1, some cases of non-mass DCIS may appear only as a subtle hypoechoic area on ultrasound rather than as a discrete mass, making detection more challenging on routine examination. This is clinically relevant in daily practice, particularly in dense breasts and in patients with subtle mammographic findings. This is clinically relevant in daily practice, particularly in dense breasts and in patients with subtle mammographic findings.

The upgrade rate in our study was 34.0%, which falls within the broad range reported in the literature (Brennan et al., 2011; Lamb et al., 2021; Villegas-Carlos et al., 2022). Upgrade matters because it can change the operative plan and support consideration of sentinel lymph node biopsy. In our cohort, lesion size ≥20 mm and multifocality were the clearest imaging clues associated with upgrade. Most upgraded mass lesions measured at least 20 mm, and all upgraded non-mass lesions were also ≥20 mm. These findings are directionally consistent with prior reports identifying larger lesion extent as a predictor of invasion (Lamb et al., 2021; Villegas-Carlos et al., 2022; Yoon et al., 2020).

We also observed that nearly half of the upgraded cases were high-grade lesions. This is consistent with previous studies suggesting that high-grade DCIS is more likely to harbor invasive foci that are not captured by CNB (Brennan et al., 2011; Villegas-Carlos et al., 2022). However, lesion size and multiplicity appeared more practically useful than grade alone in our dataset.

MRI was not the focus of the present study, but prior research has suggested that it may improve assessment of disease extent in selected patients, especially in multifocal or non-calcified DCIS (Bragg et al., 2021; Yoon et al., 2020). Even so, mammography remains indispensable for direct visualization of calcifications, while ultrasound retains a critical role in dense breasts, non-calcified lesions, and biopsy guidance.

This study has limitations. It was retrospective, single-center, and based on a selected ultrasound-guided biopsy cohort, which likely enriched the sample for sonographically visible mass lesions. The sample size was modest, and no multivariable modeling was performed. Even so, the study offers practical insight into the imaging spectrum of DCIS in real-world ultrasound-guided biopsy practice.

5. Conclusion

DCIS in an ultrasound-guided CNB cohort showed diverse imaging appearances but predominantly presented as a mass. Non-mass lesions were less common but remained clinically relevant, particularly when they manifested as hypoechoic areas or ductal abnormalities. The upgrade rate from DCIS on CNB to invasive carcinoma on final surgical pathology was 34.0%. Lesion size ≥20 mm and multifocality were the most useful imaging clues associated with upgrade.

Funding: This research received no external funding.
Conflicts of Interest: The authors declare no conflict of interest.
Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers.

References

[1]. Ban, K., Hara, T., Nishioka, A., et al. (2020). Characteristics of ultrasonographic images of ductal carcinoma in situ with abnormalities of the ducts. Journal of Medical Ultrasonics, 47(1), 107–115.
[2]. Berg, W. A., & Leung, J. (2019). Diagnostic imaging: Breast. Elsevier Health Sciences.
[3]. Bragg, A., et al. (2021). Imaging of noncalcified ductal carcinoma in situ. Journal of Clinical Imaging Science, 11, 34.
[4]. Brennan, M. E., et al. (2011). Ductal carcinoma in situ at core-needle biopsy: Meta-analysis of underestimation and predictors of invasive breast cancer. Radiology, 260(1), 119–128.
[5]. D'Orsi, C., Bassett, L., & Feig, S. (1998). Breast imaging reporting and data system (BI-RADS) breast imaging atlas. American College of Radiology.
[6]. Lamb, L. R., et al. (2021). Noncalcified ductal carcinoma in situ (DCIS): Rate and predictors of upgrade to invasive carcinoma. Academic Radiology, 28(3), e71–e76.
[7]. Lee, M. H., et al. (2013). Sonographic findings of pure ductal carcinoma in situ. Journal of Clinical Ultrasound, 41(8), 465–471.
[8]. Moon, W. K., et al. (2002). US of ductal carcinoma in situ. RadioGraphics, 22(2), 269–281.
[9]. Stomper, P. C., et al. (1989). Clinically occult ductal carcinoma in situ detected with mammography: Analysis of 100 cases with radiologic-pathologic correlation. Radiology, 172(1), 235–241.
[10]. Villegas-Carlos, F., et al. (2022). Predictive factors of invasion in ductal carcinoma in situ diagnosed by core-needle biopsy. Cirugía y Cirujanos, 90(1), 41–49.
[11]. Watanabe, T., et al. (2017). Ultrasound image classification of ductal carcinoma in situ (DCIS) of the breast: Analysis of 705 DCIS lesions. Ultrasound in Medicine & Biology, 43(5), 918–925.
[12]. Yoon, G. Y., et al. (2020). Surgical outcomes for ductal carcinoma in situ: Impact of preoperative MRI. Radiology, 295(2), 296–303.

Table 1. Mammographic findings in 70 included DCIS cases

Mammographic finding	**n**	**%**
Mass with calcifications	35	50.0
Non-calcified mass	15	21.4
Calcifications alone	10	14.3
Focal asymmetry	6	8.6
Architectural distortion	0	0.0
Negative mammography	4	5.7

Table 2. Ultrasound findings in 70 included DCIS cases

Ultrasound pattern	**n**	**%**
Mass-forming lesion	55	78.6
Non-mass lesion	15	21.4

Table 3. Histologic grade according to calcification status in 66 evaluable cases

Histologic grade	**Non-calcified DCIS**	**Calcified DCIS**
Grade 1	4	1
Grade 2	12	21
Grade 3	7	21
Not reported	1	1

Table 4. Characteristics of upgraded cases (n = 24)

Variable	**Category**	**n**
Lesion type	Mass-forming	21
	Non-mass	3
Size in mass lesions	<20 mm	1
	≥20 mm	14
Size in non-mass lesions	<20 mm	0

	≥20 mm	3
Multiplicity	Multifocal	6
Histologic grade	Grade 1	2
	Grade 2	9
	Grade 3	11
	Not reported	2

Figure 1. Illustrative case of non-mass DCIS presenting on ultrasound as a subtle hypoechoic area without a discrete mass. The lesion was more confidently detected on targeted ultrasound after suspicious findings had been identified on mammography and MRI