



# Sonographic Features of Palpable Breast and Axillary Lesions in Adult Male Patients: A Pictorial Essay

만져지는 유방과 액와부 병변을 주소로 내원한  
성인 남성의 초음파 소견: 임상화보

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The male breast is a non-functional and rudimentary organ, but similarly to the female breast, it can be affected by various diseases. In contrast to female breast cancer, male breast cancer has a low incidence, and there is no established breast cancer screening program for male patients. Therefore, the diagnostic evaluation is usually performed in male patients with symptoms such as palpability or pain in the breasts. Furthermore, most adult male patients who visit breast clinics sometimes present with not only breast symptoms but also axillary symptoms, and both the breast and axilla are usually examined during breast ultrasonography in daily clinical practice. The purpose of this pictorial essay was to present the sonographic features of various palpable breast and axillary lesions in adult male patients.

**Index terms** Male; Ultrasonography; Breast Neoplasms, Male; Axilla

## INTRODUCTION

A unilateral palpability or enlargement is the most common symptom observed in male patients visiting breast clinics (1). Most lesions are benign and malignancy is rare, accounting for 0.5% to 1.0% of all breast cancers (2). Although mammography is a useful imaging modality, male patients tend to be reluctant to undergo this procedure. Moreover, because of the relatively small volume of the male breasts, it is often difficult to perform mammography on it. Muñoz Carrasco et al. (3) reported the usefulness of ultrasonography (US) for the evaluation of male breast lesions. Rong et al. (4) reported that US can be used as an initial imaging modality to evaluate male breast disease. Furthermore, most adult male patients who visit breast clinics sometimes complain of symptoms not only the breast but also axilla. In daily clinical practice, both the breast

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and axilla are usually examined during breast US. Therefore, we aimed to depict the sonographic features of various palpable breast and axillary lesions in adult male patients.

## BENIGN BREAST LESIONS

### GYNECOMASTIA

Gynecomastia is a benign proliferation of duct and stromal elements in the male breast, and is its most common lesion (4). It may be physiologic or associated with various diseases and medications; and it commonly manifests between 20 and 50 years of age (4, 5). US features have been reported as nodular, dendritic, and diffuse (6, 7). Nodular gynecomastia is described as a subareolar hypoechoic mass; dendritic gynecomastia as a subareolar heterogeneous hypoechoic mass with extension into the surrounding tissue; and diffuse gynecomastia as resembling a female breast (Fig. 1).

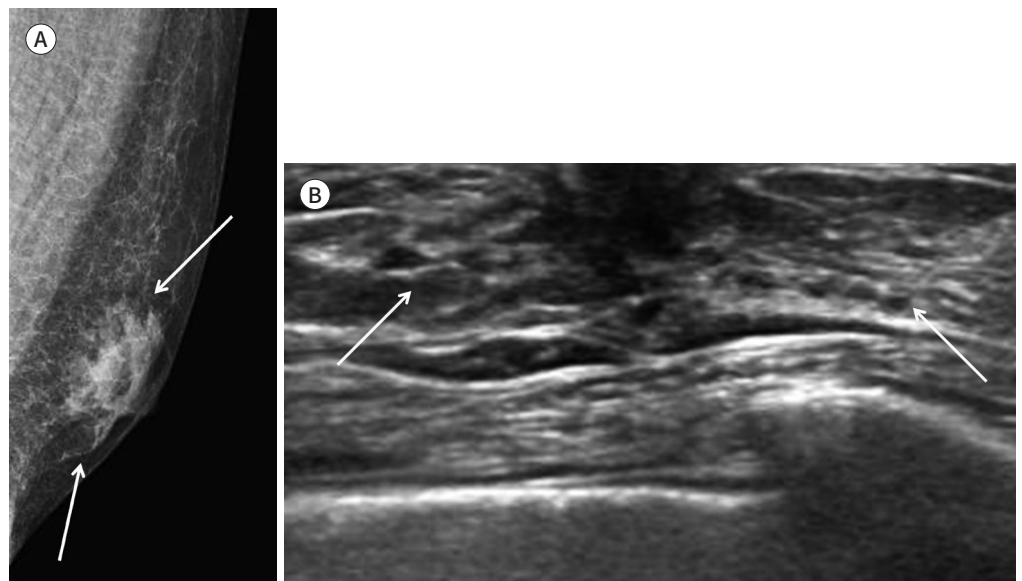
### LIPOMA

Lipoma is a circumscribed mass composed of mature adipose tissue and is the most common benign tumor in the male breast (4). It is usually asymptomatic and does not need management until the tumor becomes large. Furthermore, because male breast stroma contains low amounts of fat, lipoma in male patients is usually located in subcutaneous fat tissue (8). On US, lipomas appear as hyperechoic or isoechoic masses with circumscribed margins and internal echoes oriented parallel to the cutaneous layer (Fig. 2) (7).

**Fig. 1.** Imaging findings of gynecomastia of the left breast in a 68-year-old male.

**A.** Mediolateral oblique mammogram shows a retroareolar, high-density mass extending into the deeper adipose tissue (arrows).

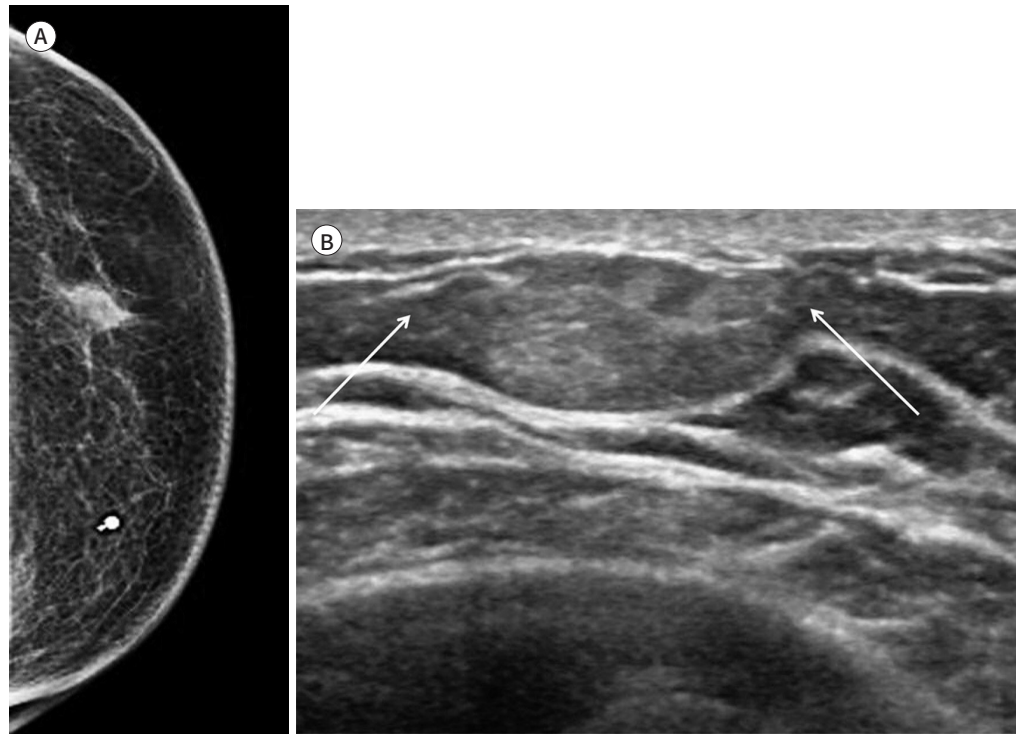
**B.** Transverse ultrasonographic scan reveals a subareolar, hypoechoic mass extending into the surrounding tissue (arrows).



**Fig. 2.** Imaging findings of lipoma of the left breast in a 47-year-old male.

**A.** Craniocaudal mammogram shows no abnormal density around the marker clip.

**B.** Transverse ultrasonographic scan shows an oval-shaped, hyperechoic mass with circumscribed margins, internal echo pattern, and orientation parallel to the skin (arrows).



## ABSCCESS

Breast abscess is most commonly seen in the subareolar location (9). On US, it presents as an irregular multi-loculated mass with increased echogenicity of the surrounding fat and thick peripheral wall that may show increased vascularity (Fig. 3) (10).

## FAT NECROSIS

Fat necrosis is a non-suppurative inflammatory process and is often related to trauma. Trauma results in inflammation and subsequent fibrosis (11). It may be detected incidentally or present as a lump. On US, it appears as a simple, hypoechoic, hyperechoic, or complex cystic and solid mass depending on the time (Fig. 4).

## MALIGNANT BREAST LESIONS

### INVASIVE DUCTAL CARCINOMA

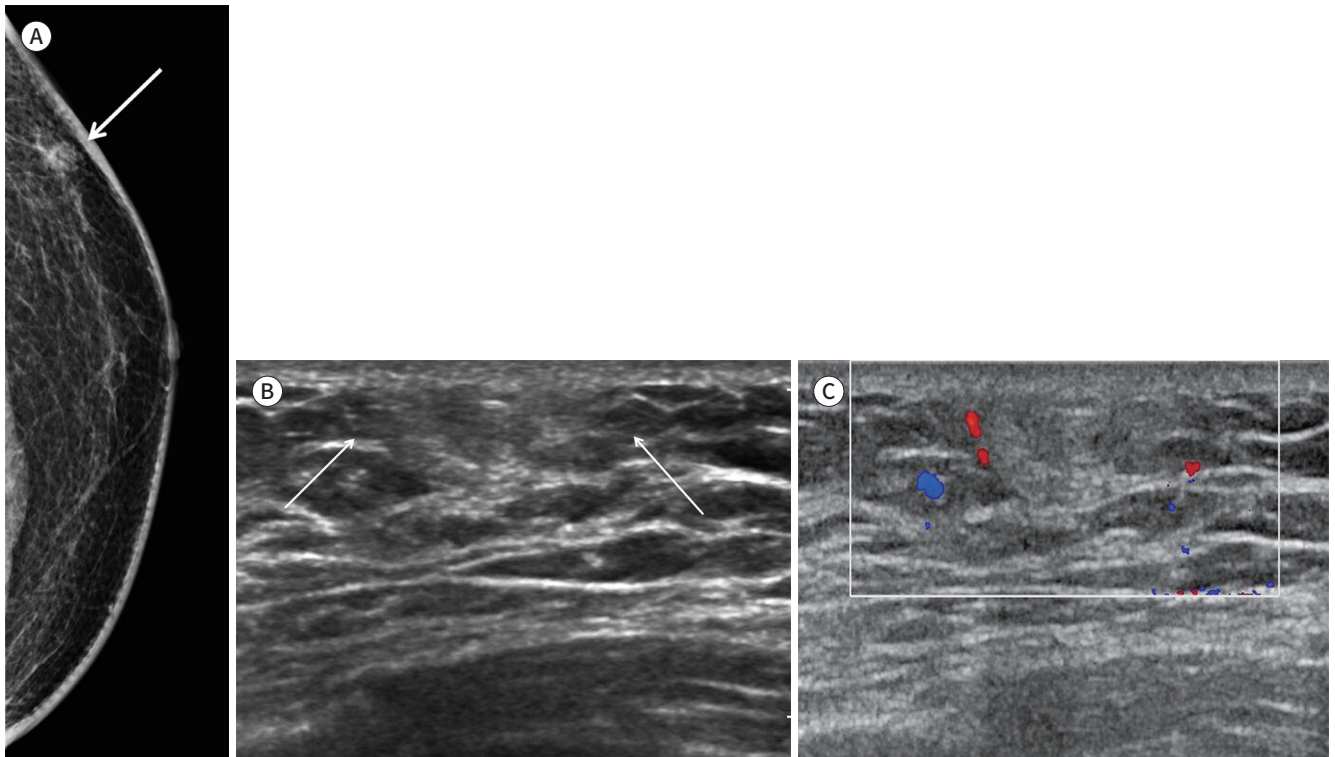
Male breast cancer is rare and constitutes up to 1% of all breast cancers (2). Invasive ductal carcinoma is the most common type of male breast cancer, making up to 85% of all cases (12). It usually presents as a painless palpable lump. It can be associated with bloody nipple discharge, which has been reported in 25% of cases (12). On US, it usually appears as an irregular mass with non-circumscribed margins (Figs. 5, 6) (1, 13, 14).

**Fig. 3.** Imaging findings of abscess of the left breast in a 56-year-old male.

**A.** Craniocaudal mammogram shows a round-shaped, high-density mass with indistinct margins (arrow).

**B.** Transverse ultrasonographic scan shows an irregularly shaped, hyperechoic mass with indistinct margins (arrows).

**C.** Color Doppler image of the left breast shows peripheral vascularity in the mass.



### PAPILLARY CARCINOMA

Papillary carcinoma is the second most common type of male breast cancer and accounts for 5% of male breast cancer (15, 16). Most papillary carcinomas in male are intracystic and non-invasive (16). On US, it presents as a complex cystic and solid mass and often associated with a cyst or ductal dilatation (Fig. 7) (5).

### LYMPHOMA

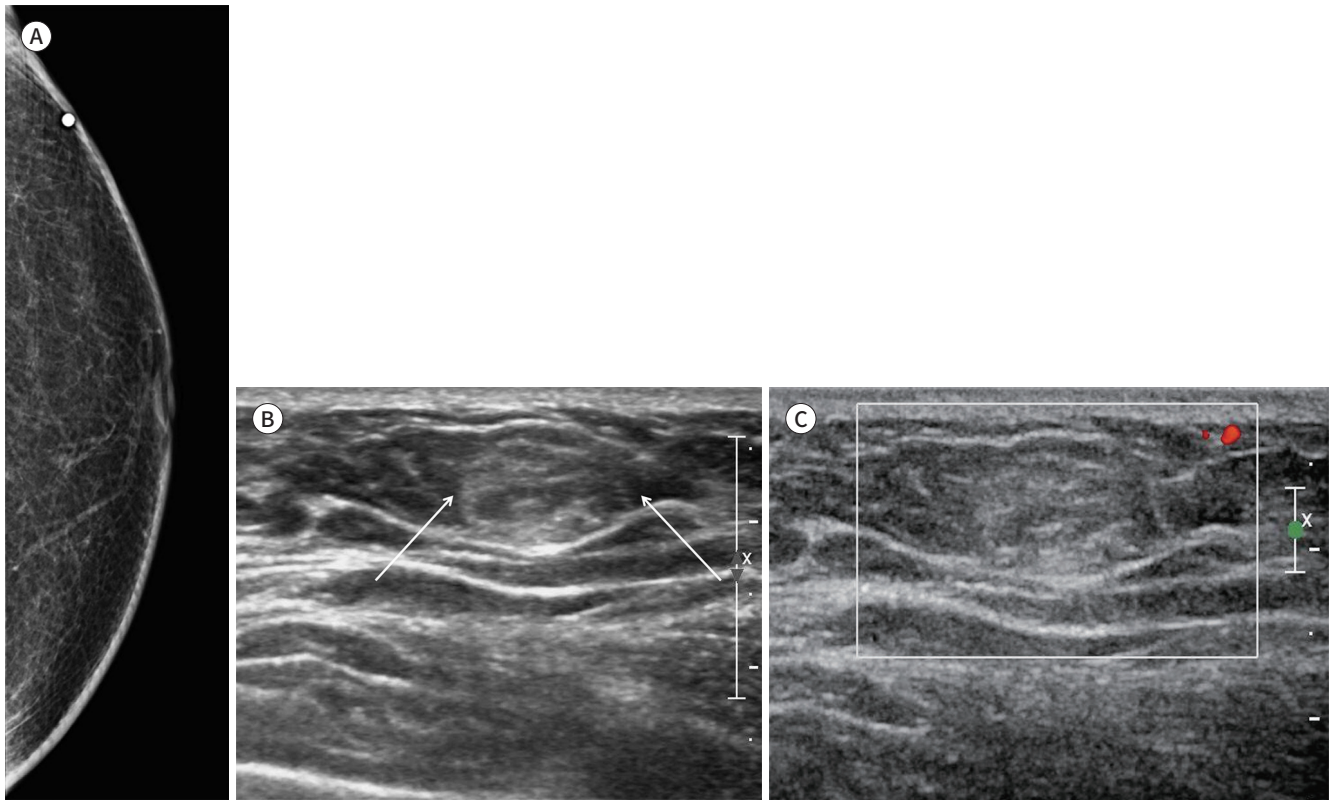
Lymphoma of male breast tissue may be primary or secondary. Most are secondary involvement with lymphoma and are related to non-Hodgkin B cell lymphomas (5). On US, lymphomas present as a single or multiple circumscribed or irregular masses (Fig. 8) (17).

### MALIGNANT FIBROUS HISTIOCYTOMA

Malignant fibrous histiocytoma is the most common soft-tissue sarcoma in adults and usually occurs in the extremities. It often occurs in middle aged female and rarely occurs in elderly male (18). It is characterized by aggressive biological behavior with a high rate of local recurrence and distant metastasis (19). On US, it presents as a complex cystic and solid mass with increased vascularity of the solid component (Fig. 9) (20).

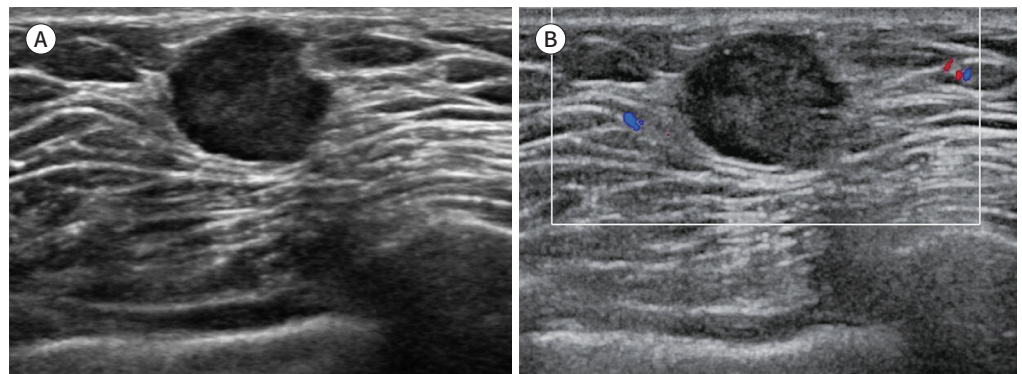
**Fig. 4.** Imaging findings of fat necrosis of the left breast in a 48-year-old male.

- A.** Craniocaudal mammogram shows no abnormal density around the marker clip.
- B.** Transverse ultrasonographic scan shows an oval-shaped, heterogeneously hyperechoic mass with circumscribed margins (arrows).
- C.** Color Doppler image of the left breast shows no vascularity in the mass.



**Fig. 5.** Imaging findings of invasive ductal carcinoma of no special type in a 78-year-old male.

- A.** Transverse ultrasonographic scan shows an irregularly shaped, hypoechoic mass with microlobulated margins.
- B.** Color Doppler image shows no vascularity in the mass.



## LYMPH NODE-RELATED LESIONS IN THE AXILLA

### REACTIVE LYMPH NODE HYPERPLASIA

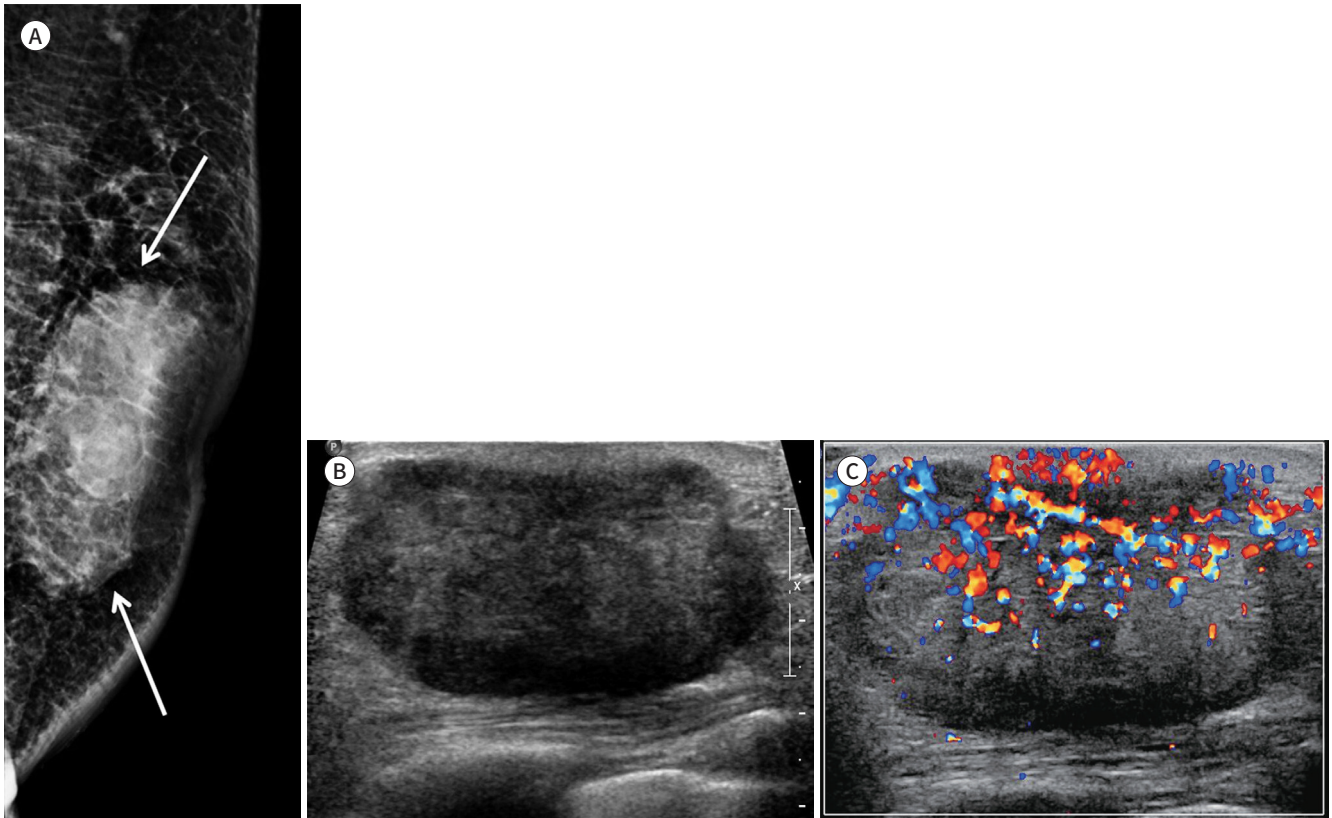
The most common lesion found in the axilla is reactive lymph node hyperplasia (21). It resolves spontaneously within several weeks. The size of the lymph nodes is not a reliable crite-

**Fig. 6.** Imaging findings of invasive ductal carcinoma arising from intraductal papillary carcinoma in a 56-year-old male.

**A.** Mediolateral oblique mammogram shows an ill-defined, irregular, high-density mass with diffuse skin and trabecular thickening, causing nipple retraction and replacing the left breast completely (arrows).

**B.** Transverse ultrasonographic scan shows an irregularly shaped, complex cystic and solid mass.

**C.** Color Doppler image shows increased vascularity in the mass.



tion for the diagnosis of reactive lymph node hyperplasia (22). Moreover, whether the axilla should be scanned in the transverse or longitudinal direction has not been clarified (22). The features on US of reactive lymph node hyperplasia are as follows: oval or lobulated shape, well-circumscribed margins, uniform hypoechoic cortex measuring < 3 mm, central echogenic hilum, and hilar vascularity or avascularity (Fig. 10) (23).

### KIKUCHI DISEASE

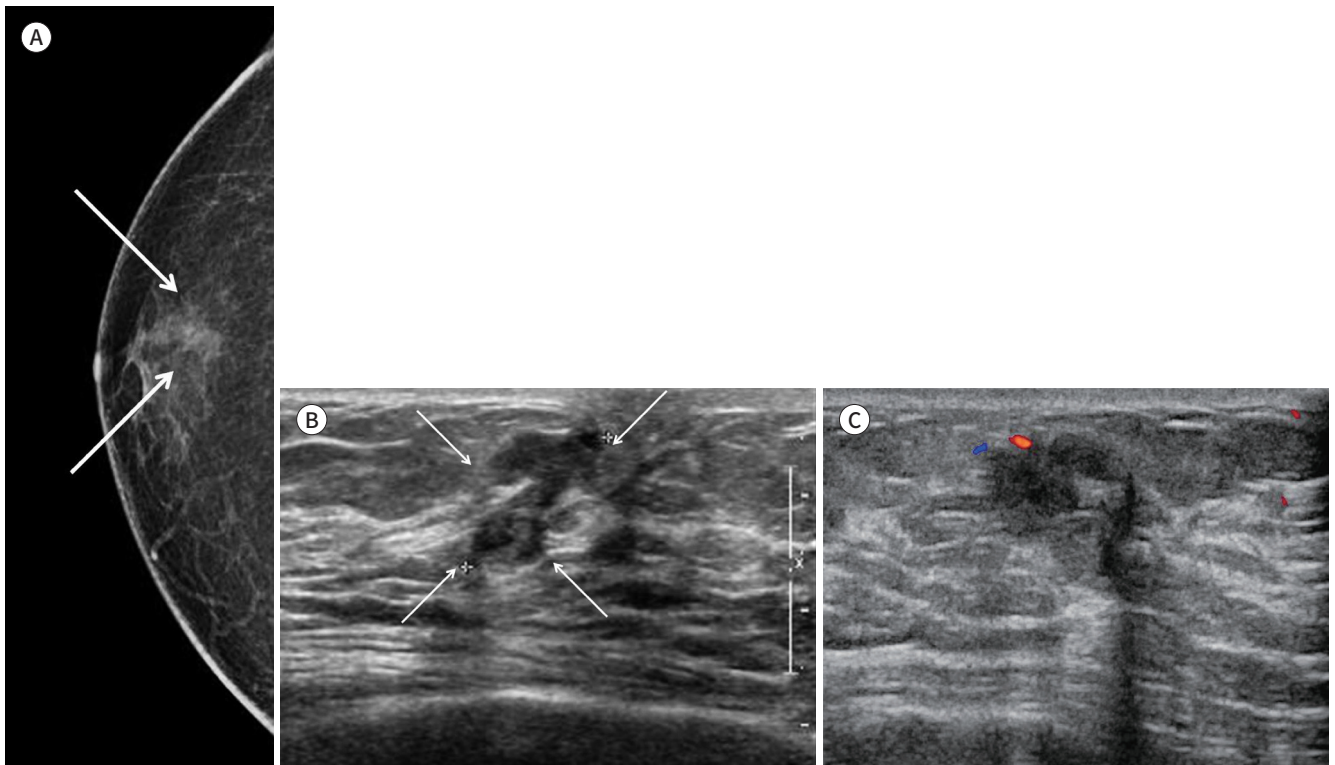
Kikuchi disease, also known as histiocytic necrotizing lymphadenitis, is an uncommon cause of benign lymphadenopathy. It resolves spontaneously within several weeks to months (24). Its etiology has been suggested to include autoimmune disease, viral infection, and post-infectious hyperimmune reactions following infection with Epstein-Barr virus; nonetheless, its cause is uncertain (21, 25). The cervical lymph nodes have been reported in 70%–98% of cases as the primary sites (25). The imaging findings are nonspecific; however, the characteristic findings on US include multiple enlarged lymph nodes and increased perinodal echogenicity (Fig. 11) (21).

## CASTLEMAN DISEASE

Castleman disease is an uncommon inflammatory lymphoproliferative disorder of unknown cause. Approximately 70% of cases occur in the thorax, while 2% of cases occur in the axilla (26). The disease is classified into two clinical subtypes, namely the localized and

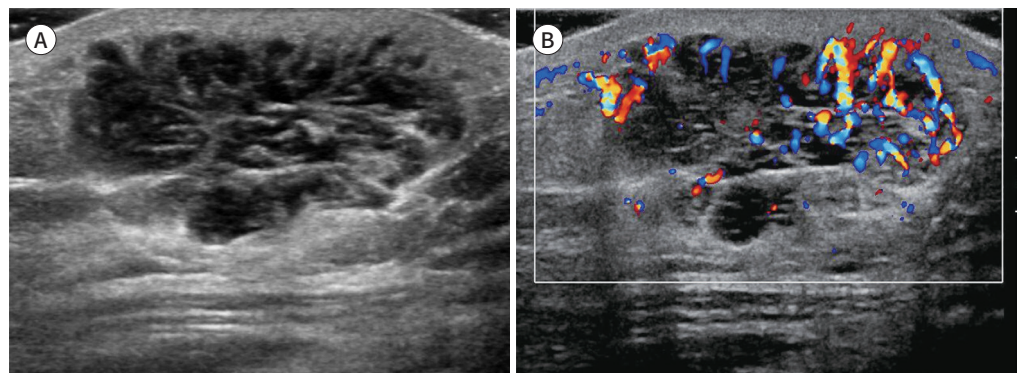
**Fig. 7.** Imaging findings of solid papillary carcinoma of the right breast in a 71-year-old male.

- A.** Craniocaudal mammogram shows a retroareolar, irregularly shaped, indistinct, mixed high- and iso-density mass extending into the deeper adipose tissue in the right outer breast (arrows).
- B.** Transverse ultrasonographic scan shows an irregular, hypoechoic mass with angular margins (arrows).
- C.** Color Doppler image shows peripheral vascularity in the mass.



**Fig. 8.** Imaging findings of lymphoma in a 67-year-old male.

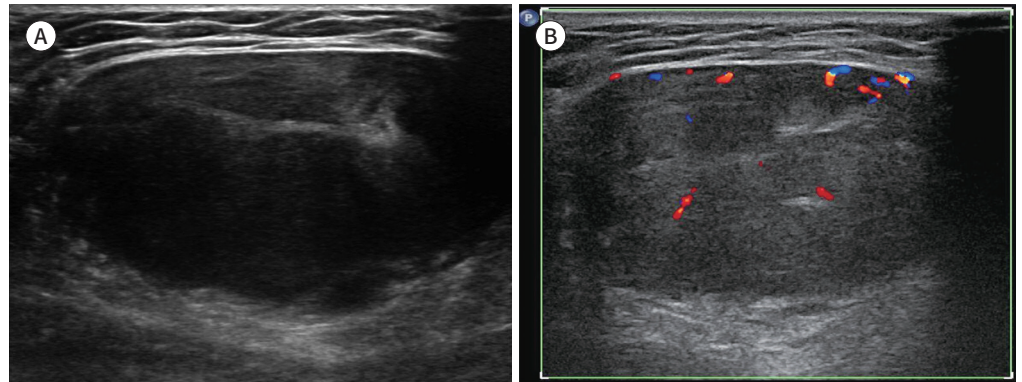
- A.** Longitudinal ultrasonographic scan shows an oval-shaped, hypoechoic mass with microlobulated or indistinct margins.
- B.** Color Doppler image shows increased vascularity in the mass.



disseminated subtypes, and two histological subtypes, namely the hyaline vascular and plasma cell subtypes (21). On US, multiple, well-circumscribed, and hypoechoic masses with oval shape and hypervascularity can be visualized (Fig. 12) (26).

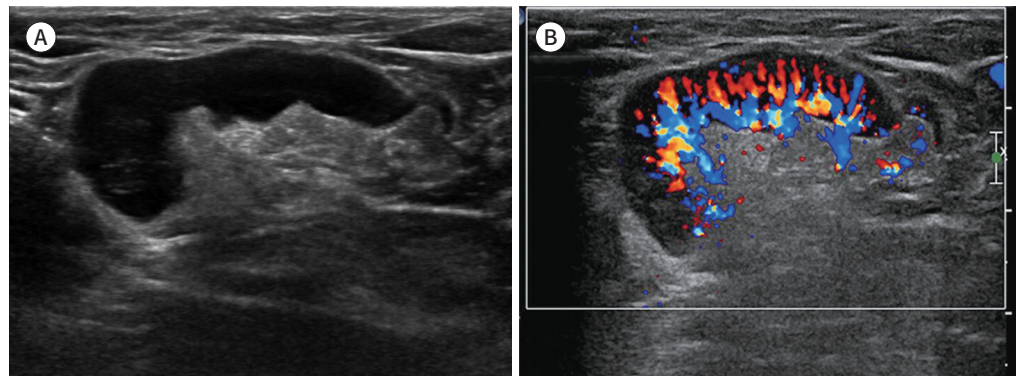
**Fig. 9.** Imaging findings of malignant fibrous histiocytoma of storiform-pleomorphic type in a 89-year-old male.

- A.** Transverse ultrasonographic scan shows an oval-shaped, hypoechoic mass with indistinct margins.
- B.** Color Doppler image shows internal vascularity in the mass.



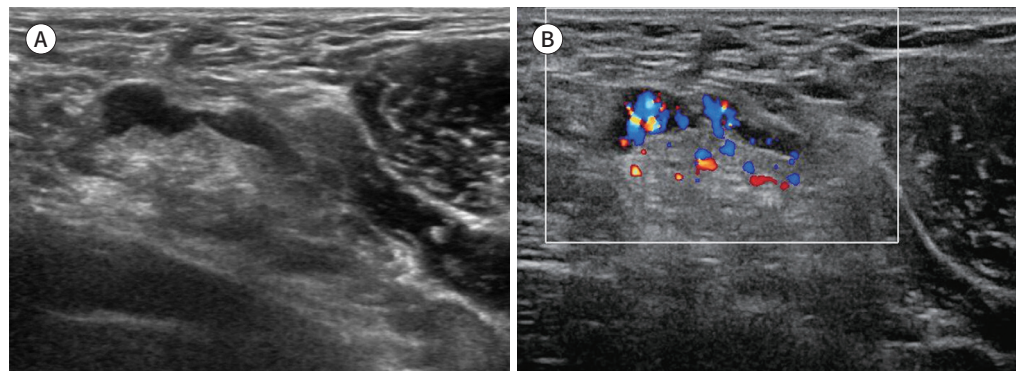
**Fig. 10.** Imaging findings of reactive hyperplasia of the right axilla in a 43-year-old male.

- A.** Transverse ultrasonographic scan shows an enlarged lymph node with cortical thickening.
- B.** Color Doppler image shows increased vascularity in the mass.



**Fig. 11.** Imaging findings of Kikuchi's Lymphadenopathy of the axilla in a 38-year-old male.

- A.** Transverse ultrasonographic scan shows a lymph node with mild cortical thickening.
- B.** Color Doppler image shows increased vascularity in the mass.





### ATYPICAL PARACORTICAL HYPERPLASIA

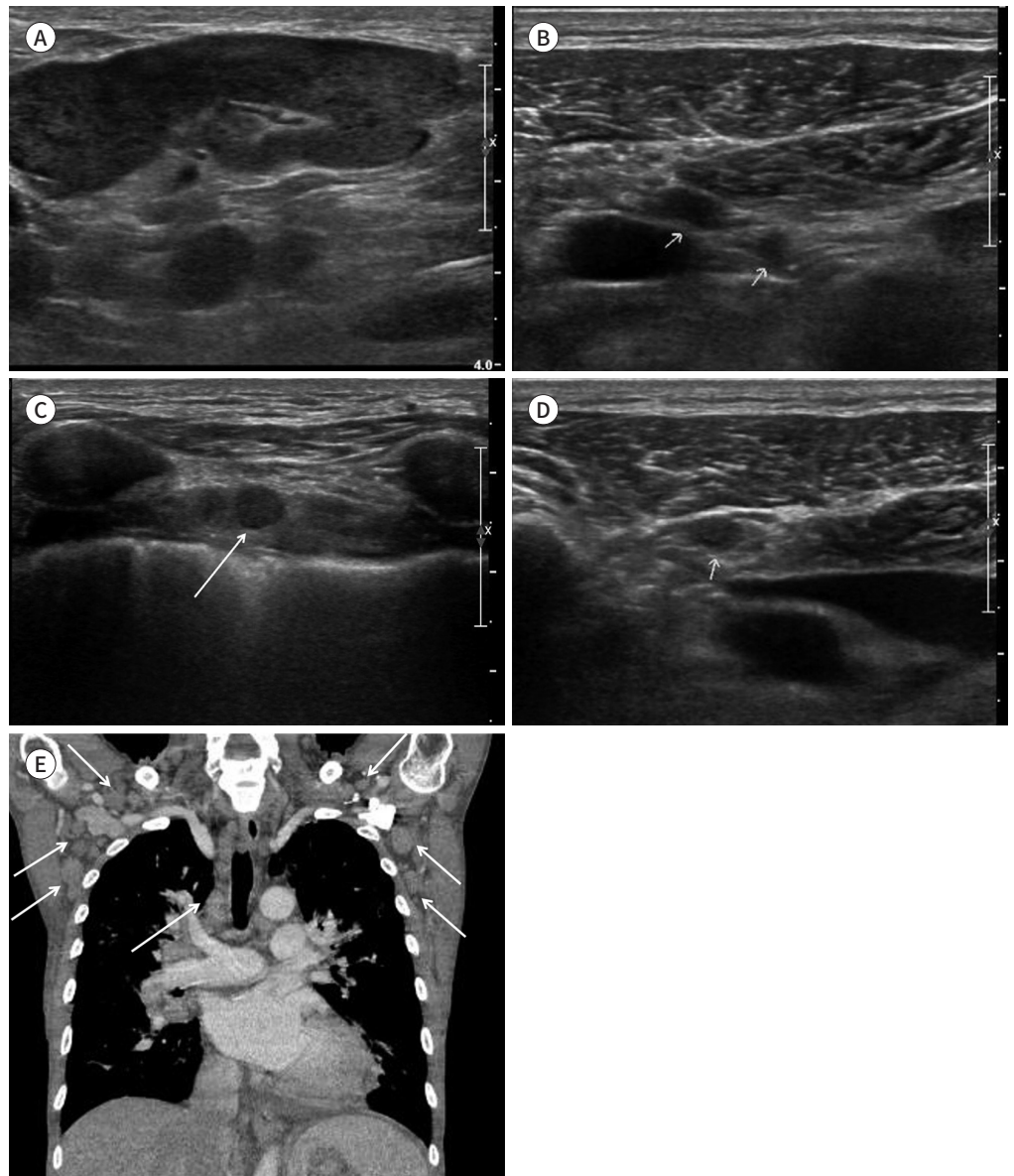
Lymphoproliferative disorders encompass a wide spectrum of diseases including reactive, atypical, and malignant ones. Greiner et al. (27) reported the following atypical lymphoid disorders: Castleman disease, angioimmunoblastic lymphadenopathy, lymphadenopathy in autoimmune diseases, post-transplant lymphoproliferative disorders, and X-linked lymphoproliferative disease. The term “atypical paracortical hyperplasia” refers to a number of conditions rather than to a specific disease (28). Atypical paracortical hyperplasia can be identified

**Fig. 12.** Imaging findings of Castleman disease in a 56-year-old male.

**A.** Transverse ultrasonographic scan shows an enlarged lymph node with cortical thickening.

**B-D.** Ultrasonographic scans of the left axilla reveal several lymph nodes at the second and third axillary levels (**B, C**) and the internal mammary chain (**D**) (arrows).

**E.** Contrast-enhanced chest CT scan demonstrates multiple enlarged lymph nodes in both the axillae, the neck, and the mediastinum (arrows).



on US by the presence of an enlarged lymph node with loss of the central echogenic hilum and increased vascularity (Fig. 13).

## LYMPHOMA

Lymphoma is a common cause of superficial lymph node enlargement (29). It typically presents as a systemic disease, and the involvement of a solitary lymph node is unusual (30). The features suggesting a lymphoma on US include variable-sized hypoechoic masses with uncircumscribed margins, eccentric cortical thickening, and increased vascularity at the periphery and center of the mass (Fig. 14) (29).

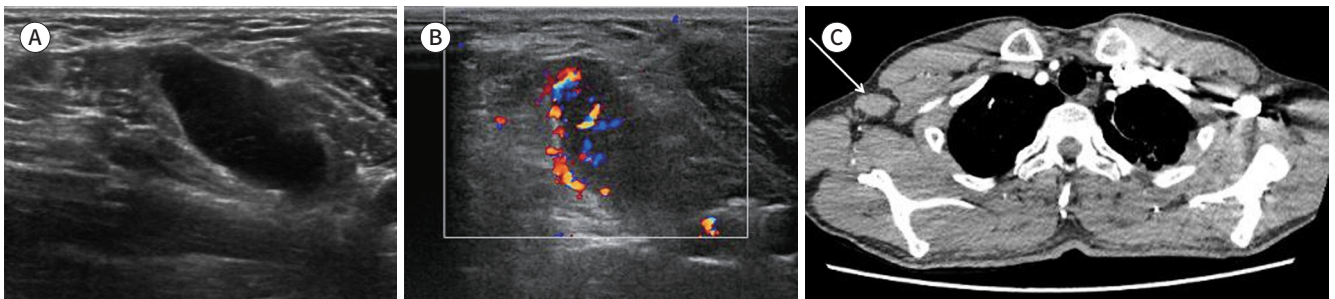
## SOFT TISSUE LESIONS IN THE AXILLA

### EPIDERMAL INCLUSION CYST

The epidermal inclusion cyst presents as a mobile cutaneous or subcutaneous lump (31). Complications such as rupture of the cyst, inflammation or abscess, and the development of squamous cell cancer can occur (31). On US, it appears as a well-circumscribed mass with variable internal echogenicity (Fig. 15).

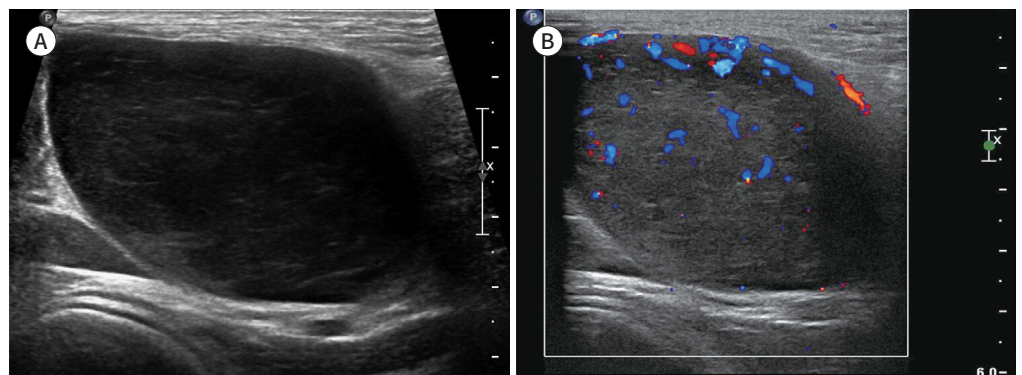
**Fig. 13.** Imaging findings of atypical paracortical hyperplasia of unknown significance in a 49-year-old male who had a history of diffuse large B cell lymphoma.

- A. Transverse ultrasonographic scan shows an enlarged lymph node with the loss of central fatty hilum.
- B. Color Doppler image shows increased vascularity in the mass.
- C. Contrast-enhanced chest CT scan shows an enlarged lymph node in the right axilla (arrow).



**Fig. 14.** Imaging findings of diffuse large B-cell lymphoma of the right axilla in a 50-year-old male.

- A. Radial ultrasonographic scan shows an oval-shaped, hypoechoic mass with circumscribed margins.
- B. Color Doppler image shows increased vascularity in the mass.



### SIMPLE CYST

Breast cysts occur commonly in premenopausal female (32). However, they are uncommon in male patients. Patients with breast cysts are usually asymptomatic although they may present with palpable masses or pain (32). A simple cyst is considered benign, and is sonographically defined as an anechoic mass with circumscribed margins, round or oval shape, and posterior enhancement (Fig. 16) (33). If the patient with a simple cyst is symptomatic, aspiration of the cyst can be performed (34). Neurogenic tumor may be included in the differential diagnosis. Neurogenic tumor arising from the brachial plexus has been reported in the axilla (35). It usually presents as a well-circumscribed oval hypoechoic mass with or without posterior acoustic enhancement on US (35).

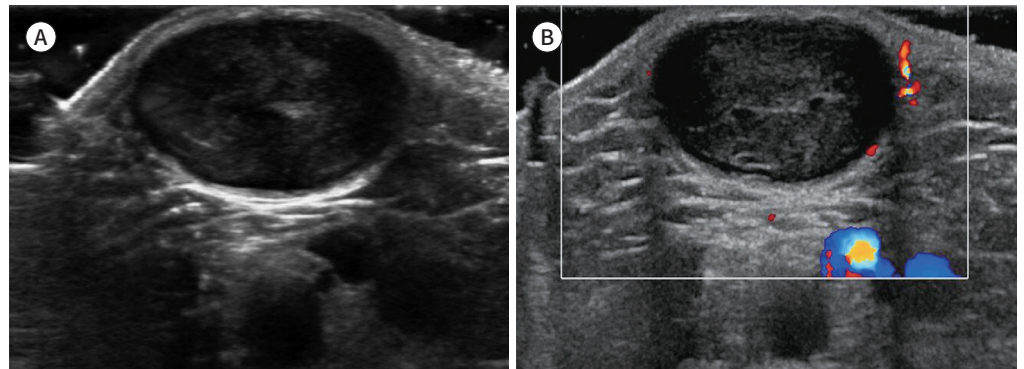
### FAT NECROSIS

Fat necrosis is an inflammatory process that often results from trauma. Trauma leads to inflammation, liquefactive necrosis of fat cells, and subsequent fibrosis (31). Fat necrosis is usually located close to the surface of the skin (31). US findings suggesting fat necrosis are as fol-

**Fig. 15.** Imaging findings of epidermal inclusion cyst of the left axilla in a 51-year-old male.

**A.** Transverse ultrasonographic scan shows an oval-shaped, hypoechoic mass measuring 2.4 cm in size with circumscribed margins.

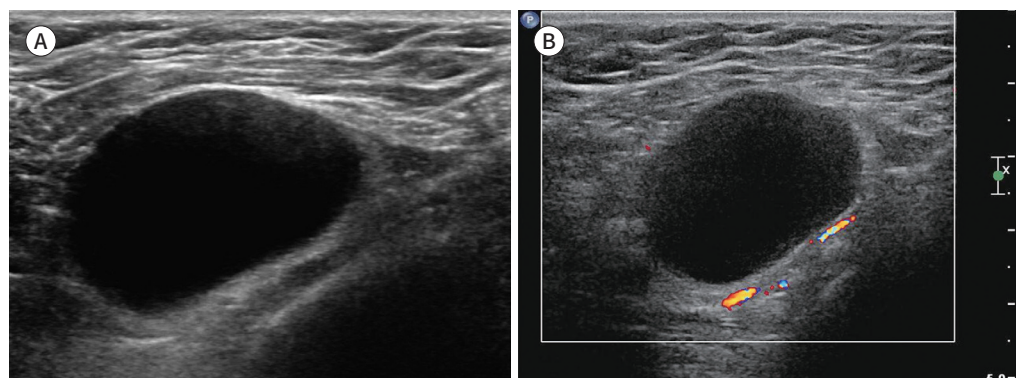
**B.** Color Doppler image shows peripheral vascularity in the mass.



**Fig. 16.** Imaging findings of benign cyst with thick fibrotic wall of the right axilla in a 88-year-old male.

**A.** Longitudinal ultrasonographic scan shows an enlarged cystic mass measuring 3.3 cm in size with posterior enhancement.

**B.** Color Doppler image shows no vascularity in the mass.



lows: simple cysts, complex cysts, and a solid mass with variable internal echogenicity depending on the stage of fat necrosis (Fig. 17) (35).

### ABSCCESS

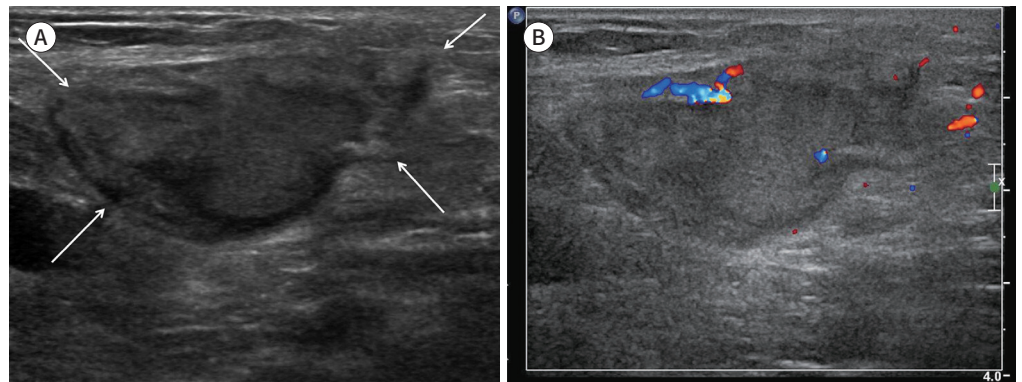
A breast abscess occurs as a complication of infectious mastitis, and usually affects young female (10). It occurs rarely in male. When present in male, the breast abscess is most commonly located in the periareolar region (10). On US, it appears as an irregular multi-loculated mass (Fig. 18) (35).

### ANGIOMATOID FIBROUS HISTIOCYTOMA

Angiomatoid fibrous histiocytoma was first described as “angiomatoid malignant fibrous histiocytoma” by Enzinger in 1979 and is now considered to be an intermediate malignancy. It usually occurs in children and young adults, with a median age of 14 years (36). It typically presents as a painless and slowly growing mass in the dermis and subcutis (36, 37). The extremities are commonly involved, while the trunk, head and neck are less commonly involved (37). The imaging findings are non-specific and may mimic those of a hematoma, hemangioma,

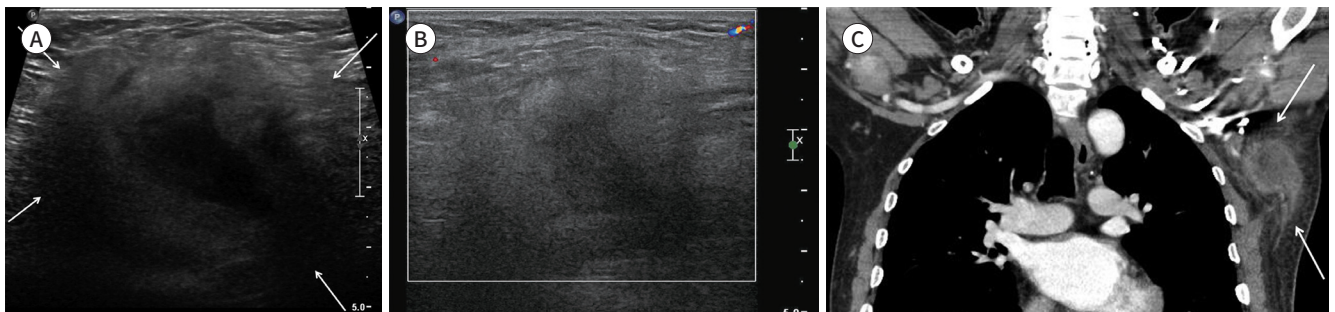
**Fig. 17.** Imaging findings of fat necrosis of the right axilla in a 35-year-old male.

- A.** Radial ultrasonographic scan shows an irregularly shaped, heterogeneously hyperechoic mass measuring 3.4 cm in size with indistinct margins (arrows).
- B.** Color Doppler image shows vascularity in the mass.



**Fig. 18.** Imaging findings of abscess of the left axilla in a 60-year-old male.

- A.** Transverse ultrasonographic scan shows an irregularly shaped, heterogeneously hypoechoic mass measuring 4 cm in size with indistinct margins (arrows).
- B.** Color Doppler image shows no vascularity in the mass.
- C.** Contrast-enhanced chest CT scan shows an enlarged mass with perilesional fat stranding (arrows).



or malignant fibrous histiocytoma (Fig. 19) (36). Wide surgical excision and follow-up are recommended for the management of this condition (36, 37).

### SQUAMOUS CELL CARCINOMA

Squamous cell carcinoma is an epithelial malignancy that can occur in any organ bearing a squamous epithelium; it has the potential metastatic spread (38). It can arise in many anatomical sites including the skin, lips, mouth, esophagus, urinary tract, prostate, lungs, vagina, and cervix (38). Most cases involve the skin, head and neck, esophagus, and lungs (38). On US, it appears as a hypoechoic mass with circumscribed margins, oval shape, and increased vascularity (Fig. 20).

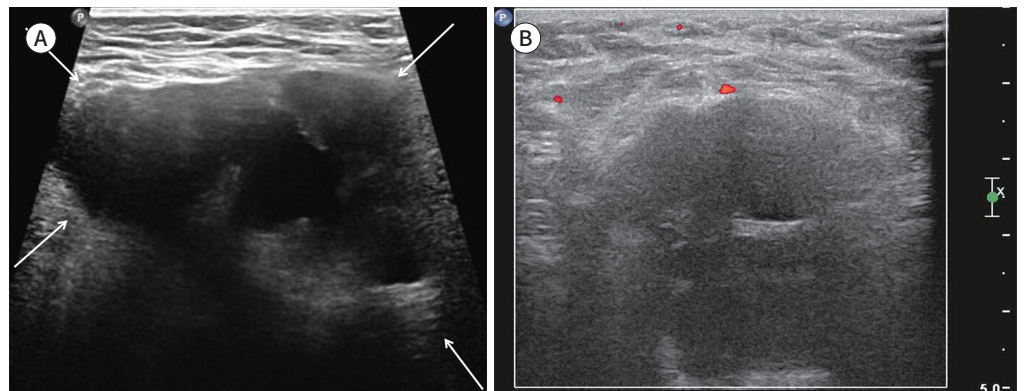
### METASTASIS

Metastatic spread to the axilla can occur from primary malignancies of the breast, lungs, thyroid, stomach, colon, rectum, pancreas, ovaries, and kidneys (35). The most common cause of a palpable axillary mass is metastatic spread in breast cancer (31). Involvement of

**Fig. 19.** Imaging findings of angiomatoid fibrous histiocytoma of the right axilla in a 52-year-old male.

**A.** Transverse ultrasonographic scan shows an irregularly shaped, complex cystic and solid mass measuring 6 cm in size with indistinct margins (arrows).

**B.** Color Doppler image shows no vascularity in the mass.

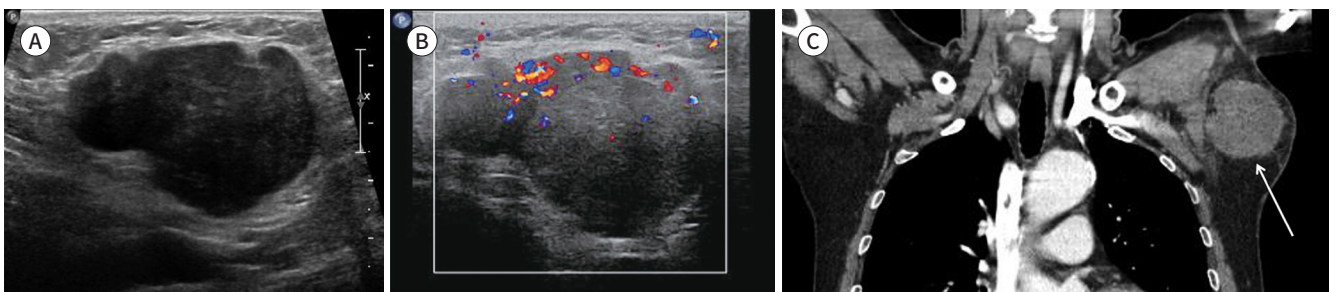


**Fig. 20.** Imaging findings of moderately differentiated squamous cell carcinoma of the left axilla in a 75-year-old male.

**A.** Radial US scan shows an oval-shaped, hypoechoic mass measuring 4.4 cm in size with circumscribed margins.

**B.** Color Doppler image shows increased vascularity in the mass.

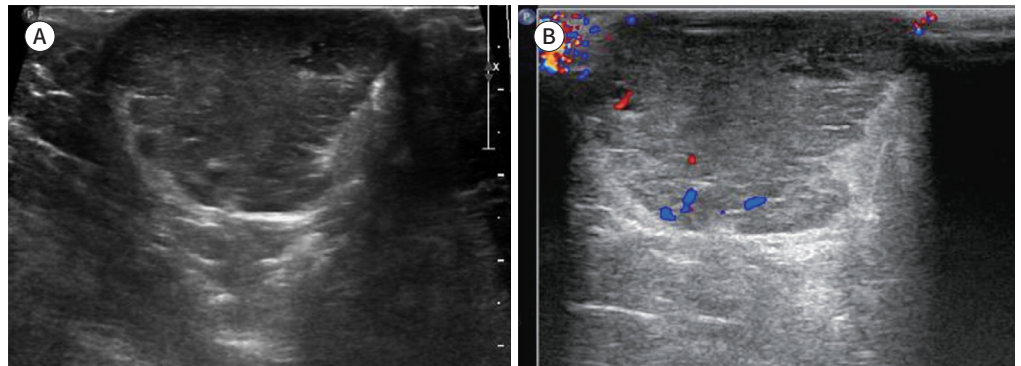
**C.** Contrast-enhanced chest computed tomographic scan shows a mildly enhancing lobulated mass in the left axilla (arrow).



**Fig. 21.** Imaging findings of metastatic mucinous carcinoma of the right axilla in a 65-year-old male who had a history of bladder cancer.

**A.** Radial US scan reveals an indistinct, oval-shaped, isoechoic mass measuring 3.2 cm in size.

**B.** Color Doppler image shows internal vascularity in the mass.



the axillary lymph nodes is an important prognostic factor for breast cancer (35). On US, a metastatic lesion is described as a round mass with a hypoechoic cortex, cortical thickening, loss of the central echogenic hilum or an eccentric hilum, and increased vascularity (Fig. 21) (21, 29, 35).

## CONCLUSIONS

Most adult male patients who visit a breast clinic complain of symptoms such as palpability. Although gynecomastia is the most common US finding, other diseases may occur in adult male breasts. Furthermore, it may be difficult to distinguish between lymph node-related lesions and non-lymph node-related soft tissue lesions in the axilla, various lesions can develop in the axilla. US can be a useful imaging modality for the evaluation of palpable male breast and axillary lesions. It is, therefore, important for radiologists to familiarize themselves with the imaging findings of these diseases.

### Author Contributions

Conceptualization, J.H.K.; supervision, L.Y.; writing—original draft, J.H.K.; and writing—review & editing, L.Y.

### Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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## 만져지는 유방과 액와부 병변을 주소로 내원한 성인 남성의 초음파 소견: 임상화보

정현경 · 임윤정\*

남성 유방은 기능이 없는 잔유기관이지만, 여성 유방과 유사하게 다양한 질환이 발생할 수 있다. 하지만 여성 유방암과 달리 남성 유방암의 발병률이 낮아 남성 환자를 위한 확립된 검진방법은 없다. 따라서 남성 유방의 평가는 보통 만져지는 종물이나 통증과 같은 증상을 가진 환자에서 진단적 평가를 하게 된다. 더욱이 외래를 방문하는 성인 남성 환자들은 유방뿐 아니라 액와부의 증상을 호소하기도 하며, 일반적으로 유방 초음파 검사 시 유방뿐 아니라 액와까지 검사한다. 이에 본 임상화보는 유방 및 액와의 만져지는 종물을 주소로 내원한 성인 남성 환자에서 발생하였던 다양한 증례의 초음파 소견을 제시하고자 한다.

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