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## Case Report

# Pseudoaneurysm of the breast following blind palpation-guided core needle biopsy: a case report and literature review <sup>☆</sup>

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## ABSTRACT

Core needle biopsy is currently the most widely used basic diagnostic method for the diagnosis of breast masses; it is a minimally invasive procedure with excellent specificity and sensitivity and negligible complication rates, particularly when image-guided. However, complications tend to be higher when performed blindly. Hematoma remains the most common complication resulting from this procedure. Iatrogenic pseudoaneurysm is a rare complication with no previous report in Nigeria. In this report, we present a case of breast pseudoaneurysm occurring after 2 blind, palpation-guided core needle biopsies in a 51-year-old known hypertensive woman at a Nigerian tertiary hospital. Spontaneous thrombosis of the pseudoaneurysm occurred over three months after the second blind biopsy.

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## Case report

A 51-year-old perimenopausal multiparous woman presented to the surgical outpatient clinic with a painless right breast mass detected during a self-breast examination. There had been no change in the size since detection, and there was no

pain, nipple discharge, skin discoloration, or axillary swelling associated with the lesion. The patient was a known hypertensive with good blood pressure control. On clinical breast examination, a nontender mass measuring 2 × 2 cm was found in the upper outer quadrant of her right breast, which was free from the overlying skin or chest wall. There was no palpable lymph node in the axillae. A

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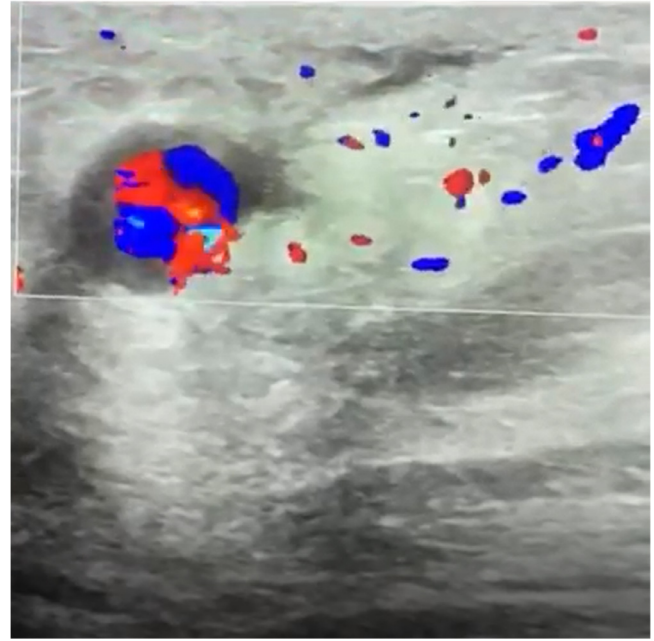
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**Fig. 1 – B-mode ultrasound image of the right breast mass showing a thick-walled lesion with a pulsatile anechoic center.**



**Fig. 2 – Color Doppler image of the right breast mass showing swirling (yin yang) flow within the pulsatile anechoic center of the lesion.**

clinical assessment of a possible mitotic breast mass was made.

A blind biopsy was performed with a 14-gauge core biopsy needle for histopathological analysis two weeks after symptom recognition. The histopathology result suggested a sampling error, as the tissue obtained by the surgeon was reported not to be representative and was inadequate for histological appraisal.

A repeat blind biopsy was performed by another surgeon three weeks after the initial biopsy due to the persistence of the mass. This was also performed with a 14-gauge core biopsy needle similar to the first blind biopsy. Some unusual bleeding was observed during the procedure, which resolved after a few minutes of applying firm pressure. The histopathological analysis of the second blind biopsy showed acute-on-chronic nonspecific inflammation with fat necrosis. Since there was no evidence of malignancy, the patient was reassured.

However, the patient presented to the surgical outpatient clinic 3 weeks after the second blind biopsy due to the persistence of the mass, with some associated discomfort around the breast. A breast ultrasound was requested, which revealed a thick-walled anechoic mass (Fig. 1) that measured  $2.07 \times 1.02 \times 0.9$  cm (L  $\times$  AP  $\times$  Tr) with a pulsating anechoic center that showed swirling blood flow on color Doppler examination (Fig. 2). An assessment of a pseudoaneurysm complicating the previous biopsies was made on ultrasound, and a 3-month follow-up scan was recommended given the conservative management proposed by the surgeons. At the follow-up scan, the lesion was observed, measuring  $1.20 \times 1.03 \times 0.9$

cm (L  $\times$  AP  $\times$  Tr), containing an echogenic material within its previously described anechoic center (Fig. 3). No flow was detected in the mass on Doppler interrogation. An assessment of spontaneous thrombosis of the pseudoaneurysm was made.

## Discussion

A pseudoaneurysm, also known as a pulsatile hematoma, is a false aneurysm. The occurrence of a pseudoaneurysm is mostly secondary to a traumatic injury, and it is a well-known complication following vascular catheterization and percutaneous core needle biopsy of solid organs [1,2]. A pseudoaneurysm can occur spontaneously in those with known atherosclerosis, aged patients, and those undergoing coagulation therapies [3]. Vascular invasion by a malignant breast lesion can also result in pseudoaneurysm formation. The index patient gave no history of any abnormal bleeding tendency or anticoagulant use. Although there was no baseline ultrasound for comparison, the clinical trajectory of this patient is strongly in keeping with a posttraumatic etiology from the repeated blind biopsies. The recent ultrasound did not reveal a mass adjacent to the pseudoaneurysm, suggesting that the initial mass, which was reported as nonspecific inflammation with fat necrosis from the second blind biopsy, could have resolved, while what was seen clinically as a persistent mass was the pseudoaneurysm. Although the first biopsy did not yield adequate tissue for histopathological appraisal, the second biopsy result is likely to be the diagnosis of the mass ab initio even though the index case did not report any injury to the breast before the presentation. This is supported by the



**Fig. 3 – B-mode ultrasound image of the right breast mass at 3 months follow-up after the second blind biopsy showing an echogenic material within the previously described anechoic center of the lesion.**

literature report that up to 50% of cases of fat necrosis do not report any injury to the breast at presentation [4]. Fat necrosis is also common in perimenopausal women [4], as seen in this case. The possibility that fat necrosis was an after-effect of the first biopsy also exists, as fat necrosis has been reported to occur sometimes within weeks to months after procedures such as surgery and biopsy [4].

Pseudoaneurysms result from transmural disruption of an arterial wall leading to direct leakage of blood into the extravascular space, forming what is known as a hematoma that remains connected with the lumen of the compromised artery. A pseudoaneurysm, unlike an aneurysm, does not have the three layers of the vessel wall, namely, the intima, media, and adventitia. Pseudoaneurysms are also contained in perivascular tissue [1]. On ultrasound, the periphery of the mass appears hyperechoic due to blood clotting at the edges of the hematoma, while the center remains anechoic, as seen on the initial ultrasound scan of the index patient (Fig. 1). The diagnostic feature of a swirling or yin-yang flow pattern on color Doppler due to bidirectional arterial blood during systole and diastole [1–3] was also seen in our patient (Fig. 2). During image-guided interventional procedures, color flow evaluation is usually carried out before the start of the biopsy to locate the vessels in the region of the lesion of interest. This is to ensure that the integrity of the vessels surrounding the lesion is not compromised during the biopsy of the mass, as iatrogenic injury can cause complications such as hematoma

and pseudoaneurysm [5,6]. These findings stress the advantage of image-guided biopsies performed by radiologists over the option of blind palpation-guided biopsies performed by surgeons. Traditionally, most breast biopsies in our practice, particularly those presenting with clinically palpable masses, are performed blindly by surgeons. Often, the huge size of the masses makes them easy to target, even without image guidance. However, this practice is changing, as image-guided biopsy of breast masses is increasingly being performed by radiologists in our setting. This has been facilitated by various collaborative efforts and training programs that have helped with skill development among radiologists. A National Institute of Health (NIH)-funded capacity building project to train Nigerian radiologists in ultrasound-guided breast biopsies using mobile health (mHealth) technology (1R21CA239784-01), which is currently domiciled in our institution, is one such effort.

On ultrasound, differential diagnoses of breast pseudoaneurysm include true breast aneurysm, hematoma, and complex breast cyst [6]. True breast aneurysm is the closest differential. Unlike pseudoaneurysms, true aneurysms contain the three arterial wall layers and do not occur spontaneously. Hematomas appear as a predominantly anechoic heterogeneous collection after the hyperechoic phase, but unlike pseudoaneurysms and aneurysms, they do not have internal vascularity on color Doppler examination. Complex cystic lesions appear as heterogeneous anechoic cystic masses with solid components on B-mode ultrasound. Unlike pseudoaneurysms and aneurysms, complex cystic breast lesions are not connected to an artery and do not have internal turbulent flow.

Management options for pseudoaneurysm include ultrasound-guided compression therapy, percutaneous alcohol or thrombin injection, surgical repair, and coil embolization [1,2]. Although compression has been the therapy of choice and the first line of management of postcatheterization pseudoaneurysm, this treatment is time-consuming, painful, and often unsuccessful [2]. All of the cases of breast compression following pseudoaneurysm in the literature reported failures [3,7]. The natural history of pseudoaneurysm is not known. Spontaneous thrombosis is related to pseudoaneurysm size, the length of the neck of the pseudoaneurysm, and the patient's anticoagulation status [8]. With the increased use of percutaneous diagnostic interventions in the evaluation of breast disease, pseudoaneurysms are likely to occur more frequently. No standard management protocol has been developed for this uncommon complication. However, a conservative approach to management, which entails simple monitoring of the pseudoaneurysm, may be an alternative to more invasive remedies, as it has been shown to offer a chance for spontaneous thrombosis, as in the case of the index patient.

Pseudoaneurysm of the breast is rare. Our review of the literature revealed only twenty-four reported cases [9], making this the twenty-fifth. It is, however, the first case of breast pseudoaneurysm to be reported in Nigeria. This case presentation highlights the need for imaging assessments of suspected breast lesions, especially after a percutaneous diagnostic procedure. In addition, the conservative management of breast pseudoaneurysm is a feasible option.

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## Patient consent statement

Written informed consent was taken from the patient for publication.

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.radcr.2022.06.069](https://doi.org/10.1016/j.radcr.2022.06.069).

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