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Case Report

Diagnostic pitfall in radiological imaging after vacuum-assisted excision of B3 breast lesion: A case report ^{☆,☆☆}

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ABSTRACT

The management of B3 breast lesions using vacuum-assisted excision (VAE) is gaining increasing traction in clinical practice. However, it is infrequently reported in the literature how this technique may affect long-term imaging appearances. We present a challenging case in which the previous VAE site displayed a mass-like appearance that mimicked breast cancer. The purpose of this case report is to share our experience and illustrate the ultrasound and mammographic characteristics of the residual cavity after VAE, in order to contribute to expanding knowledge regarding radiological imaging post-VAE, which is currently still limited.

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Introduction

The management of B3 breast lesions poses a clinical and diagnostic challenge due to their atypical histological features, which increase the risk of malignancy. Vacuum-assisted excision (VAE) is becoming increasingly common for the treatment of these lesions and is now included in guidelines, offering a minimally invasive approach for removal and

histological analysis [1]. However, it is infrequently reported how the interpretation of long-term postprocedural radiological imaging can be complex and may lead to diagnostic issues. This case report describes a clinical scenario where a diagnostic issue occurred in radiological imaging following vacuum-assisted excision of a B3 lesion, highlighting the associated diagnostic challenges and the importance of accurate clinical-radiological correlation to avoid patient management errors.

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Case presentation

A 35-year-old woman, with no symptoms or history of previous pregnancy or breastfeeding but with a positive family history of breast carcinoma (maternal grandmother) and on contraceptive hormone therapy, was found to have an 8 mm hypoechoogenic solid nodular formation with blurred boundaries at the junction of the outer quadrants of the left breast, during an ultrasound screening examination performed at the University Polyclinic of Rome Tor Vergata. In the absence of the previous mammogram, which had been performed earlier that year but was lost by the patient, and given the relatively small size of the lesion, it was decided to perform a vacuum-assisted biopsy (VAB) for proper histological diagnosis (Fig. 1).

Written informed consent was obtained from the patient for all procedures.

In August 2022, an ultrasound-guided biopsy was performed: after intracutaneous injection of a local anesthetic (1–2 mL of 1% lidocaine) and a 3–5 mm skin incision, a 10-gauge

needle was positioned with the aperture of the needle just beneath the ultrasound-visualized lesion. The vacuum biopsy resulted in the excision of several specimens, and a metallic tissue marker clip was placed. The procedure was completed in 20–30 minutes. Compression of the breast was performed for 5–10 minutes following the procedure. Dressing of the incision was made and ice was applied, and the patient was advised to start broad-spectrum prophylactic antibiotic therapy for 5 days according to hospital guidelines.

Histopathological examination of the specimens demonstrated the presence of a papillary lesion with aspects of apocrine metaplasia, thus classifying it as a B3 lesion according to European Guidelines. As a lesion of uncertain potential, vacuum-assisted excision (VAE) was recommended.

A month later, VAE was performed under ultrasound guidance, similar to the procedure described above, but with a larger 8-gauge needle. The procedure was concluded when no remaining tumor could be identified and the site of the lesion was obscured by blood, which occurred during the withdrawal of 12 specimens. Since the tissue marker clip used during the

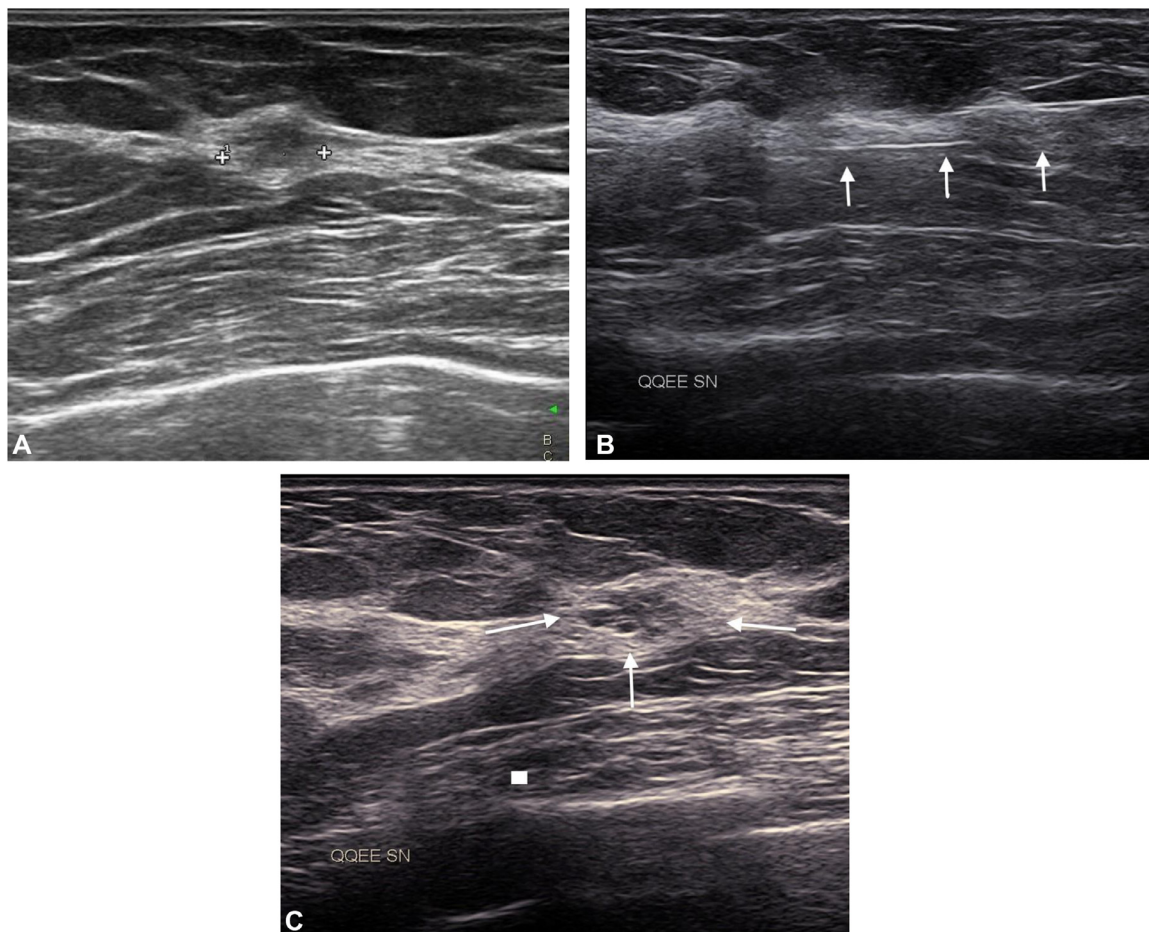


Fig. 1 – US-guided vacuum-assisted biopsy (VAB). (A) Sonogram showing the left breast nodule before the procedure (VAB) (B) Ultrasound during the procedure, showing the positioning of the needle below the lesion (indicated by the arrows) and activation of the vacuum (C) Sonogram obtained after the biopsy demonstrates no evidence of the lesion; the little residual cavity is indicated by the arrows.



Fig. 2 – Ultrasound follow-up performed 6 month after vacuum-assisted excision (VAE). In the site of the previous procedure, recognizable by the presence of the released clip, an hypo-anechogenic area 1 cm in size, with oval morphology, blurred margins and eco-structural alteration of the adjacent parenchyma is showed.

initial biopsy was removed, a new clip was applied. The procedure was well-tolerated by the patient, and no complications occurred.

Histopathological examination of the tissue revealed frustules of mammary parenchyma with adenosis, columnar and apocrine cell metaplasia, and confirmed the presence of a pseudo-cystic cavity and fibrous scar reaction as a consequence of the previous VAB procedure (B2 score according to European Guidelines). As a result, it was decided to call the patient back for an ultrasound check in 6 months.

In March 2023, ultrasound follow-up demonstrated a hypo-anechogenic area 1 cm in size in the left breast at the site where the procedures had been performed. The area had an oval morphology, blurred margins, and central punctiform hyperechogenicity corresponding to the metallic clip placed at the end of the excision, along with fuzzy echostructural alteration of the adjacent parenchyma (Fig. 2). A mammography with tomosynthesis images of the left breast was therefore requested and performed the following month, revealing a nodular opacity with spiculated margins and blurred boundaries, along with adjacent parenchymal distortion at the aforementioned site (Fig. 3).

The patient's case was discussed at the Working Oncological Group (WOG) of our hospital, and it was decided to proceed with surgical intervention. In April 2023, under stereotactic guidance, a metallic guide wire was placed within the area of parenchymal distortion of the left breast. On the same day, the patient underwent breast surgery (Figs. 4 and 5), and histologic examination of the surgical specimen documented the presence of a pseudo-cystic cavity, attributable to the previ-

ous biopsy procedures (B2 score according to European Guidelines).

Discussion

Breast cancer encompasses a group of diseases (>100) with many biological subtypes reflecting distinct molecular profiles and clinicopathological aspects [2,3]. For each molecular subtype, there are different therapeutic approaches and clinical outcomes [4]. Lesions of uncertain malignant potential in the breast (B3 lesions) are a subgroup with an overall malignancy risk of 9.9%-35.1% after total resection [5,6]. For all B3 lesions, open surgical excision has traditionally been recommended; however, over the past decade, there has been a trend toward minimally invasive breast biopsy or percutaneous excision using a vacuum-assisted device. This approach allows the removal of larger tissue volumes compared to core biopsy, equivalent to a small-wide local excision, while maintaining the same diagnostic accuracy as open surgery [6–8].

Vacuum-assisted excision (VAE) of breast lesions is a procedure involving the removal of larger tissue volumes using needles ranging in size from 14- to 8-gauge under tomographic or ultrasound guidance. The 14-gauge probe retrieves approximately 40 mg of tissue per sample, and the 11-gauge probe retrieves approximately 100 mg per sample [9]. Breast tissue is drawn into the needle by vacuum technology, and repeated samples are extracted through the same needle using a revolving cutting tool. A radio-opaque marker clip is then placed in

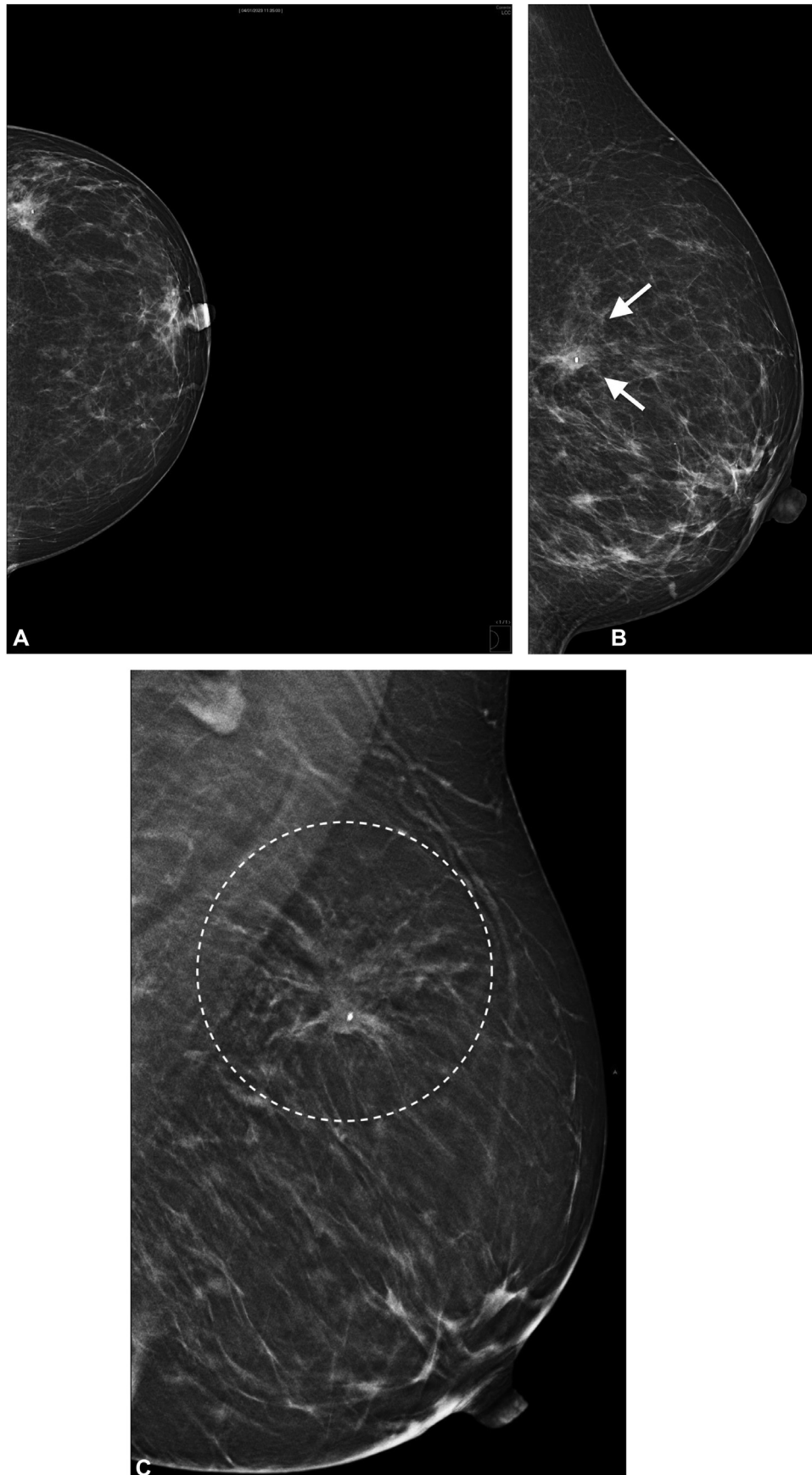


Fig. 3 – Mammographic imaging. Mammography and tomosynthesis projections of the left breast showing a nodular opacity with spiculated margins and blurred boundaries with adjacent parenchymal distortion in the site of previous procedure (indicated by the arrows and surrounded by the dotted line): (A) cranio-caudal mammogram; (B) medio-lateral mammogram; (C) medio-lateral-oblique tomosynthesis projection.

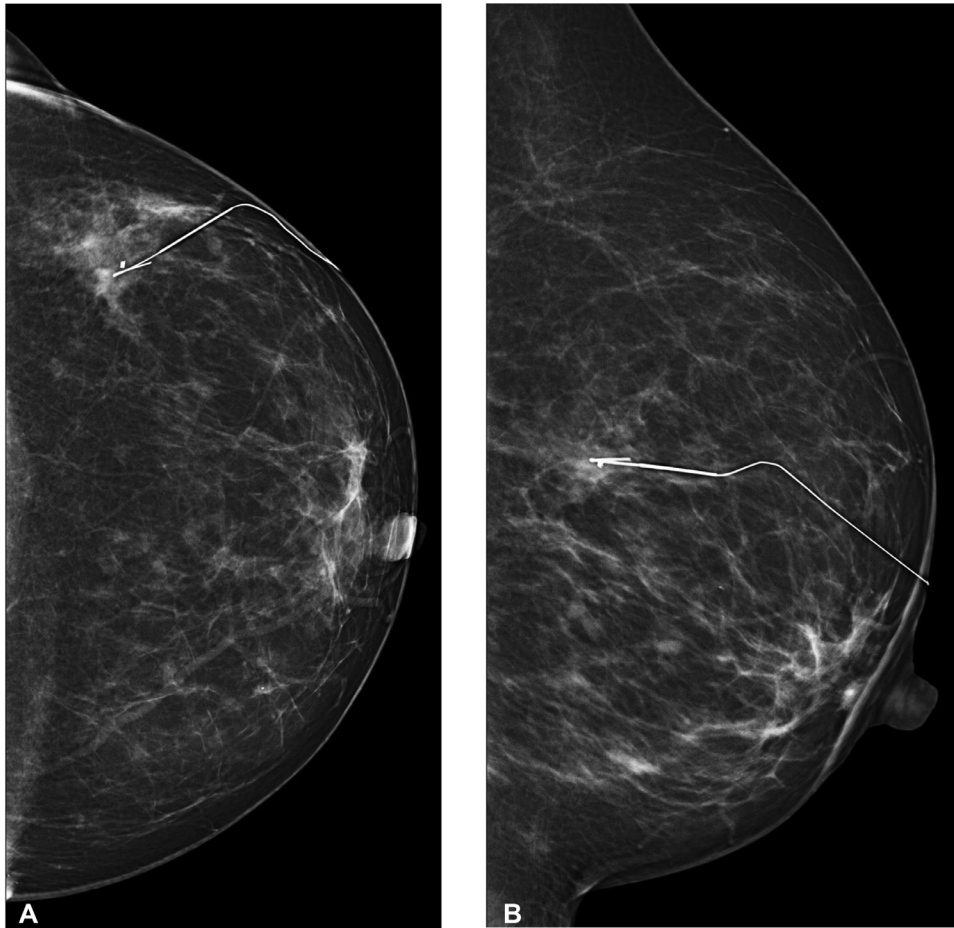


Fig. 4 – Preoperative imaging. Mammographic projections performed after placement a metallic guide wire (A) cranio-caudal mammogram; (B) medio-lateral mammogram.

the breast to allow for recognition of the procedure site in subsequent follow-up.

VAE of breast lesions is gaining increasing traction in clinical practice and is now included in guidelines [1]. VAE has significantly decreased the surgical upgrade rate and improved the accuracy of the procedure's outcomes. It can lead to surgical de-escalation in specific circumstances and become crucial when the goal is to achieve lower expenses and reduce rates of underestimation or overtreatment without compromising the standard of care for patients [10]. Recent Australian and Italian studies have also described VAE as a safe and effective pathway for managing selected B3 lesions [11,12].

However, it is little known and underreported in the literature how post-VAE changes in tissue, such as fibrous scarring, can lead to diagnostic pitfalls and complicate imaging interpretation and patient management. Most research so far has focused on postprocedural hematomas, scars, pain perception, and recurrence [13,14]. In this case report, the patient developed a post-VAE fibrous scar at the treated area, which mimicked a malignant lesion on mammogram and ultrasound imaging. This led to complications in imaging interpretation and necessitated surgery, which confirmed the lesion's be-

nign nature. It was considered whether a magnetic resonance imaging (MRI) with contrast media i.v. injection could have resolved the diagnostic issue, potentially by evaluating the post-contrast behavior of the area; however, our patient suffered from claustrophobia and could not undergo MRI.

Considering that VAE has recently become widely used, there are only a few studies documenting radiological imaging findings after the procedure [15,16]. Therefore, it is important to recognize that postprocedural outcomes may often mimic the presence of a malignant lesion, as seen in our case. Few cases in the literature address this topic [16], and it is crucial to share them to improve knowledge in this field and enhance the management of post-VAE patients. In our case, the issue was resolved with surgery, but a second-level imaging technique such as MRI with contrast media injection might have been helpful in resolving this diagnostic concern. Further studies exploring this aspect would be valuable. In these cases, aside from the patient's medical history and second-level imaging, awareness of these diagnostic pitfalls is essential. Thus, it is important to report experiences such as ours to contribute to expanding knowledge about radiological imaging after VAE and to reduce the risk of misdiagnosis and overtreatment.



Fig. 5 – Radiographic image of the surgical piece. Metallic clip and metallic repair wire can be seen within the surgical piece excised.

Declarations and Statement

The authors certify that the submitted article will not constitute redundant publication.

All figures of the review are available from the corresponding author (P.E. Gigliotti) on request.

Patient consent

The patient's written and informed consent was secured before publishing.

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