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Case Report

Breast pseudoaneurysm after core needle biopsy in a pregnant patient☆,☆☆

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ABSTRACT

Breast pseudoaneurysm is an extremely rare complication of interventional breast procedures. Pregnancy and lactation are associated with increased breast vascularization, which may act as a risk factor. We present the case of a 36-year-old woman in the third trimester of a spontaneous twin pregnancy, who presented with a newly-detected BI-RADS 4 mass in her right breast. The patient requested not to defer a biopsy until after the pregnancy, and an ultrasound-guided breast core biopsy was performed. The patient presented bleeding during the procedure, but no hematomas or other vascular lesions were immediately detected. During follow-up, a breast ultrasound revealed an anechoic circumscribed mass and high-velocity blood flow. The color Doppler showed a spiral blood flow with the Yin-Yang sign, together with a communication channel between the sac and feeding artery. A diagnosis of breast pseudoaneurysm was made. The patient was managed conservatively, and breastfeeding continued normally. This case report highlights the importance of color Doppler in the detection of pseudoaneurysms, and the need to consider deferring invasive breast procedures in pregnant women when possible.

Introduction

Breast pseudoaneurysms are extremely rare complications of interventional breast procedures [1–4]. An arterial pseudoaneurysm is caused by damage to the arterial wall. Unlike a true aneurysm, a pseudoaneurysm does not contain any vessel wall layer. Instead, there is blood containment by a wall that comprises the products of the clotting cascade; a pseudoaneurysm is essentially a contained arterial rupture [5].

Vessel injury by a biopsy needle might cause a breast pseudoaneurysm. Some factors predispose to its formation, such as anticoagulant therapy and advanced age [5]. Pregnancy and lactation are associated with increased breast vascularization [6], which can act as a risk factor for local complications of percutaneous procedures.

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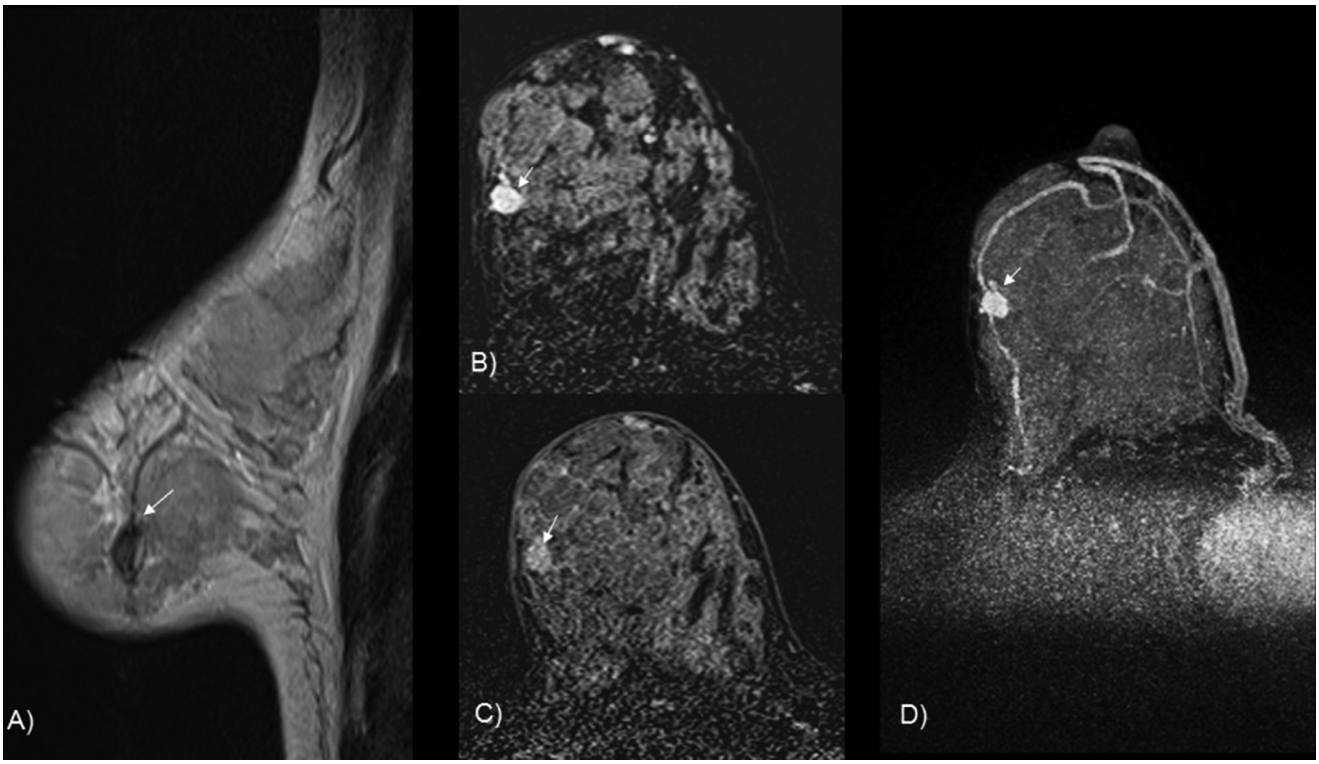

Fig. 1 – (A) Sagittal T2-weighted MR image shows a hypointense mass (white arrow) with a vascular supply structure. (B and C) Axial T1-weighted MR images obtained 1 minute (B) and 5 minutes (C) after the injection of contrast medium show an oval mass with early-phase enhancement and intense uptake of contrast in the external lower quadrant of the right breast. (D) Maximum intensity projection image (MIP) shows an oval mass with intense uptake of contrast (white arrow).

We present an illustrative case of a breast pseudoaneurysm in a pregnant woman, to highlight the value of ultrasound and breast Doppler for its correct diagnosis.

Case report

A 36-year-old woman with a spontaneous twin pregnancy and no relevant medical history presented to our hospital with a tender breast mass. She reported a growing, painful mass in her right breast, which she detected at the beginning of the third trimester of her pregnancy. On physical examination, the mass occupied the lower half of her right breast, and was associated with mild erythema of the overlying skin.

A breast ultrasound revealed a circumscribed, predominantly solid mass of mixed echogenicity with associated internal vascularity. The right breast was categorized as BI-RADS 4.

Percutaneous biopsy during the third trimester has known risks (including bleeding due to increased breast vascularization). Some of these risks might persist during lactation (eg, the risk of milk fistula might increase while breastfeeding [6,7]). The case was discussed with a multidisciplinary treatment team of radiologists, gynecologists, and surgeons. The patient made an informed decision and requested not to defer a breast biopsy.

Consequently, the patient underwent an ultrasound-guided breast core biopsy of the palpable mass. The biopsy was performed with a Tru-Cut 14-gauge needle. During the procedure, the patient presented active, pulsating bleeding that remitted after 45 minutes of external breast compression. Due to the bleeding, the interventional radiologist decided not to take extra tissue samples and 2 core-cylinders were submitted for pathologic examination. After the bleeding ceased, an ultrasound showed no signs of acute parenchymatous hematoma or other local complications. Following an observation period, the patient was discharged with a scheduled follow-up visit. She reported no clinical signs of further bleeding of the biopsy site.

In the week following the procedure, the patient underwent a c-section due to signs of preeclampsia. She gave birth to 2 healthy newborns and started breastfeeding normally.

Biopsy results reported a lactating adenoma; the patient was advised to continue breastfeeding and undergo a scheduled ultrasound check. The patient decided to seek a second opinion, and consulted a breast surgeon. The specialist examined the pathology samples and considered pathology results of the 2 biopsy cylinders to be discordant. Due to the recent bleeding after the percutaneous core biopsy, they decided against a new biopsy and ordered a breast magnetic resonance imaging to further characterize the lesion (Fig. 1). Dynamic imaging showed background parenchymal enhancement,

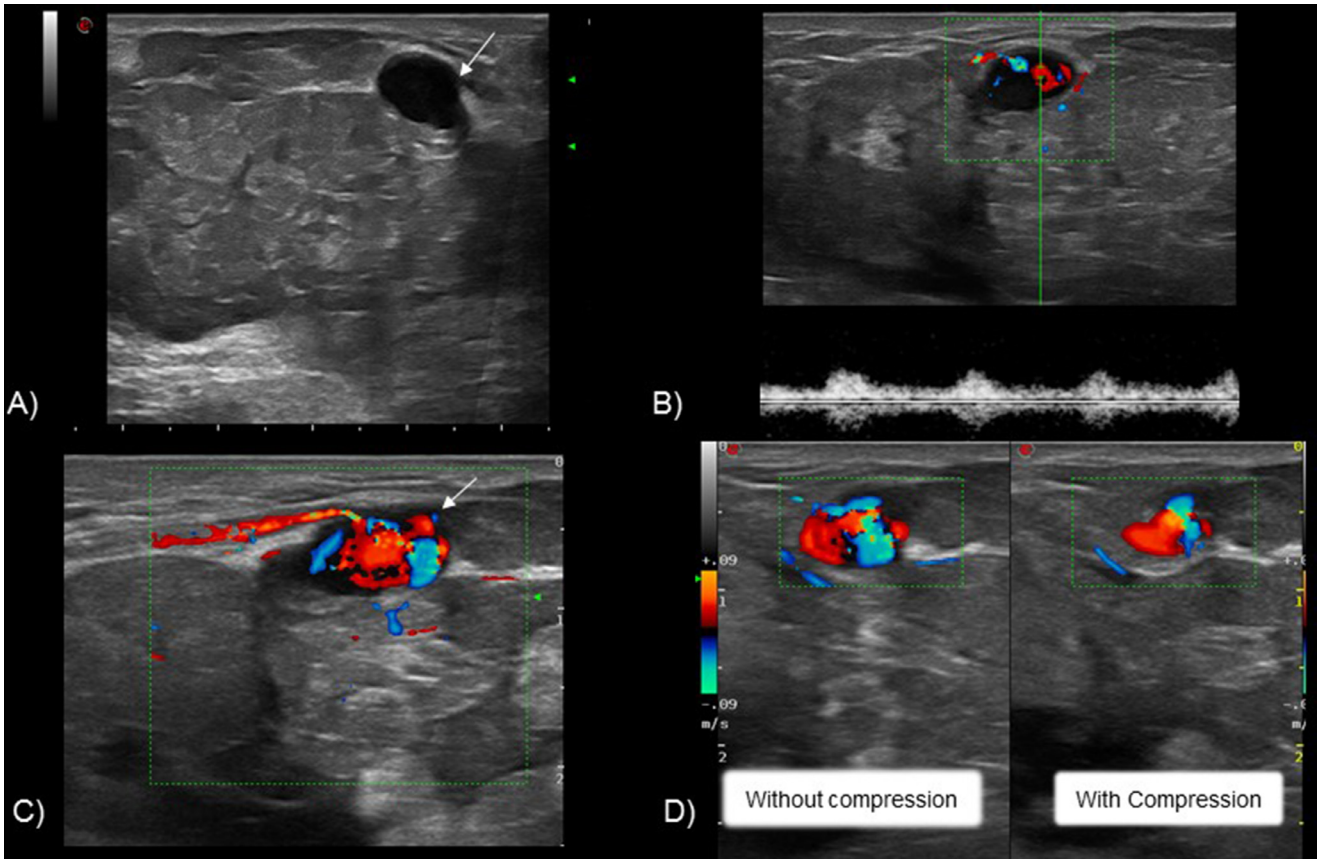

Fig. 2 – (A) B-mode Ultrasound: anechoic image of a complex cystic mass with a circumscribed margin (white arrow). (B) Spectral Doppler (C) Color Doppler image shows a Yin-Yang pattern within the cystic component (white arrow) and the adjacent prominent supply artery. (D) Color Doppler image illustrating the pseudoaneurysm with and without external compression.

possibly associated with physiologically increased breast vascularity. In addition, a circumscribed mass of 13 mm was identified. This structure showed intense initial-phase enhancement, and a blood vessel on the cranial side of the formation raised the suspicion of a pseudoaneurysm.

An ultrasound revealed an anechoic circumscribed mass and high-velocity blood flow. The color Doppler showed spiral blood flow with the Yin-Yang sign (Fig. 2). In addition, a communication channel between the sac and feeding artery was detected, with a "forward and backward" waveform. Spectral analysis demonstrated the characteristic swirling sign with a "to-and-fro" waveform. A diagnosis of breast pseudoaneurysm was made. The pseudoaneurysm diameter was 13 mm. Since the patient had shown no further signs of bleeding and remained asymptomatic while continuing to breastfeed, she was managed conservatively and observed regularly.

Follow-up

Ultrasound-assisted examinations revealed a progressive reduction in the pseudoaneurysm diameter. Three months after diagnosis, the lesion showed a diameter of 7 mm. The patient continued breastfeeding and showed no signs of further clinical complications.

Discussion

We presented the case of a 36-year-old female with a spontaneous twin pregnancy, who developed a breast pseudoaneurysm as a complication of a percutaneous breast biopsy. To the best of our knowledge, this is the first reported case of a pseudoaneurysm after a breast needle biopsy in a pregnant woman.

Pseudoaneurysms of the breast are rare complications of percutaneous breast interventions [1–4,8]. Some authors have explored local complications of invasive and percutaneous breast procedures during pregnancy [6]. Hemorrhage, hematoma, and infection are the most frequent complications; fistulas and pseudoaneurysms are extremely rare. Hypervascularization, edema and and delayed wound healing during pregnancy may act as risk factors [6].

Our patient had no previous medical history—including no coagulation disorders, no anticoagulation therapy or malignancies—besides her spontaneous twin pregnancy. The hypervascularization of the breast during pregnancy was the only identifiable predisposing factor.

Ultrasonography plays a key role in the diagnosis of breast pseudoaneurysms, as this case shows. The grayscale ultra-

sound depicts a pseudoaneurysm as an anechoic cystic structure close to a supplying artery. Color Doppler ultrasound must be employed to confirm the diagnosis. Blood flow is characterized by a typical swirling motion, called the "Yin-Yang sign" [9–11].

The treatment of bleeding complications during percutaneous breast biopsies has been properly described [12]. If bleeding occurs during a percutaneous breast biopsy, manual compression should be applied for at least 5-10 minutes. In rare cases in which bleeding is due to a breast pseudoaneurysm, manual pressure should be applied to the neck of the pseudoaneurysm with ultrasound guidance. The pseudoaneurysm can be reassessed with Doppler imaging to look for any residual flow. The process may be repeated until thrombosis is observed; sometimes the required compression time extends up to 60 minutes [12]. Further treatment options include observation [4,13], thrombin injection, open surgical repair, and percutaneous embolization [14–16]. In this case, the patient evolved favorably with conservative management.

Breast vascularization is substantially increased during pregnancy and lactation. Local procedures should therefore be carefully considered; deferring them until after the breastfeeding period is often the most appropriate choice. In this case, given her newly-detected BI-RADS 4 lesion, the patient requested to undergo a breast biopsy during her pregnancy. The case was evaluated by an interdisciplinary team, and the procedure was not deferred.

Using color Doppler during ultrasound-guided interventional procedures can reduce the risk of damaging an arterial vessel [17]. In pregnant women, if procedures cannot be delayed until after the lactation period, using color Doppler ultrasound during percutaneous biopsy to visualize and document the location of any vascular structure along the trajectory of the needle may decrease the risk of vascular damage. Further studies should explore whether cases like the one presented in this report warrant the routine use of color Doppler ultrasound during percutaneous breast procedures of pregnant women, to decrease the risk of vascular complications.

Conclusion

Breast pseudoaneurysm is an extremely rare complication of percutaneous breast biopsies. Pregnancy and lactation are associated with markedly increased breast vascularization, which could play a role as a risk factor. This case report highlights important considerations regarding the management of pregnant women with suspicious breast lesions. First, invasive procedures should be delayed whenever possible, given the risks of local complications associated with pregnancy and lactation. Second, in cases in which deferral of the procedure may not be acceptable -our patient had a symptomatic, newly-detected BI-RADS 4 lesion and requested the procedure not to be delayed-, Doppler ultrasound might aid in the prevention and early detection of vascular complications, as pseudoaneurysms show characteristic ultrasonographic patterns. Third, decisions about diagnostic studies and procedures in pregnant patients with suspicious breast lesions should be evaluated carefully; interdisciplinary teams can provide great assistance in these decisions.

Ethical standards

This study was approved by the institutional Ethics Committee.

Informed consent

Informed consent was signed.

Consent for publication

All authors expressed explicit consent for the publication of this manuscript.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2020.10.025.

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