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Atypical Ductal Hyperplasia of the Breast:
Radiologic and Histopathologic Correlation[1]

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Purpose: To evaluate the clinical and radiologic findings of atypical ductal hyperplasia (ADH) using mammography and ultrasonography, and to correlate the radiologic and histopathologic findings.

Materials and Methods: Sixty-four pathologically proven lesions in 64 patients who were examined between March 2000 and March 2003 were the subject of this study. Mammography was performed in all 64 cases, and ultrasonography in 30. Two radiologists retrospectively evaluated the radiologic findings, classifying them as one of four types: mass, microcalcification, other finding, and no detected lesion. At mammography, masses were classified according to their shape, margin, and density and microcalcifications according to their shape and distribution. At ultrasonography, masses were evaluated in terms of their shape, margin, internal and posterior echotexture, ductal extension, and parallelism to skin. Geographic correlation between the radiologic and histopathologic findings was classified as direct, near direct, or remote correlation.

Results: Mammography demonstrated 37 cases of microcalcification (57.8%), 14 in which masses were present (21.9%), two in which there were other findings (3.1%), and 11 in which lesions were not detected (17.2%). The "other finding" was ductectasia. Microcalcifications were round in 19 cases, pleomorphic heterogeneous in 16, and branching linear in one. The most common distribution of microcalcification was clustered (29 cases; 78.4%). Masses were oval or round in nine cases and irregular in three, and in seven cases their margin was ill-defined. In 13 cases, the density of the masses was equal to that of breast tissue. Ultrasonography showed that the masses were round or oval in 15 cases and irregular in 14, and that the margin was ill-defined in 16 cases and circumscribed in ten. In 19 cases, the echotexture of the masses was low, and in 20 cases, heterogeneous. Parallel orientation was seen in 25 cases, and ductal extension in 22. Category 4 was the most common final assessed BI-RADS category, found in 75% of cases. Radiologic-histopathologic correlation was direct in 44 cases, near direct in 13, and remote in seven. Clinically, self or clinical examination of the breast revealed no abnormality in 47 cases, a palpable mass in seven, nipple discharge in seven, and breast pain in three.

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Conclusion: At mammography, the most common finding of ADH was clustered round or pleomorphic heterogeneous microcalcifications, and at ultrasonography, ill-defined, round or oval, or irregular-shaped, hypoechoic masses with parallel orientation and ductal extension. Clinically, most ADH was incidentally discovered at radiologic examination. In this study, 17.2% of ADH cases were not demonstrated by mammography but were detected at ultrasonography, and for the detection of ADH, the use of this latter modality, alongside mammography, is thus feasible.

Index words : Breast
Breast, mammography
Breast, ultrasonography
Breast neoplasms
Breast neoplasms, diagnosis

Atypical ductal hyperplasia (ADH) of the breast is a borderline lesion that has some but not all of the features of ductal carcinoma in situ (DCIS) (1). ADH was found adjacent to breast cancer in about 51% of reported cases, and women in whom ADH is discovered at surgical biopsy are at four-to fivefold increased risk of developing invasive breast cancer. If there is a family history of breast cancer, this risk doubles and becomes equal to the risk of carcinoma in situ (2, 3).

The early detection and diagnosis of ADH may thus prevent the subsequent development of invasive carcinoma, and may play an important role in detecting associated early cancer in adjacent breast.

The purpose of this study was to evaluate the clinical and radiologic findings of ADH, using mammography and ultrasonography, and to correlate the radiologic and histopathologic findings.

Materials and Methods

Between March 2000 and March 2003, 64 lesions in 64 patients with pathologically proven ADH were surgically excised, and the cases formed the basis of this study. Patients in whom synchronous breast cancer and ADH existed within the same breast were excluded, as were those in whom preoperative biopsy suggested ADH but DCIS was diagnosed after surgical excision. The patients' age range was 23–56 (mean, 47.8) years.

Mammography was performed in 64 cases: screening mammography in 46 cases and diagnostic mammography in 18. In 30 of the 64, ultrasonography was performed for further evaluation of mammographically detected abnormal findings ($n=19$), due to dense breasts ($n=9$), or symptomatic patients with negative mammography ($n=2$). Among the 64 patients involved, 52 underwent surgical excision involving imaging-guided localization; this was mammography-guided in 37 cases and ultrasonography-guided in 15.

A Senographe DMR+ (General Electronic Medical Systems, Milwaukee, Wis., U.S.A.) was used for mammography, and an HDI 5000 SonoCT (Advanced Technology Laboratories, Bothell, Wash., U.S.A.), an Ultramark 9 (Advanced Technology Laboratories) and a Logiq 9 (General Electronics) for ultrasonography. A broad-band 12–14 MHz linear scanhead was utilized. In a few cases, scanning was performed at outside institutions, using unknown but dedicated equipment.

Mammography provided mediolateral oblique and craniocaudal views of each breast in all 64 patients, and in 17 cases, spot compression or magnification views were obtained after routine mammography. Ultrasonograms of both breasts were obtained in the transverse, longitudinal, radial, and antiradial planes.

The radiologic findings were retrospectively evaluated by two breast radiologists. The American College of Radiology BI-RADS (Breast Imaging Reporting and Data System) (4) was used, and a consensus was reached. Abnormalities were classified as one of four types: mass, microcalcification, other findings, or no detected lesion. "Other findings" included ductal change.

Using the BI-RADS, breast composition was found to be one of four types: extremely dense, heterogeneously dense, consisting of scattered fibroglandular densities, or entirely fatty. Masses were evaluated in terms of their shape, margin, density, and the presence of microcalcification. Their shape was classified as round or

oval, lobular, irregular, or involving architectural distortion, and their margin as circumscribed, microlobulated, obscured (partially hidden by adjacent structures), ill-defined, or spiculated. By comparing it with the density of normal breast tissue, density was defined as high, equal, low, or fat-containing.

The microcalcifications observed at mammography were evaluated in terms of their morphology and distribution pattern. Their shape was classified as round or punctate (round microcalcifications less than 0.5 mm in size), amorphous, fine linear branching, or pleomorphic heterogeneous, and their distribution pattern as clustered, segmental, regional, or diffuse.

At ultrasonography, masses were evaluated in terms of their shape, margin, internal echogenicity, internal echotexture, posterior echo intensity, orientation, the presence of ductal extension, and the presence of microcalcification. Shape and margin as visualized at mammography were evaluated similarly. By comparing it with that of fat tissue, internal echogenicity was classified as high, equal, or low and internal echotexture as hetero- or homogeneous. Posterior echo intensity was classed as enhanced, unaffected, or decreased, and orientation as parallel or antiparallel to overlying skin.

The final assessment of radiologic findings in each case was determined using the BI-RADS, which indicates the probability of malignancy: category 1, negative; category 2, benign; category 3, probably benign; category 4, suspicious abnormality; and category 5, highly suggestive of malignancy.

Corresponding hematoxylin-eosin slides were retrieved from the files of The Department of Pathology, and were reviewed by a pathologist in order to confirm or refute the presence of ADH using the criteria established by Page et al. (5), Dupont and Page (6), and Cotran et al. (7). The diagnosis of ADH was made in cases in which the cells within the hyperplastic ducts fulfilled some, but not all, of the criteria of intraductal carcinoma, including rounded, uniform cells, regular cell placement of oval cells without streaming or orienta-

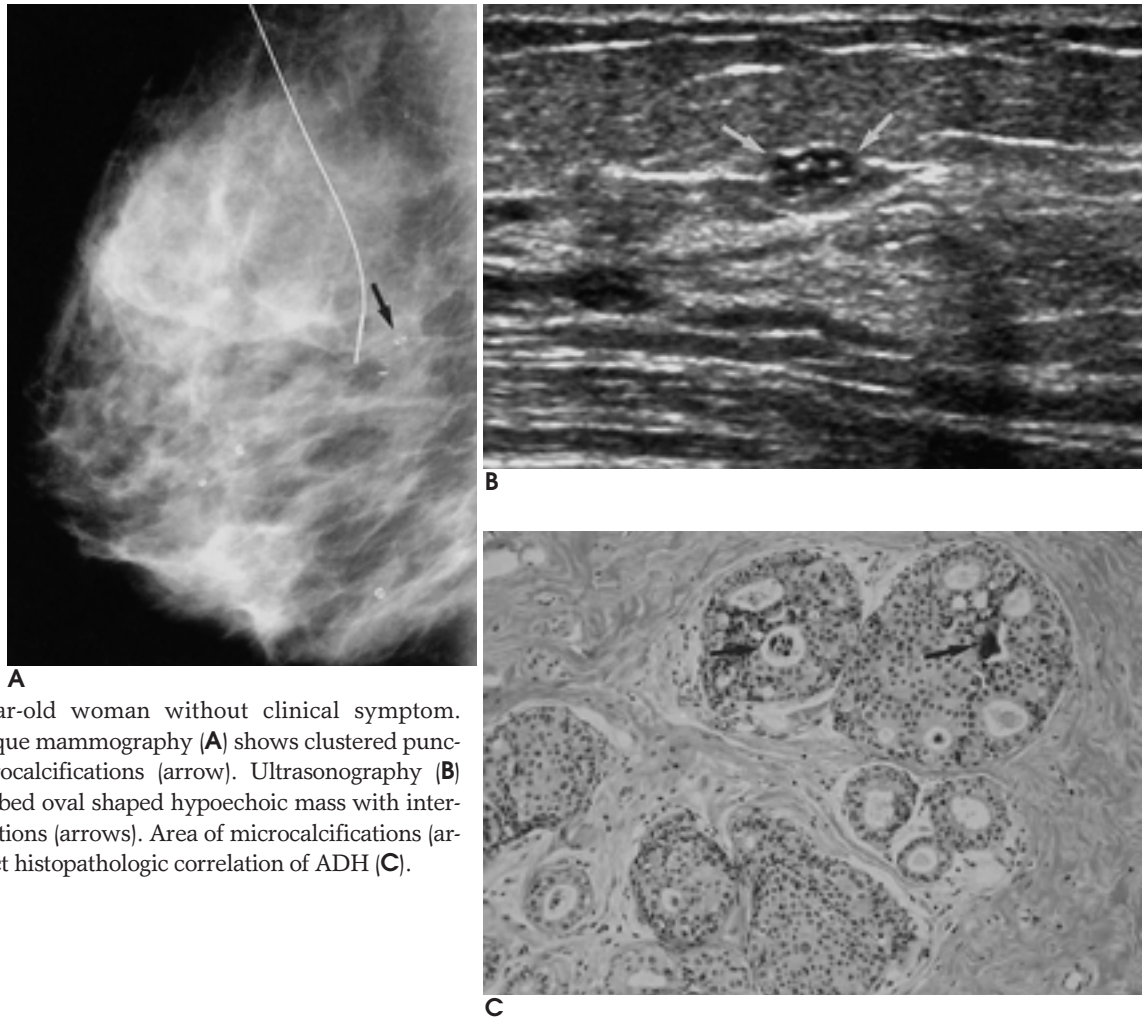

Fig. 1. A 54-year-old woman without clinical symptom. Mediolateral oblique mammography (**A**) shows clustered punctate shaped microcalcifications (arrow). Ultrasonography (**B**) shows circumscribed oval shaped hypoechoic mass with internal microcalcifications (arrows). Area of microcalcifications (arrows) shows direct histopathologic correlation of ADH (**C**).

tion, and a cribriform architectural arrangement. Cases in which ducts incompletely demonstrated these features, or in which they were limited to a single intraductal space, were diagnosed as ADH. None of our cases demonstrated frank intraductal necrosis.

All biopsy specimens were processed and examined in their entirety; in the absence of visible abnormality, five sections per specimen were microscopically examined, and if abnormalities were then discovered, additional sections were processed. After a diagnosis of ADH was confirmed, the geographic relationship of the microscopic focus of ADH was correlated with the mammographic and ultrasonographic abnormality. The histopathologic slides and mammographic and ultrasonographic findings were reviewed by the pathologist and radiologists, and a consensus was reached. Geographic correlation between the mammographic and histopathologic findings was classified according to the system devised by Helvie et al. (10): direct, near direct or remote. Direct correlation indicated that the mammographic abnormalities corresponded geographically to the histopathologic area of ADH, while near direct correlation was classified as such when mammographic abnormality was detected on the same microscopic slide but did not directly match the histopathologic area of ADH. Remote lesions were either mammographically occult or remote from the area of ADH.

Patients' main problems were identified through ex-

Table 1. Mammographic Findings of Microcalcifications in 38 Cases with ADH

Mammographic Finding	Number of Cases
Morphology	
round or punctate	19
pleomorphic heterogeneous	16
amorphous	2
fine linear branching	1
Distribution	
clustered	29
segmental	6
regional	2
diffuse	1

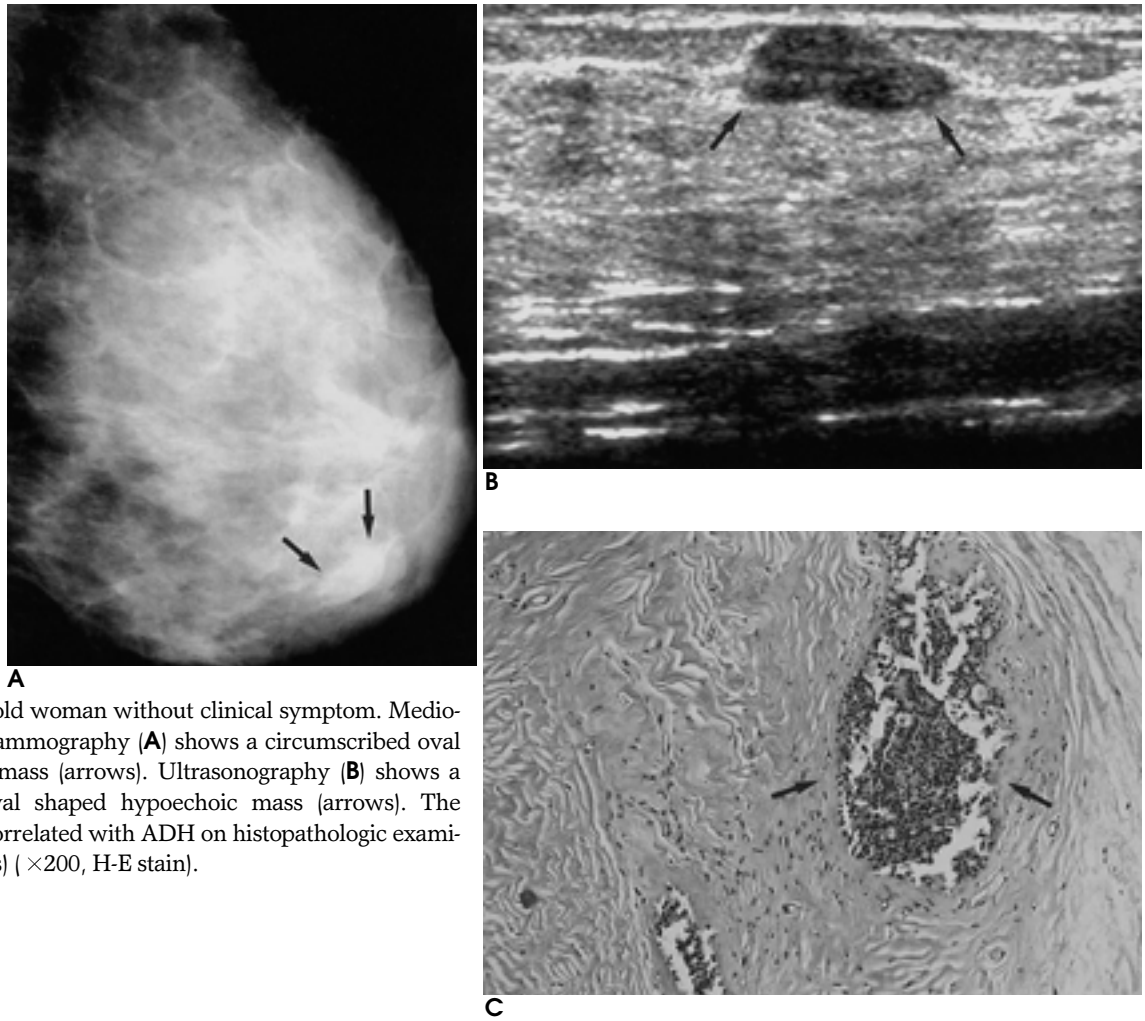

Fig. 2. A 34-year-old woman without clinical symptom. Mediolateral oblique mammography (**A**) shows a circumscribed oval shaped isodense mass (arrows). Ultrasonography (**B**) shows a circumscribed oval shaped hypoechoic mass (arrows). The mass is directly correlated with ADH on histopathologic examination (**C**) (arrows) (×200, H-E stain).

amination of their medical records, or by means of direct history taking by a radiologist. Clinical findings were classified as either the presence (i.e., palpable mass, nipple discharge, or pain) or absence of symptoms.

Results

Breast composition as seen at mammography was extremely dense in 15 of 64 cases, heterogeneously dense in 40, scattered fibroglandular in seven, and entirely fatty in two.

Microcalcifications were present in 37 of 64 cases (57.8%) (Fig. 1), and masses in 14 (21.9%) (Fig. 2, 3). There were other findings in two cases (3.1%) (Fig. 4), and in 11 cases (17.2%), no lesions were detected (Fig. 5). In one case in which mammography revealed a mass, there were clustered microcalcifications within the mass.

Table 1 shows that among 38 cases, including one in which mammography revealed microcalcification within the mass, the shape of microcalcifications was round or punctate in 19 cases (50.0%) (Fig. 1), pleomorphic heterogeneous in 16 (42.1%), and amorphous in two (5.3%), and showed fine linear branching in one (2.6%). The distribution pattern of microcalcifications was clustered in

Table 2. Mammographic Findings of Mass in 14 Cases with ADH

Mammographic Finding	Number of Cases
Shape	
round or oval	9
irregular	3
lobular	1
architectural distortion	1
Margin	
ill-defined	7
obscured	4
circumscribed	2
spiculated	1
Density	
equal	13
high	1

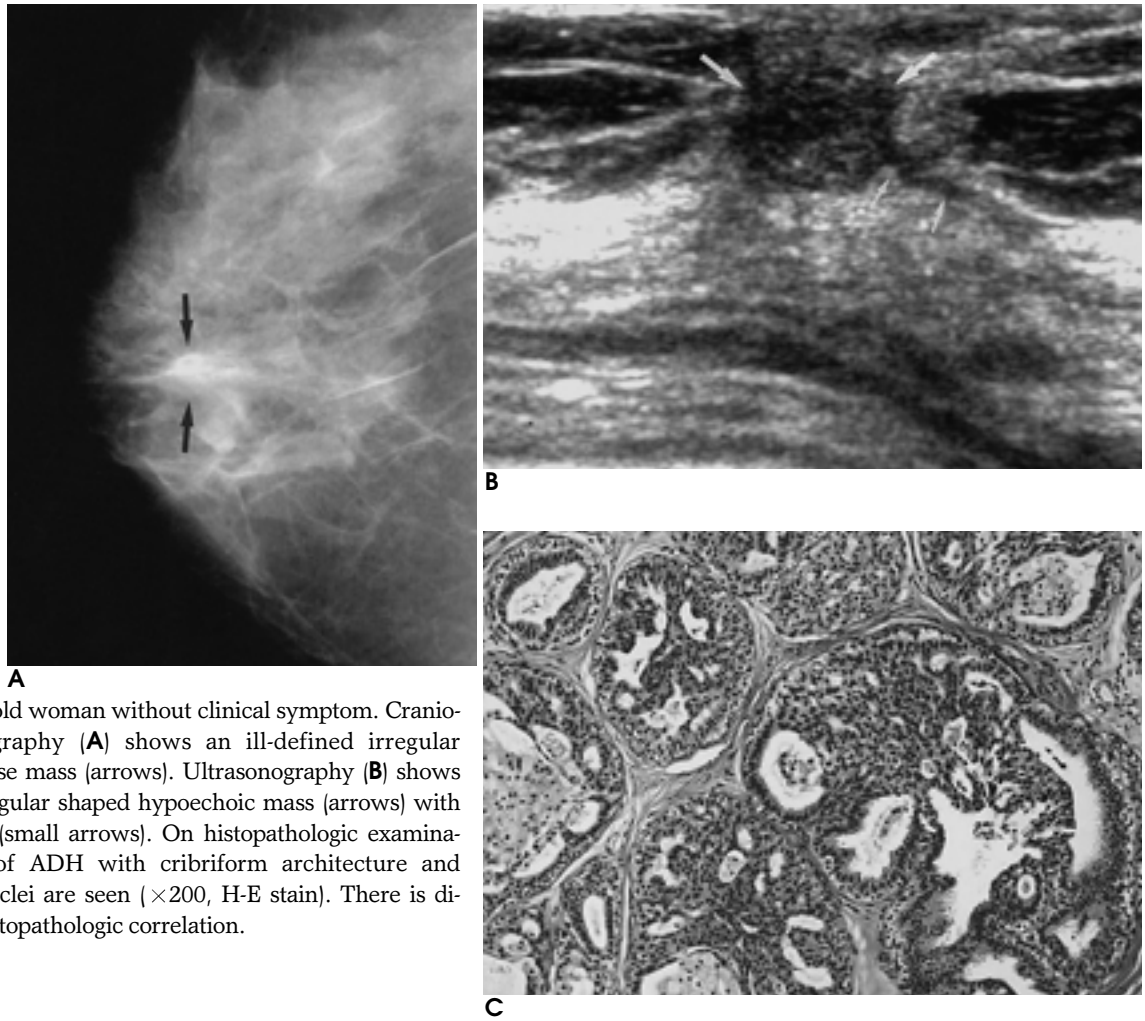

Fig. 3. A 45-year-old woman without clinical symptom. Craniocaudal mammography (**A**) shows an ill-defined irregular shaped hyperdense mass (arrows). Ultrasonography (**B**) shows an ill-defined irregular shaped hypoechoic mass (arrows) with ductal extension (small arrows). On histopathologic examination (**C**), areas of ADH with cribriform architecture and monomorphic nuclei are seen (×200, H-E stain). There is direct radiologic-histopathologic correlation.

29 cases (76.3%) (Fig. 1), segmental in six (15.8%), regional in two (5.3%), and diffuse in one (2.6%) (Table 1).

In 14 cases in which mammography revealed a mass, this was round or oval in nine cases (64.3%) (Fig. 2), irregular in three (21.4%) (Fig. 3), and lobular in one (7.1%), and in one case there was architectural distortion (7.1%) (Table 2). The margin of masses was ill-defined in seven cases (50.0%) (Fig. 3), obscured in four (28.6%), circumscribed in two (14.3%) (Fig. 2), and spiculated in one (7.1%) (Table 2). The density of masses was equal in 13 cases (92.9%) (Fig. 2) and high in one (7.1%) (Fig. 3) (Table 2).

In two cases with other mammographic findings, there was ductal dilatation (Fig. 4); in these patients, ultrasonography revealed intraductal nodules within a dilated duct. In 11 cases in which lesions were not demonstrated by mammography, all were detected at ultrasonography (Fig. 5). Breast composition was dense in 9 of these cases (81.8%), and fibroglandular in the remaining two.

Table 3 summarizes the ultrasonographic findings. Masses were demonstrated in 29 cases (96.7%) (Figs. 1–5); in one (3.3%), no lesion was detected, and mammography revealed clustered microcalcifications. The mass was round or oval in 15 cases (51.7%) (Fig. 2) and irregular in 14 (48.3%) (Figs. 3–5), while its margin was ill-defined in 16 cases (55.2%) (Figs. 3–5), circumscribed in ten (34.5%) (Fig. 2), microlobulated in two (6.9%), and spiculated in one (3.4%). Internal echogenicity was low in 19 cases (62.1%) (Figs. 2, 3) and equal in ten (34.5%) (Figs. 4, 5); internal echotexture was heterogeneous in 20 cases (69.0%) (Fig. 5). Posterior echo intensity was unaffected in ten cases (34.5%) (Figs. 2, 5), decreased in ten (34.5%) (Figs. 3, 4), and enhanced in nine (31.0%). Orientation was parallel in 25 cases (86.2%) (Fig. 2). Ductal extension was demonstrated in 22 cases (75.9%) (Fig. 3) and five masses were located intraductally (Fig. 5).

The initial BI-RADS categories of the 64 patients, as determined after routine mammography, were category

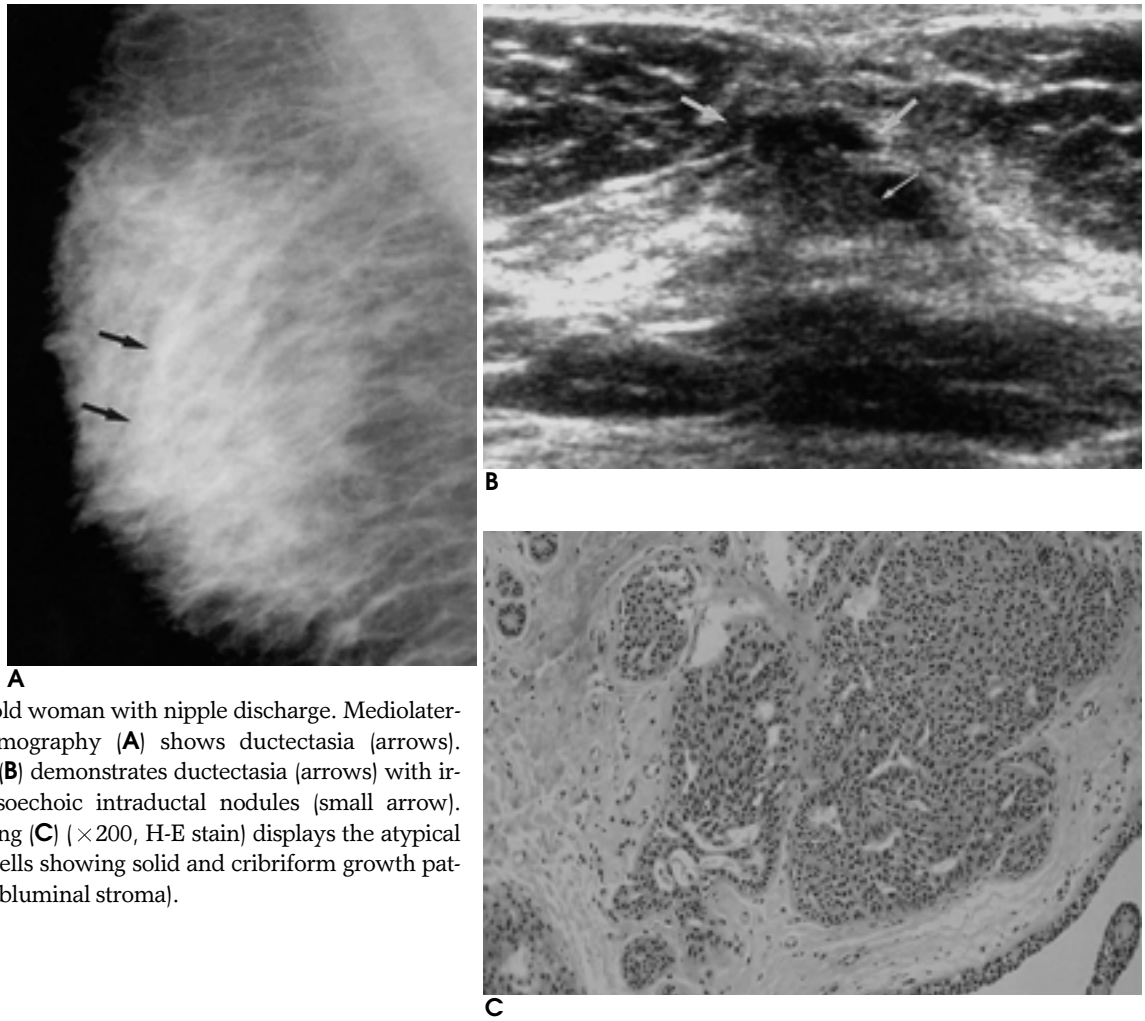

Fig. 4. A 56-year-old woman with nipple discharge. Mediolateral oblique mammography (**A**) shows ductectasia (arrows). Ultrasonography (**B**) demonstrates ductectasia (arrows) with irregular shaped isoechoic intraductal nodules (small arrow). Microscopic finding (**C**) (×200, H-E stain) displays the atypical ductal epithelial cells showing solid and cribriform growth pattern (located in subluminal stroma).

0 in 21 cases (32.8%), category 1 in three cases (4.7%), category 2 in one case (1.6%), category 3 in 17 cases (26.6%), category 4 in 21 cases (32.8%), and category 5 in one case (1.6%). The final assessed BI-RADS categories in these 64 cases, after additional mammography and ultrasonography, were category 2 in one case (1.6%), category 3 in 13 cases (20.3%), category 4 in 48 cases (75.0%), and category 5 in two cases (3.1%).

By means of radiologic-histopathologic correlation using mammography and ultrasonography, direct correlation was found in 44 of the 64 cases (68.8%) (Figs. 1−3, 5), near correlation in 13 (20.3%), and remote correlation in seven (10.9%). Mammography, on the other hand, revealed direct correlation in 36 cases (56.3%) (Fig. 1−3), near correlation in 15 (23.4%), and remote correlation in 13 (20.3%) (Fig. 5) (Table 4). In 37 cases in which there was microcalcifications, 23 (62.1%) showed direct correlation (Fig. 1), 11 (29.7%) near correlation, and three (8.1%) remote correlation. Among 14 cases in which mammography revealed a mass, direct correlation was observed in 13 cases (92.9%) (Figs. 2, 3) and near correlation in one (7.1%).

Among 30 cases, ultrasonography demonstrated direct correlation in 26 (86.7%) (Figs. 1−3, 5), near correlation in two (6.7%) and remote correlation in two (6.7%) (Table 5). Among the 29 cases in which ultrasonography revealed a mass , direct correlation was found in 26 cases (89.7%) (Figs. 1−3, 5), near correlation in two (6.9%) and remote correlation in one (3.4%).

In 47 of 64 cases (73.4%), self and clinical examination of the breast revealed nothing abnormal. Seven patients (10.9%), however, had a palpable mass, seven (10.9%) had nipple discharge, and three (4.7%) complained of breast pain.

Discussion

The histopathologic criteria for the diagnosis of ADH include either monotonous, non-high-grade atypical cellular proliferation showing any of the architectural pat-

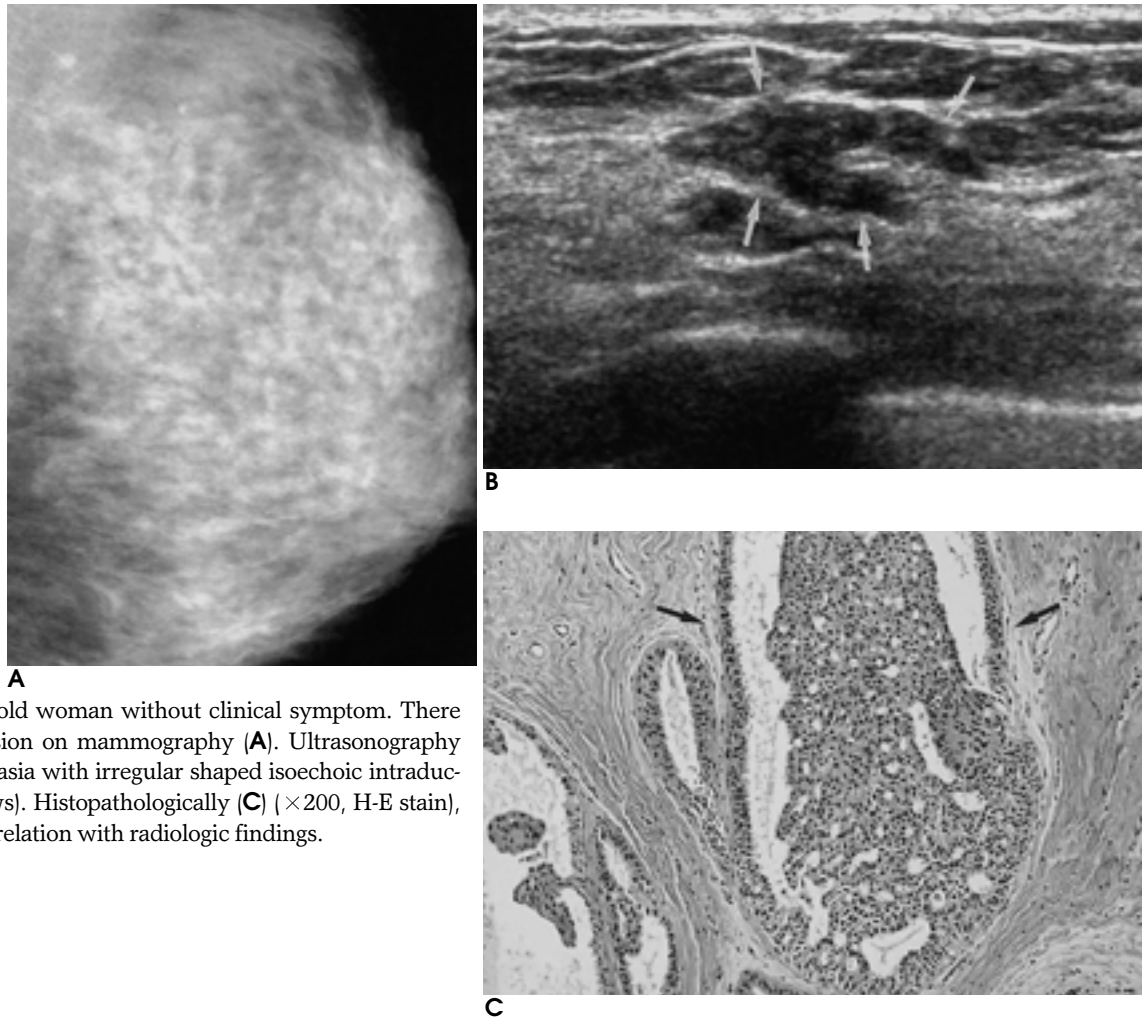

Fig. 5. A 42-year-old woman without clinical symptom. There is no detected lesion on mammography (**A**). Ultrasonography (**B**) shows ductectasia with irregular shaped isoechoic intraductal nodules (arrows). Histopathologically (**C**) (×200, H-E stain), there is direct correlation with radiologic findings.

terns of nonatypical ductal hyperplasia, the partial involvement of a ductal cross section, or the complete involvement of non-necrotic, non-high-grade intraductal proliferation with a cribriform or micropapillary pattern but measuring 2 mm or less in aggregate cross-sectional diameter. ADH is a transitional phase in the transformation of ductal epithelium from normal to malignant (1). In a study by Vilde and Arkwright (9), ADH was found adjacent to 51% of breast carcinomas. A finding of ADH at core biopsy thus raises the possibility that the lesion also contains carcinoma. This study demonstrated, furthermore, that ADH was found incidentally at mammography or ultrasonography, without abnormal findings on self or clinical examination of the breast, ant that radiologic evaluation was thus important for the detection of ADH.

Table 3. Ultrasonographic Findings of Masses in 29 Cases with ADH

Ultrasonographic Finding	Number of Cases
Shape	
round or oval	15
irregular	14
lobular	0
architectural distortion	0
Margin	
ill-defined	16
circumscribed	10
microlobulated	2
spiculated	1
Internal echogenicity	
low	19
equal	10
Internal echotexture	
heterogeneous	20
homogeneous	9
Posterior echo intensity	
unaffected	10
decreased	10
enhanced	9
Parallel orientation	
parallel	25
antiparallel	4
Ductal extension	
present	22
absent	7

Table 4. Mammographic-Histopathologic Correlation in 64 Cases with ADH

Histopathologic Finding / Mammographic Finding	Direct ($n=36$)	Near ($n=15$)	Remote ($n=13$)
Microcalcification ($n=37$)	23	11	3
Mass ($n=14$)	13	1	0
Other finding ($n=2$)	0	2	0
No detected ($n=11$)	0	1	10

Table 5. Ultrasonographic-Histopathologic Correlation in 30 Cases with ADH

Histopathologic Finding / Mammographic Finding	Direct ($n=26$)	Near ($n=2$)	Remote ($n=2$)
Mass ($n=29$)	26	2	1
No detected ($n=1$)	0	0	1

In this study, the most frequent mammographic finding of ADH was microcalcification. Among 64 patients who underwent mammography, microcalcifications were found in 37, and in only one nodule was there internal microcalcification. This result was similar to those of studies by Helvie (10), Liberman (11), and Jackman (12). Clustered distribution, and morphologically round or punctate, or pleomorphic heterogeneous microcalcifications were the most common mammographic abnormalities encountered among our patients. Areas of ADH and associated carcinoma or DCIS may not be distinguishable on the basis of mammographic findings, but Stomper et a1. (13) reported a series of 100 cases of asymptomatic patients with DCIS in which 72% of malignancies manifested as microcalcifications, and 35% of the microcalcification clusters were categorized as predominantly casts (linear), 52% as granular, and 13% as granular with several casts. In our study, only one case (2.6%) of pure ADH showed fine linear branching microcalcifications, a feature that represents calcified necrotic debris within a duct and commonly occurs in invasive carcinoma and DCIS. ADH, on the other hand, is not associated with central necrosis; thus, fine linear branching microcalcifications are rare in ADH (14).

At radiologic examination, it is sometimes difficult to differentiate ADH from focal fibrosis. In studies by Rosen et al. (15) and Venta et al. (16), focal fibrosis commonly presented at mammography as a noncalcified mass, and microcalcification was a less common feature in focal fibrosis. On the other hand, both earlier reports and this study have shown that the most common mammographic finding of ADH is clustered microcalcifications (8, 10−12).

In this study, the most common mammographic features of masses were their round or oval shape, ill-defined margin, and equal density. In the study by Helvie et al. (10), fibrosis associated with ADH produced mass on mammography. In this study, direct histopathologic correlation was found in 62.1% of patients with microcalcifications and 92.9% of those in whom mammogra-

phy revealed a mass, a finding which might be related to the possible loss of microcalcification during specimen processing for histopathologic examination and the small size of a specimen containing only an isolated cluster of microcalcifications from a wire-localized biopsy. The remaining cases in which microcalcifications were depicted at mammography showed almost near correlation; thus, mammographically-detected abnormalities correlated either directly or near directly with the pathological location of ADH.

In this study, 11 of 64 lesions (17.2%) were not detected at mammography but were depicted at ultrasonography as a mass. Breast composition at mammography was extremely or heterogeneously dense in nine cases, and showed a scattered fibroglandular pattern in the remaining two. In two other cases in which ductectasia were seen at mammography, intraductal nodules were depicted on ultrasonography. Thus, ultrasonography was effective in detecting abnormalities in dense breast and intraductal lesions in the patients with ductectasia.

Almost all ADH cases detected by ultrasonography presented as a mass. In terms of shape, margin, internal echogenicity, internal echotexture, and posterior echo intensity, it was somewhat difficult to distinguish ADH from malignant masses. A spiculated marginated, marked hypoechoic mass with extensive posterior acoustic shadowing was, however, extremely rare in ADH. Parallel orientation of the mass to the skin, one of the benign ultrasonographic features, was common in ADH (86.2%), and ductal extension of the mass was also frequent, occurring in 75.9% of the patients in this study. In a study by Moon et al. (17), ductal extension was a common finding of ductal carcinoma, occurring in 70.0% of their cases. In ADH the pathologic cause of ductal extension was surrounding proliferative ductal change, not tumor extension, as in DCIS.

In this study, assessment showed that BI-RADS categories changed between initial mammography and final study after additional mammography or ultrasonography. At initial routine mammography, 21 cases (32.8%) were category 4, while 48 (75.0%) fell into this category at final assessment. This was caused by a shifting of cases from category 0 or 1 at initial mammography to category 4 on final study. At initial mammography, 21 cases were category o and three were category 1, and after ultrasonography or additional mammography, almost all these were finally assessed as category 4.

In conclusion, our most frequent mammographic finding of ADH was clustered round, or pleomorphic heterogeneous microcalcifications, while at ultrasonography, the most common finding was an ill-defined round or oval, or irregular-shaped hypoechoic mass with parallel orientation and ductal extension. Direct histopathologic-radiologic correlation of ADH was more common in cases involving a mass than in those showing microcalcification. Most ADH cases (75%) were finally assessed as BI-RADS category 4. Clinically, most ADH was found incidentally at radiologic examination. In this study, 17.2% of ADH cases were not demonstrated by mammography but were detected at ultrasonography, and for the detection of ADH, the use of ultrasonography in conjunction with mammography is thus feasible.

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유방의 비정형유관상피증식증: 방사선학적 소견과 병리학적 소견의 연관성[1]

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목적: 비정형 유관상피증식증의 임상소견, 유방촬영술과 유방초음파상의 방사선학적 소견을 분석하고, 방사선학적 소견과 병리학적 소견과의 연관성을 알아보고자 하였다.

대상과 방법: 2000년 3월부터 2003년 3월까지 수술로 확진된 64명 환자들의 64 병소들을 대상으로 하였다. 64예 모두가 유방촬영술을 시행하였고, 30예에서 유방초음파를 시행하였다. 두 명의 유방 방사선과 전문의가 후향적으로 유방촬영술소견과 초음파소견을 분석하여, 병변을 종괴, 미세석회화, 이외의 기타소견(유관변화 등)과, 병변이 보이지 않는 경우 등 4군으로 나누었다. 유방촬영술상 종괴의 경우는 모양, 경계, 음영, 석회화 동반 여부 등을 알아보았고, 미세석회화의 경우는 모양과 분포를 관찰하였으며, 유방초음파에서는 종괴의 모양, 경계, 내부와 후방 에코패턴, 석회화 동반 여부, 유관과 연결유무, 피부와 나란한 방향인지 등을 살펴보았다. 비정형 유관상피증식증의 방사선학적 병리학적 연관성을 직접연관(direct), 근접연관(near direct), 연관성 없음(remote correlation)의 3가지로 분류하였다.

결과: 유방촬영술에서는 미세석회화가 37예(57.8%), 종괴가 14예(21.9%), 기타소견은 2예(3.1%)이었고, 11예(17.2%)에서는 병변이 발견되지 않았다. 미세석회화의 경우, 모양은 원형이 19예(50.0%), 비균질한 다형성이 16예(42.1%)이었고, 분포는 군집형이 29예(76.3%)로 가장 많았다. 종괴로 보인 14예의 경우, 모양은 타원형이나 원형이 9예(64.3%)이었고, 경계는 불분명한 경우가 7예(42.9%)로 가장 많았다. 유방초음파를 시행한 30예 중 29예가 종괴로 보였고, 타원형이나 원형의 모양이 15예(51.7%), 불규칙한 모양이 14예(48.3%)이었다. 종괴의 경계는 불분명한 경우가 16예(55.2%), 저에코가 19예(62.1%), 주변 유관과의 연결은 22예(75.9%)에서 보였으며, 22예(75.9%)는 종괴의 장축이 피부와 평행하였다. 방사선학적 소견과 병리학적 소견은 직접연관은 44예(68.8%), 근접연관은 13예(20.3%)였고, 나머지 7예(10.9%)는 연관성이 없었다. 임상소견은 64예중 47예(73.4%)에서 증상이 없이 우연히 선별검사에서 병변이 발견되었고 증상을 동반한 17예중 7예(10.9%)는 촉지되는 종괴를, 7예(10.9%)는 유두분비물을, 나머지 3예(4.7%)는 통증을 동반하였다.

결론: 비정형 유관상피증의 가장 흔한 유방촬영술 소견은 군집형 분포를 보이는 원형 또는 비균질한 다형성 모양의 미세석회화이고, 가장 흔한 초음파소견은 불분명한 경계의 원형이나 타원형 또는 불규칙한 모양의 저에코의 종괴로서 피부와 평행하게 위치하며 유관과의 연결을 동반한다. 비정형 유관 상피증식증은 임상적으로 특별한 소견이 없이 방사선학적 검사에서 우연히 발견되는 예가 대부분이며, 이 연구에서 유방촬영술에서 병변이 보이지 않는 17.2%가 유방초음파에서 발견되므로, 유방촬영술과 함께 유방초음파가 보완적인 역할을 할 것으로 기대된다.