



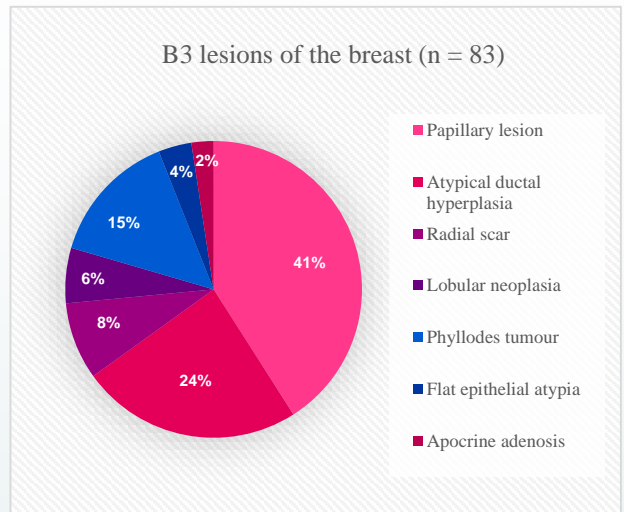
Introduction

A heterogenous group of breast lesions with uncertain malignant potential are classified as B3 lesions according to the pathologic B-classification by the British Society of Breast Radiologists (BSBR). They carry different malignant potential and rates of upgrade on surgery. We aim to review their imaging features, and to discuss the diagnostic and management challenges.

Methods

Retrospective search of cases of biopsy-proven B3 lesions in our institution from July 2022 to July 2024 was performed via the Radiology Information System. Representative cases were selected for demonstration in this presentation.

Results



Papillary lesion

- Intraductal papilloma consists of a fibrovascular stalk with luminal epithelial or myoepithelial proliferation. It can be central (arising from the ducts of the subareolar region sparing terminal duct lobular units (TDLU) or peripheral (originating from TDLU).
- Imaging findings
 - Mammogram (MMG): Well-circumscribed mass, dilated ducts or pleomorphic calcifications.
 - Ultrasound (USG): Solid and hypoechoic mural nodule within a dilated duct or complex cystic lesion.
 - Magnetic resonance imaging (MRI): Oval and well-circumscribed mass with dilated duct.
- Management
 - Vacuum-assisted excision (VAE) or surgical excision is recommended for complete removal of lesion without atypia. [1]
 - Surgical excision is recommended if there is concomitant atypical ductal hyperplasia. [2]

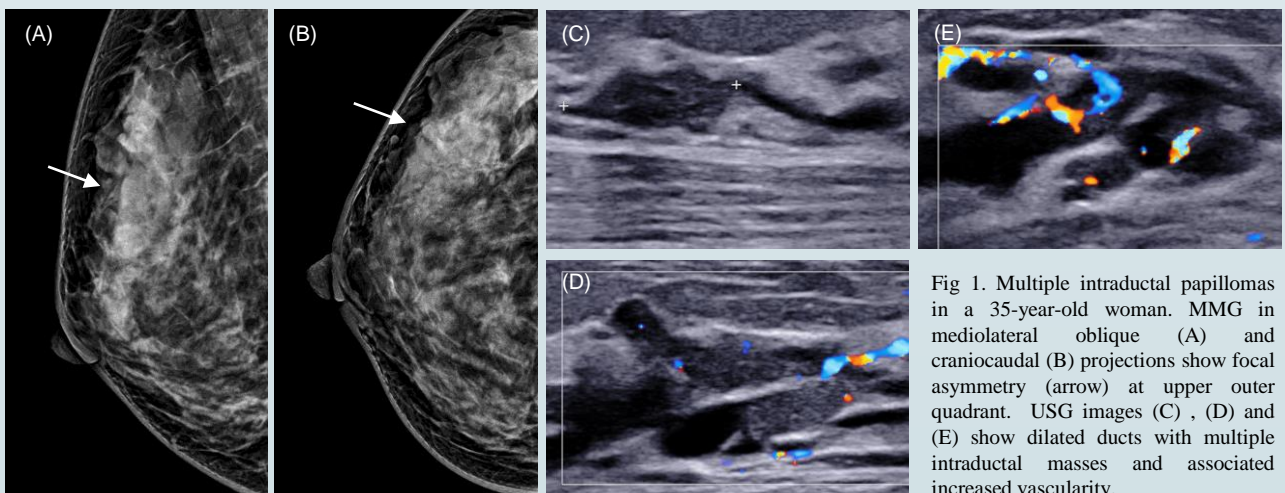


Fig 1. Multiple intraductal papillomas in a 35-year-old woman. MMG in mediolateral oblique (A) and craniocaudal (B) projections show focal asymmetry (arrow) at upper outer quadrant. USG images (C), (D) and (E) show dilated ducts with multiple intraductal masses and associated increased vascularity.

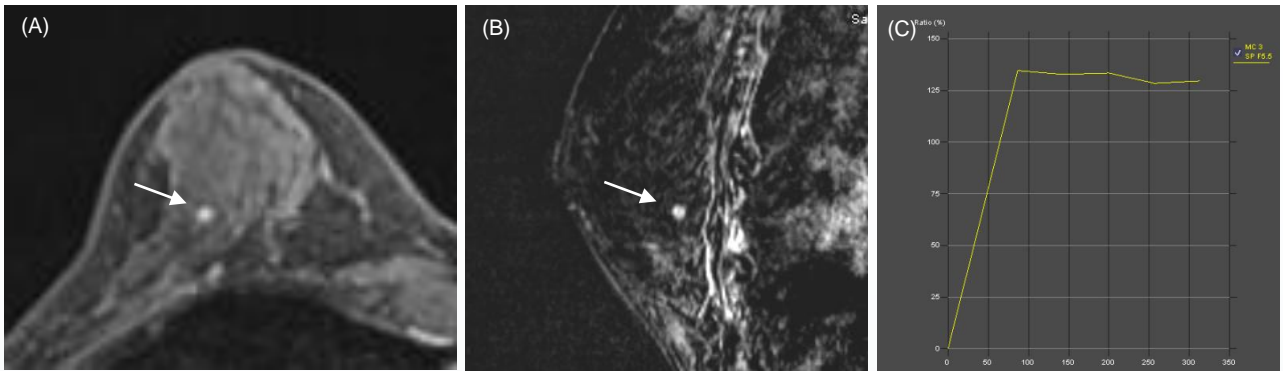


Fig 2. Papillary lesion in a 55-year-old woman. T1-weighted contrast enhanced axial image (A) and T1-weighted contrast enhanced sagittal image with subtraction (B) show an avidly enhancing ovoid mass (arrow) at the 8-o'clock position in the right breast 2cm from nipple. Kinetic time curve (C) shows that the mass displays fast initial and persistent delayed kinetics (type 2 curve).

Atypical ductal hyperplasia (ADH)

- A clonal intraductal lesion with proliferation of epithelial cells and low-grade atypia. It shows histologic features similar to low-grade ductal carcinoma in situ but only partially involves the TDLU of ≤ 2 mm in maximal extension.
- Imaging findings
 - MMG: Pleomorphic or amorphous microcalcifications in grouped or linear branching distribution.
 - USG: Irregular, parallel and hypoechoic mass with microlobulated margin and no posterior feature.
 - MRI: Non-mass enhancement or irregular mass.
- Management
 - Surgical excision is recommended due to high risk of underestimation on biopsy and high upgrade rates (7.3-57%) and associated increased risk of breast cancer. [1]

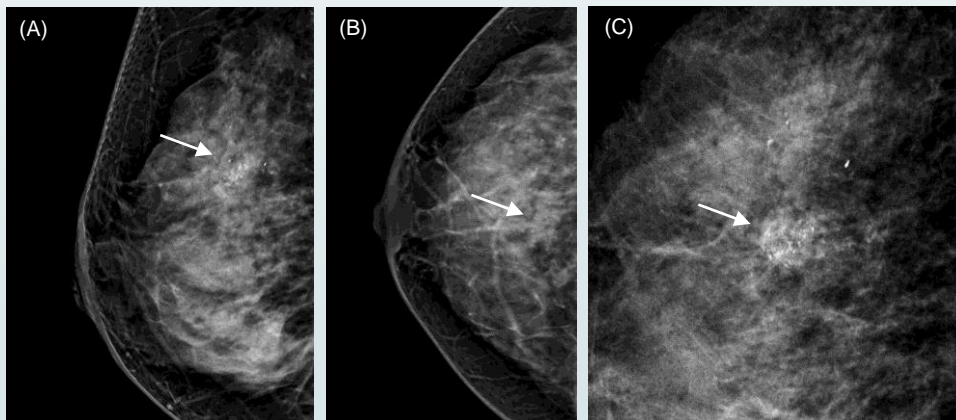


Fig 3. Atypical ductal hyperplasia in a 37-year-old woman. MMG in mediolateral oblique (A) and craniocaudal (B) projections show grouped microcalcifications (arrow) at upper central breast. Magnification view (C) shows pleomorphic morphology of the microcalcifications (arrow).

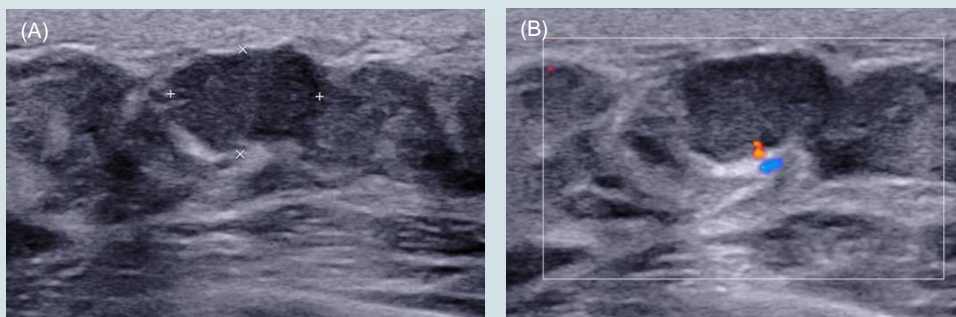


Fig 4. Atypical ductal hyperplasia in a 41-year-old woman. USG images (A) and (B) show an oval, parallel and hypoechoic mass with intrinsic vascularity and no posterior shadowing at the 12-o'clock position in the left breast 3cm from nipple



Fig 5. Atypical ductal hyperplasia in a 66-year-old woman. T1-weighted contrast enhanced axial image (A) and T1-weighted contrast enhanced sagittal image with subtraction (B) show segmental and heterogenous non-mass enhancement at the 9-o'clock position in the left breast. Kinetic time curve (C) shows that the lesion displays fast initial and persistent delayed kinetics (type 2 curve).

Radial scar

- A lesion of stellate configuration with a central fibro-elastotic core and peripheral glandular structures and cysts, often associated with calcifications and sclerosing adenosis.
- Imaging findings
 - MMG: Architectural distortion, radiolucent star-shaped (also known as “black star”) lesion and microcalcifications.
 - USG: Irregular hypoechoic mass with posterior shadowing or parenchymal distortion.
 - MRI: Spiculated mass or non-mass enhancement.
- Management
 - Radiological-pathological correlation is important. VAE and follow-up after complete removal of the visible lesion are recommended. [1]
 - Surgical excision is recommended if there is associated atypia (ADH, lobular neoplasia, etc). [2]

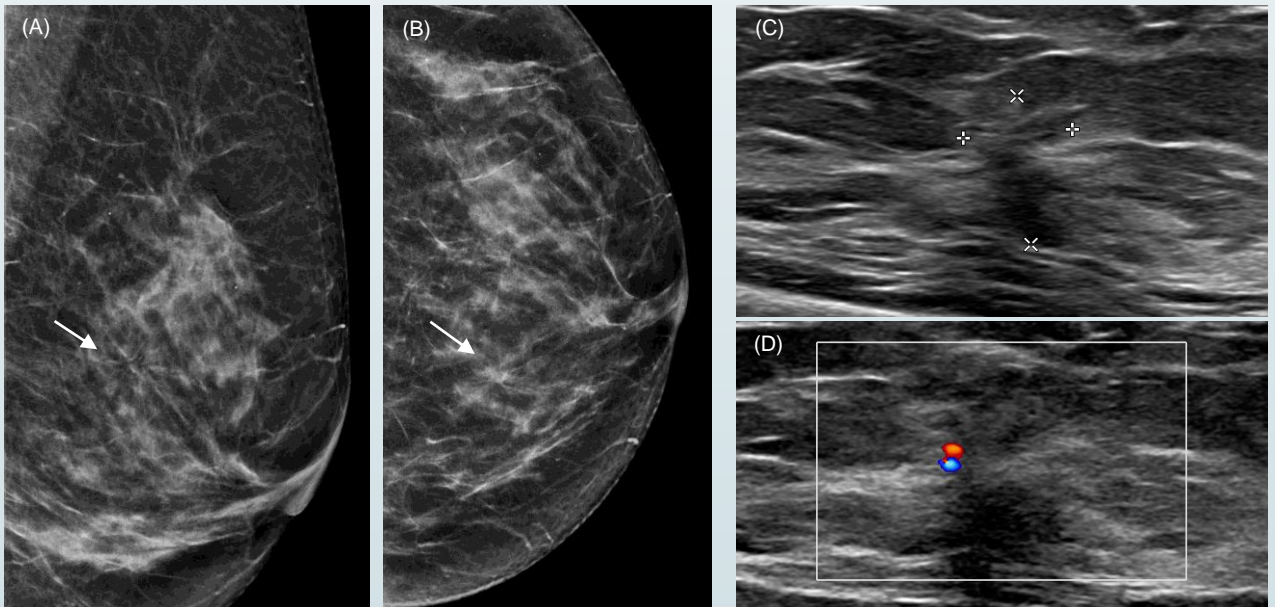


Fig 6. Radial scar in a 59-year-old woman. MMG in mediolateral oblique (A) and craniocaudal (B) projections show architectural distortion (arrow) at upper inner quadrant of left breast. USG images (C) and (D) show an irregular shaped, non-parallel, hypoechoic mass with spiculated margins, posterior shadowing and intrinsic vascularity at the 10-o'clock position in the left breast 3cm from nipple. Associated architectural distortion is also noted. This lesion corresponds to the MMG-detected lesion.

Classical lobular neoplasia (LN)

- Classical LN is a neoplastic lesion with proliferation of dis-cohesive epithelial cells originates from the TDLU. It is divided into atypical lobular hyperplasia and lobular carcinoma in situ (LCIS) according to the extent within the TDLUs (<50% and $\geq 50\%$, respectively). It is a risk factor and a non-obligate precursor of breast cancer. Non-classical LCIS (pleomorphic, apocrine or florid LCIS) are considered B5 lesions and excluded in this discussion.
- Imaging findings
 - MMG: Grouped amorphous microcalcifications, mass or focal asymmetry.
 - USG: Irregular hypoechoic mass with posterior shadow.
 - MRI: Non-mass enhancement.
- Management
 - VAE for lesion of radiological-pathological concordance and follow-up after complete removal of the visible lesion. [1]
 - Surgical excision is recommended in case of suspicious radiological findings or other high-risk lesions. [2]
 - Unilateral or bilateral mastectomy is no longer recommended. [2]

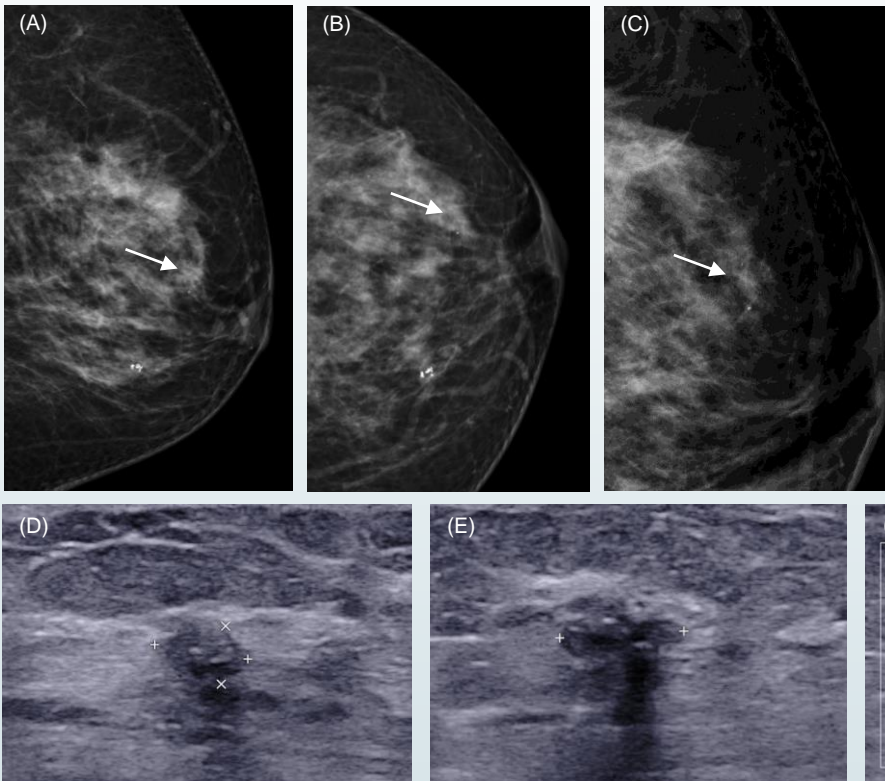


Fig 7. Atypical lobular hyperplasia in a 73-year-old woman. MMG in mediolateral oblique (A) and craniocaudal (B) projections show grouped microcalcifications (arrow) in the upper outer quadrant of left breast. Magnification view (C) shows amorphous morphology of the microcalcifications.

USG images (D), (E) and (F) show an irregular, anti-parallel, hypoechoic mass with internal calcifications and posterior shadowing at the the 8-o'clock position in the left breast 1cm from nipple. This lesion corresponds to the MMG-detected lesion

Benign and borderline phyllodes tumour (PT)

- A circumscribed fibroepithelial lesion which is composed of leaflike stromal fronds with cleft-like spaces. Benign and borderline PT are classified as B3 lesions while malignant PT is considered B5 lesion.
- Imaging findings
 - MMG: Ovoid, well-circumscribed and high-density mass with lobulated margin, may contain coarse calcification or fat.
 - USG: Heterogenous and hypoechoic mass with internal cleft-like cystic spaces and posterior shadowing.
 - MRI: Circumscribed enhancing mass.
- Management
 - Surgical excision is recommended. [1]

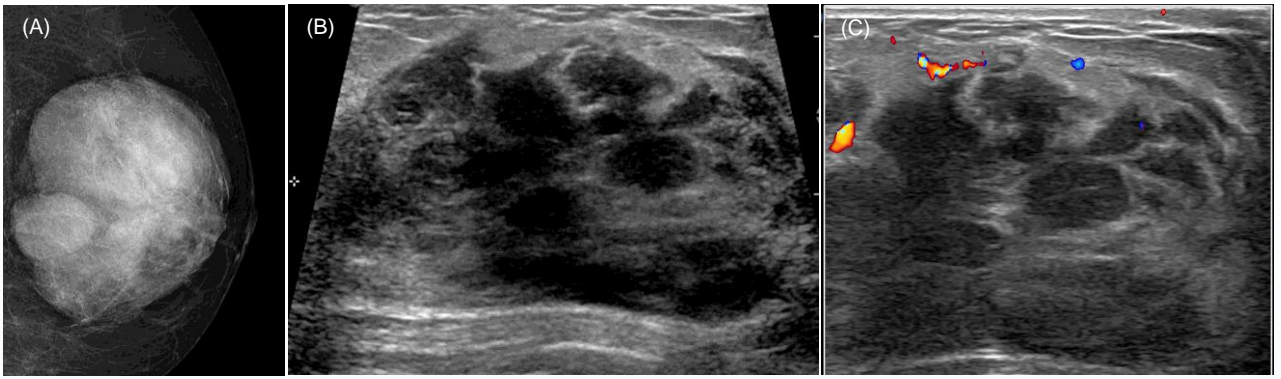


Fig 8. Phyllodes tumour in a 54-year-old woman. MMG in craniocaudal (A) projection shows a large high-density lobulated mass in left breast. USG images (B) and (C) show a large heterogenous hypoechoic mass with internal cystic spaces and intrinsic vascularity in the left breast. This lesion corresponds to the MMG-detected lesion.

Flat epithelial atypia

- A non-malignant, atypical columnar cell lesions of the breast, characterized by columnar cell changes with monomorphic cytological atypia. It often coexists with other high-risk lesions such as ADH or LN.
- Imaging findings
 - MMG: Grouped amorphous or pleomorphic microcalcification.
 - USG: Irregular and hypoechoic mass with microlobulated margin.
- Management
 - VAE and follow-up after complete removal of the visible lesion. [1]
 - Surgical excision if there is radiological-pathological discrepancy or concomitant ADH. [2]

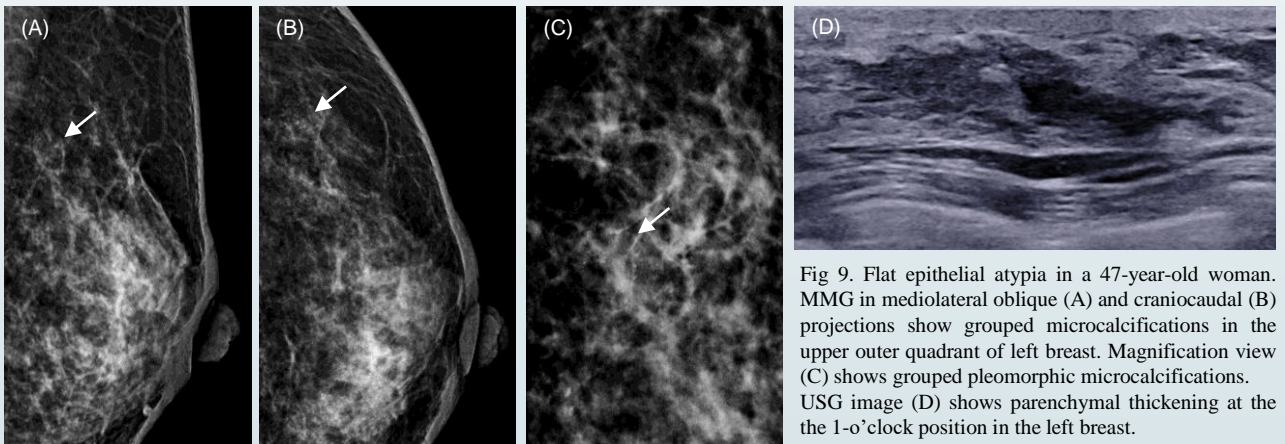


Fig 9. Flat epithelial atypia in a 47-year-old woman. MMG in mediolateral oblique (A) and craniocaudal (B) projections show grouped microcalcifications in the upper outer quadrant of left breast. Magnification view (C) shows grouped pleomorphic microcalcifications. USG image (D) shows parenchymal thickening at the the 1-o'clock position in the left breast.

Conclusion

Radiologists should be aware of the variable presentation of different B3 lesions and the recent changes in their management approach. Multidisciplinary discussion is of paramount importance to ensure personalized care and avoid unnecessary surgical excision.

Reference

1. Elfgen C, Leo C, Kubik-Huch RA, et al. Third International Consensus Conference on lesions of uncertain malignant potential in the breast (B3 lesions). *Virchows Arch.* 2023;483(1):5-20.
2. Rubio IT, Wyld L, Marotti L, et al. European guidelines for the diagnosis, treatment and follow-up of breast lesions with uncertain malignant potential (B3 lesions) developed jointly by EUSOMA, EUSOBI, ESP (BWG) and ESSO. *Eur J Surg Oncol.* 2024 Mar;50(3):107943.