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Pseudoaneurysm of the breast following a core needle biopsy: report of two cases

Pseudoaneurisma de mama tras biopsia por punción con aguja gruesa: reporte de dos casos

Running title: Case reports of breast pseudoaneurysm

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Abstract

Introduction: Core needle biopsy (CNB) is the gold standard for histopathological diagnosis of breast masses. However, rare complications may occur after undergoing CNB, including hematoma and pseudoaneurysm (PA) of the breast.

Cases presentation: *Case 1:* 66-year-old woman with a left breast mass who underwent a CNB without complications. Around eleven months later,

she noticed a palpable and pulsatile mass in her left breast. She was diagnosed with a PA (1.6x1.3 cm) by means of a Doppler ultrasound (US) and a breast magnetic resonance imaging, which was surgically resected without any complication using local anesthesia. *Case 2:* 44-year-old woman with a left breast mass. After undergoing CNB, she developed ecchymosis and a palpable and pulsatile mass in her left breast. A Doppler US showed a 1.4x0.7 cm cystic lesion suggestive of a breast PA. The mass was surgically resected without complications using local anesthesia and sedation.

Conclusion: Breast PA is an extremely rare complication of CNB, with only 17 cases reported in PubMed to date. However, breast PA must be highly suspected in the presence of warning signs such as bleeding, hematoma and a palpable and/or pulsatile breast mass after undergoing CNB.

Keywords: Vascular diseases; Pseudoaneurysm; Breast; Case Reports (MeSH).

Ribeiro- da Costa REA, Barbosa-Bevilacqua JL, da Silva-Júnior RG, Vieira SC. Pseudoaneurysm of the breast following a core needle biopsy: report of two cases. Rev. Fac. Med. 2023;71(2):e101177. English. doi: <https://doi.org/10.15446/revfacmed.v71n2.101177>.

Resumen

Introducción: La biopsia por punción con aguja gruesa (CNB por su sigla en inglés) es el estándar de oro para el diagnóstico histopatológico de las masas mamarias. No obstante, complicaciones raras como hematomas y pseudoaneurisma (PA) de la mama pueden ocurrir después de este procedimiento.

Presentación de los casos: *Caso 1:* Mujer de 66 años con una masa mamaria izquierda y a la que se le realizó una CNB sin complicaciones. Aproximadamente once meses después, notó una masa pulsátil palpable en el seno izquierdo. Mediante ecografía Doppler y resonancia magnética de las mamas se diagnosticó un PA (1.6x1.3 cm). La masa fue extirpada quirúrgicamente sin complicaciones bajo anestesia local. *Caso 2:* Mujer de 44 años con una masa mamaria izquierda. Después de realizarse la CNB, la paciente desarrolló equimosis y una masa pulsátil palpable en su mama izquierda. Mediante una ecografía Doppler se observó una lesión cística de 1.4x0.7 cm sugestiva de PA mamario. La masa fue extirpada quirúrgicamente sin complicaciones bajo anestesia local y sedación.

Conclusión: El PA mamario es una complicación extremadamente rara de la CNB; tan solo 17 casos han sido reportados en PubMed hasta la fecha. Sin embargo, esta entidad debe ser altamente sospechada en la presencia de signos de alarma como dolor, sangrado, hematoma y una masa mamaria palpable y/o pulsátil tras la realización de una CNB.

Palabras clave: Enfermedades vasculares; Aneurisma falso; Mama; Informes de casos (DeCS).

Ribeiro- da Costa REA, Barbosa-Bevilacqua JL, da Silva-Júnior RG, Vieira SC. [Pseudoaneurisma de mama tras biopsia por punción con aguja gruesa: reporte de dos casos]. Rev. Fac. Med. 2023;71(2):e101177. English. doi: <https://doi.org/10.15446/revfacmed.v71n2.101177>.

Introduction

Core needle biopsy (CNB) is a frequently performed procedure (gold standard) for histopathological diagnosis of breast masses.¹ However, after undergoing a CNB, some patients may develop a significant hematoma (a rare event) or a pseudoaneurysm (PA) of the breast (an extremely rare complication).^{2,3} Despite the latter is extremely rare, the treating physician should suspect the occurrence of a breast PA if, after undergoing a CNB, the patient develops an hematoma in the breast, together with persistent pain, and/or if a palpable mass is detected after hematoma resolution.^{2,3}

After breast PA is suspected, a Doppler ultrasound (US) should be preferably performed. If necessary, other confirmatory tests such as breast magnetic resonance imaging (MRI) may be also used for confirming the diagnosis.² Regarding the treatment of breast PA, there are several options, including ultrasound-guided compression, thrombin injection, coil embolization or surgical resection, being the latter an inexpensive and widely accessible method that also allows histopathological analysis of the surgical specimen.²

The aim of this paper is to report two cases of breast PA after undergoing a CNB of a breast mass. In addition, a literature review was conducted to identify similar cases reported in the PubMed database.

Cases presentation

Case 1

66-year-old woman with a left breast mass who visited the Breast Unit of a tertiary referral center in São Paulo (SP), Brazil, on January 2010

due to breast carcinoma suspicion, which was confirmed through a mammogram and a histopathology report of the sample obtained by means of a CNB (performed without complications). A month later, the patient underwent a segmental breast resection, a sentinel lymph node biopsy and a breast symmetrization without any complications. The histopathology report of the surgical specimen revealed a 0.4 cm (G1) [anatomic pathological stage: pT1a; pN0 (sentinel lymph node); (i+) M0] well-differentiated invasive tubular carcinoma. Likewise, the following immunohistochemistry findings were reported: estrogen receptor (ER)-positive, progesterone receptor (PR)-positive (both 100%) and human epidermal growth factor receptor 2 (HER2) (score 0-1)-negative; Ki67: 12%. The patient underwent adjuvant radiotherapy and hormone therapy with tamoxifen.

Then, in January 2011, the patient reported having a palpable, pulsatile breast mass on the upper inner quadrant (UIQ) of her left breast in a follow-up visit in which a Doppler US revealed a hypoechogenic mass with central blood flow on Doppler located in the UIQ. In addition, in a breast MRI performed on the same day, findings suggestive of a PA were reported (Figures 1A and 1B). Taking this into account, surgical treatment was decided, and in February 2011 the mass was surgically resected without complications using local anesthesia. Figure 1C shows the resected PA [largest diameter: 1.6 cm]. The histopathology image of the surgical specimen is shown in Figure 1D shows. Currently, about 132 months after surgery (February 2011 – February 2022), the patient's health condition is excellent, and there is no evidence of malignancy or other complications resulting from the surgical resection of the PA.

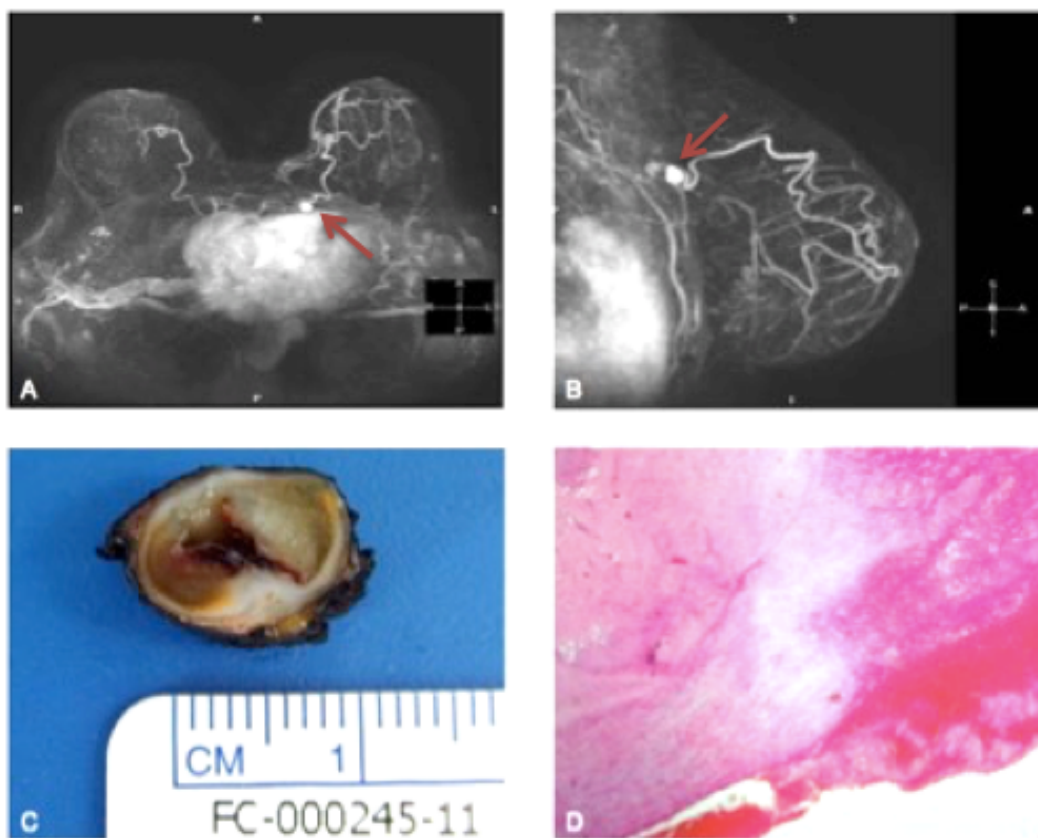


Figure 1. Breast pseudoaneurysm resected in case No. 1. Figures 1A and 1B: Breast magnetic resonance imaging. C: Surgical specimen (1.6x1.3 cm). D: Histopathology study – Hematoxylin-Eosin staining (magnification: 40x).

Source: Own elaboration.

Case 2

44-year-old woman who visited the Breast Unit of a tertiary referral center in Teresina (PI), Brazil, in April 2021 due to having a mass in the upper lateral quadrant (ULQ) of the left breast. On this occasion, a breast US showed a 1.4x1.0 cm mass with lobular contours (BI-RADS® 4 lesion). As no abnormalities were found on the patient's mammogram

performed in May 2021, a CNB was performed in the same month and the following findings were described in the histopathology report: stromal fibrosis and stromal microcalcifications. Somehow, after undergoing the CNB, the patient presented with ecchymosis and a palpable mass in her left breast.

Then, on a physical examination of the patient, an approximately 1.0 cm pulsatile mass was detected in the left axillary tail, with an audible bruit on auscultation. Thus, a Doppler US was performed on the same day (May 2021), and in which a 1.4x0.7 cm solid cystic lesion with a central flow on Doppler suggestive of breast PA was observed. Taking this information into account, it was hypothesized that breast PA occurred as a complication of CNB. Surgical treatment was decided and a few days later the mass was surgically resected without complications using local anesthesia and sedation (Figures 2A, 2B, 2C and 2D). The patient was discharged two hours after finishing the surgical procedure, as there were no complications and she showed a good clinical evolution. About nine months after surgery (May 2021 – February 2022), the general condition of the patient is good.

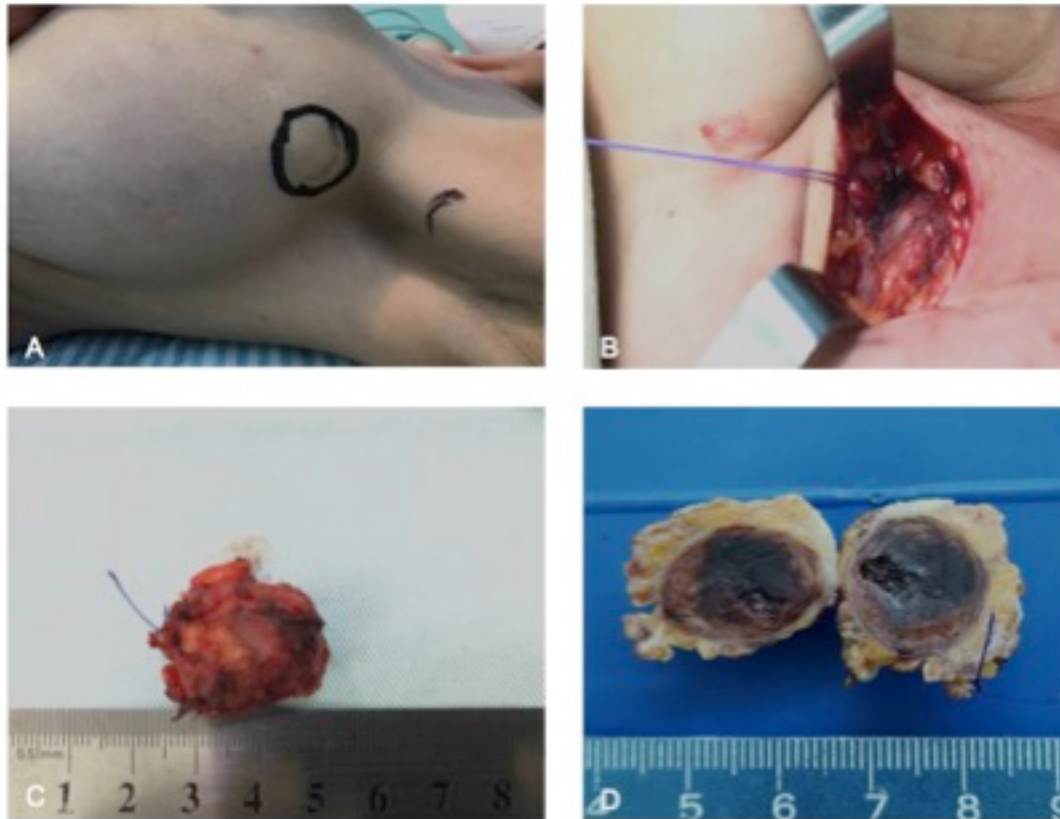


Figure 2. Breast pseudoaneurysm resected in case No. 2. A: Preoperative period. B: Surgical procedure. C and D: Surgical specimen.

Source: Own elaboration.

Discussion

The occurrence of breast PA after CNB is extremely rare. In fact, after conducting a literature search in PubMed using the following search equation "*Breast Pseudoaneurysm AND Core Needle Biopsy AND Case Report*", only 17 case reports were found (Table 1).¹⁻¹⁷

Table 1. Cases of breast pseudoaneurysm after core needle biopsy reported in PubMed as of 2/21/2022.

Au- thor(s)	Pa- tient's age (years)	Indication of CNB	Clinical manifes- tations of PA	Diagnos- tic imag- ing of PA	Greater diameter of the PA (cm)	Treatment of PA	Outcome
Russell & Cre- agh-Bar- ry ¹	45	Breast mass.	Bleeding and he- matoma after CNB.	Doppler US.	0.9	Monitoring and watch- ful waiting.	No compli- cations.
Ribeiro Filho et al. ²	51	Breast mass.	Bleeding, hematoma and palpa- ble, pulsa- tile mass after CNB.	Doppler US and magnetic reso- nance imaging (MRI).	2.9	Surgical re- section.	No compli- cations.
Pesce, Chico, Binder ³	36	Breast mass.	Bleeding after CNB.	Doppler US and MRI.	1.3	Monitoring and watch- ful waiting.	No compli- cations.
Azorín Samper et al. ⁴	47	Breast mass.	Not de- scribed.	Doppler US and MRI.	0.6	Surgical re- section.	No compli- cations.
Vignoli et al. ⁵	62	Breast mass.	Pain and palpable, pulsatile mass after CNB.	Doppler US and com- puted tomogra- phy angi- ography (CTA).	2.0	Surgical re- section.	No compli- cations.
Lee, Aripoli, Messing- er ⁶	64	Breast mass.	Palpable, pulsatile mass after CNB.	MRI, Doppler US and CTA.	5.0	Surgical re- section.	No compli- cations.
Sasada et al. ⁷	51	Breast mass.	Bleeding and palpa- ble, pulsa- tile mass after CNB.	Doppler US, MRI and CTA.	1.9	Surgical re- section.	No compli- cations.
Farrokh, Fal- lah-Ras- tegar, Abbasi ⁸	42	Breast mass.	Pain and palpable, pulsatile mass after CNB.	Doppler US.	2.0-3.0	Ultra- soun-guided compres- sion.	Complete resolution of pseudo- aneurysm and throm- bosis.

Dixon and Enion ⁹	46	Breast mass.	Bleeding, hematoma and palpable, pulsatile mass after CNB.	Doppler US.	3.0	Surgical resection.	No complications.
Erdil et al. ¹⁰	41	Breast mass.	Bleeding, hematoma and palpable, pulsatile mass after CNB.	Doppler US and MRI.	0.2	Surgical resection.	No complications.
Buck et al. ¹¹	74	Breast microcalcifications.	Palpable, pulsatile mass after CNB.	Doppler US.	3.0	US-guided thrombin injection.	Complete resolution of pseudoaneurysm and thrombosis.
Biten-court et al. ¹²	46	Breast mass.	Bleeding and hematoma after CNB.	Doppler US.	Not described.	US-guided compression.	Complete resolution of pseudoaneurysm and thrombosis.
El Khoury et al. ¹³	50	Asymmetric mammographic density.	Bleeding and palpable, pulsatile mass after CNB.	Doppler US.	2.0	No treatment (patient refused surgical resection).	Spontaneous regression.
Bazzocchi et al. ¹⁴	42	Breast mass.	Bleeding and palpable, pulsatile mass after CNB.	Doppler US.	1.6	Percutaneous injection of sterile 95% ethyl alcohol (patient refused surgical resection).	Complete resolution of pseudoaneurysm and thrombosis.
Chorny et al. ¹⁵	44	Breast mass.	Bleeding and hematoma after CNB and skin discoloration and tenderness at biopsy site.	Doppler US.	0.8	US-guided compression.	Treatment failure (patient was referred for surgical resection).

Mc-Namara Jr and Boden ¹⁶	70	Breast mass.	Bleeding after CNB.	Doppler US.	1.0	US-guided compression (treatment failure) and thrombin injection.	Complete resolution of pseudoaneurysm and thrombosis.
Swain et al. ¹⁷	65	Asymmetric mammographic density.	Bleeding after CNB.	Doppler US and magnetic resonance imaging (MRI).	1.7	Surgical resection.	No complications.

CNB: Core Needle Biopsy; PA: Pseudoaneurysm.

Source: Own elaboration.

PA is usually caused by arterial trauma and inadequate suturing of blood vessels after surgical manipulation. Blood leaks through a breach in the vessel wall and collects in adjacent tissues, leading to PA formation.² The PA may be surrounded by a fibrous capsule. After CNB, PA may also occur in parenchymal organs, e.g. the liver and kidneys.²

PAs must be differentiated from simple hematomas, as the former require more serious therapeutic interventions. However, this might be difficult, since a hematoma may conceal the intrinsic pulsations of a PA.^{2,7} It has been described that Doppler US has an approximately 95% accuracy for the diagnosis of vascular abnormalities, and that is the most appropriate imaging test to detect breast PAs.^{2,7} In breast PA cases, Doppler US shows an anechoic mass with arterial flow connected to a blood vessel. MRI also has a high sensitivity and specificity for the diagnosis of PA and it is frequently used to diagnose breast PA.^{2,7} Doppler US was used to reach the diagnosis of breast PA in the two cases reported here, while MRI was only used in one to confirm the diagnosis.

There are several treatment options depending on the characteristics of each case, including surgical resection, US-guided compression, color Doppler ultrasound-guided thrombin injection, or percutaneous embolization, among others.² However, recently it has been reported that a watchful waiting approach, together with clinical follow-up, may also be used.¹ In the cases reported here, surgical resection was chosen as the best treatment option, as surgery is a relatively inexpensive and definitive treatment. Besides, it is worth noting, that PAs were resected without complications in both patients.

Regarding the 17 case reports of breast PA following CNB found in PubMed, it was found that the patients' mean age was 51 years, that Doppler US was mostly used to confirm the PA diagnosis, and that surgical resection and US-guided compression were the main treatments used.¹⁻¹⁷

Despite the rarity of breast PA as a complication of CNB, the appearance of large hematomas on the breast following CNB should raise the clinical suspicion of this entity. When this happens, at least a Doppler US should be performed after the resolution of the hematoma.² Other diagnostic techniques such as breast MRI and computed tomography angiography of the breasts may also be used.^{2,3-7,10}

Conclusion

Breast PA is an extremely rare complication of CNB, with only 17 cases described in PubMed to date. However, breast PA must be highly suspected in the presence of warning signs such as bleeding, hematoma and a palpable and/or pulsatile breast mass after undergoing CNB.

Ethical considerations

This study was approved by the Research Ethics Committee of the Federal University of Piauí, Teresina (PI), Brazil, as stated in a concept issued by said committee under reference number: 5.044.112 (CAAE: 50022521.4.0000.5214). All ethical principles currently in force in Brazil to conduct biomedical research involving human beings were followed (National Council of Research resolution number 466/12),¹⁸ as well as international standards.¹⁹ Likewise, the patients signed a free informed consent form and agreed to use their data with the purposes of writing this paper as long as their anonymity was kept.

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Conflicts of interests

The authors declare that they have no competing interests.

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