Superficial angiomyxoma of the breast in a 25-year-old woman without carney's complex: case report and literature review

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Case Report

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Abstract

Background: Superficial angiomyxoma (SAM) is a rare, benign tumor characterized by scattered stellate or spindle cells and thin-walled blood vessels embedded in abundant myxoid stroma. It was first reported as a cutaneous myxoma associated with Carney complex in 1985, and lesions are commonly located in the eyelids, external ear canal, and nipples and often appear in multiples. In cases with no evidence of Carney complex, the incidence of breast SAM is extremely rare.

Case presentation: We reported a case of a 25-year-old Chinese woman presented with a left breast lump in the subareolar region for three years and gradually increased in size. No evidence of Carney complex was noted. Breast ultrasonography (US) and magnetic resonance imaging (MRI) were undertaken with US BI-RADS 4A and MR BI-RADS 4, respectively. The patient denied biopsy and underwent a lumpectomy and was diagnosed with SAM. There was no tumor recurrence after 18 months of follow-up.

Conclusion: This case report suggests that the preoperative US and MRI characteristics of breast SAM are specific and in accordance well with the histological appearances. Recognition of these imaging features may be helpful for the diagnosis of SAM. And complete excision and long-time regular follow-up after surgery are recommended.

Background

Superficial angiomyxoma (SAM) is a distinct, benign, soft tissue neoplasm with a high rate of local recurrence due to incomplete resection (1, 2). A subset of SAM is associated with Carney complex. The sporadic cases without Carney complex commonly occur on the trunk, head and neck, lower extremities, and genitalia, while lesions on the breast are very rare with only a handful of cases previously reported; and the appearance of lesions on preoperative images was even less be mentioned.

We present a case of a 25-year-old Chinese woman with sporadic SAM in the subareolar region and depict the preoperative ultrasonography (US) and magnetic resonance imaging (MRI) findings and histologic features. The literature regarding SAM without Carney complex of the breast is reviewed.

Case Presentation

A 25-year-old Chinese woman visited our hospital with a left breast lump that had been present for three years and gradually increased in size. She reported mild pain during menstruation but no other associated symptoms. She had no family history of breast cancer and no history of any breast lesions or injury. She had never been pregnant or taken hormone-containing drugs. No evidence of Carney complex was noted.

Upon physical examination, there was an irregular, soft lump measuring approximately 45×45 mm in the subareolar region. It was close to the nipple with mild mobility (Fig. 1). There was mild congenital nipple

retraction on both sides. No nipple discharge was noticed. The adjacent breast skin and remainder of the left breast were unremarkable. No lymphadenopathy was noted.

US demonstrated an irregular complex cystic and solid lesion, parallel to the skin at about 3–6 o'clock subareolar region, measuring approximately 31×34mm, with multiple thin echogenic septa, enhancement of the posterior echo, and microlobulated margins (Fig. 2). The interface between the mass and areolar skin was indistinct. Doppler US revealed increased chaotic blood flow within the mass. The US Breast Imaging Reporting and Data System (BI-RADS) was 4A (US BI-RADS 4A). A mammogram was not performed because of the young age of the patient. And breast MRI was suggested for further assessment.

Breast MRI showed an irregular mass in the subareolar region, attaching to the adjacent areolar skin and measuring approximately 38 ×34 ×41 mm. On T1-weighted images, the mass presented as hypo-intense with multiple short-linear iso-intense internal septations (Fig. 3A). On short time inversion recovery (STIR) T2-weighted images, the mass was strongly bright with multiple short-linear hypo-intense internal septations that presented as honeycombed or spongy in appearance (Fig. 3B). The margin of the mass was irregular. The apparent diffusion coefficient (ADC) value of the mass was $1.527\times10^{-3}mm^2/s$ (Fig. 3C). On dynamic contrast enhanced magnetic resonance imaging (DCE-MRI), it was demonstrated as the clustered small peripheral ring enhancements initially and gradually spread toward the center (Fig. 3D,3E). Sagittal delayed phase MR images showed strong heterogeneous enhancement with multiple short-linear lower enhanced internal septations (Fig. 3F). Breast MRI suggested BI-RADS 4.

The patient denied breast biopsy and underwent a lumpectomy. The mass adhered to areolar skin. And when separating it from the skin, hyaline mucoid liquid flowed out.

Grossly, the cut surface of the tumor was glistening and moist, measuring approximately 40×35 mm. It was a circumscribed, unencapsulated multinodular lesion filled with gelatinous material and blood, surrounded by grayish-pink fibrous septa. Histologically, the tumor consisted of a few scattered stellate or spindle cells and many branched and plexiform small vessels embedded in abundant myxoid stroma (Fig. 4A), which was negative for periodic acid-Schiff (PAS) and positive for Alcian blue stains. Sparse lymphocyte infiltrates were also noted. There were epidermoid cysts surrounded with thin strands of squamous epithelium within the tumor (Fig. 4B). And mammary ducts were entrapped at the periphery (Fig. 4C). No nuclear atypia or increased mitosis was identified. On immunohistochemistry, the tumor was positive for CD34 (Fig. 4D) and ERG, while epithelial membrane antigen (EMA), smooth muscle actin (SMA), S-100, Desmin, estrogen receptor (ER), and progesterone receptor (PR) were negative. The Ki-67 labeling index was 3%. Based on these findings, SAM of the breast was diagnosed.

Although the surgical resection margin adjacent to areolar skin is positive, the patient denied re-excision. Post-operatively, the patient recovered well with no sign of recurrence through the last follow-up one year after lumpectomy. Long-term follow-up is recommended.

Discussion And Conclusions

SAM is a rare, slow-growing, benign tumor, composed of scattered stellate or spindle cells and thin-walled blood vessels embedded in extensive myxoid stroma. It was first reported by Carney et al (3) in 1985, as a cutaneous myxoma associated with Carney complex. Carney complex is an autosomal dominant disorder characterized by skin pigmentary abnormalities, myxomas, cardiac myxomas, lentigines, endocrine tumors, and schwannomas (4). Myxomas are typically located in the eyelids, external ear canal, and nipples and occur in multiples. Distinguishing between SAM with Carney complex and SAM without Carney complex is impossible (5). Therefore, Carney complex should always be excluded first when presenting with multiple lesions. Cases of SAM without Carney complex can arise from any part of the body and usually occur on the trunk, head and neck, lower extremities, and genitalia. Calonje et al (6) reported 39 cases of SAM and 17 cases (44%) were located on the trunk, 7 cases (18%) on the lower extremities, 14 cases (36%) on the head and neck, and one case with no mentioned location. In general, SAM predominantly occurs in 20–40-year-old males with an average tumor size of less than 5 cm (6, 7). In cases without Carney complex, the occurrence of SAM on the breast is extremely rare. Only eight such cases have been reported (5, 7–11); 2 cases (25%) in males and 6 (75%) in females (all in premenopausal women); 4 cases (50.0%) on the nipple, 1 case (12.5%) in the nipple-areola complex, 2 case (25.0%) in the subcutaneous region and 1 case (12.5%) in the areola. A summary of the previously reported studies looking at SAM of the breast is listed in Table 1.

Table 1
Previously reported cases of superficial angiomyxoma of the breast

Reference	Age (Years)	Gender	Size (cm)	Location	Recurrence	Follow-up time (Months)
Iwashita et al[5]	39	Female	4×3	Nipple	No	16
Allen et al[7]	59	Male	2×2×2	Nipple	No	55
Allen et al[7]	14	Female	5×4×4	Nipple	?	-
Allen et al[7]	24	Female	3.5×2.5×1.4	Breast (subcutaneous)	?	-
Martinez et al[8]	28	Female	1.2×0.8	Nipple	No	12
Kumar et al[9]	22	Male	4×2.5	Nipple-areolar complex	No	3
Izquierdo et al[10]	49	Female	1.5	Areola	?	-
Dubin et al[11]	16	Female	3.5×1.1×2.2	Breast (subcutaneous)	?	-

We reported the case of a 25-year-old Chinese woman with SAM in the subareolar region and no evidence of Carney complex. Histologically, the tumor consisted of scattered stellate or spindle cells embedded in abundant myxoid stroma. The myxoid stroma was negative for PAS and positive for Alcian blue, which indicate the existence of acidic mucopolysaccharides. Small thin-wall vessels were prominently seen. There were epidermoid cysts surrounded with thin strands of squamous epithelium within the tumor, which might be derived from entrapped adnexal structures. No nuclear atypia or increased mitosis was identified. On immunohistochemistry, the tumor was positive for CD34 and ERG, while EMA, SMA, S-100, Desmin, ER, and PR were negative. Histological and immunohistochemistry findings were in line with the prior reports (5–11).

Preoperative US and DCE-MRI were undertaken. Imaging characteristics were in accordance with the pathological findings. Grossly, the tumor was a circumscribed, unencapsulated multinodular mass, which mirrored the microlobulated margins on breast US and an irregular mass on breast MRI. A multinodular myxoid lesion, separated by fibrocollagenous stroma, presented with an irregular complex cystic and solid lesion with multiple thin echogenic septa on US. And the lesion was strongly hyper-intense with multiple hypo-intense internal septations as a honeycombed or spongy appearance on STIR T2WI. Many branched and plexiform small vessels embedded in abundant myxoid stroma led to abundant chaotic blood flow within the mass on Doppler US and clustered small peripheral ring enhancement initially and

then spread toward the center on DCE-MRI. Due to the low tumor cellularity, the ADC value was high ($1.527*10^{-3}mm^2/s$). The strong signal on STIR T2WI and gradual centripetal enhancement on DCE-MRI may indicate a large component of mucin. The honeycombed or spongy appearance on STIR T2WI correlated with the multinodular myxoid lesion with fibrocollagenous stroma septations.

Preoperative imaging presentations of breast SAM were reported in very limited cases. Izquierdo et al (10) reported a case of breast SAM in areola presenting with a well delimited hyper-dense nodule immediately under the skin on mammography. Kumar et al (9) reported a case with contrast-enhanced computed tomography and showing a predominantly necrotic mass in the right breast/subcutaneous plane of chest wall with no underlying muscle infiltration. And Dubin et al (11) reported a case demonstrating with a vascular, hypoechoic mass with partially circumscribed margins on ultrasonography and an enhancing, T1 hypoinense, markedly T2 hyperintense mass on chest MRI, which were in line with our findings. And marked T2 hyperintensity on MRI which reflect the high-water content and myxoid matrix have been considered the typical imaging feature of myxoid soft-tissue lesions (12).

The MRI and US imaging features seen in this case report are novel and might be typical of SAM. Since the tumor is big and unencapsulated, it is hard to determine whether it originates from the breast parenchyma or skin on imaging. Radiologically, a differential diagnosis could include hemangioma, mucinous carcinoma, phyllodes tumor, and myxoid fibroadenoma. Breast hemangiomas are rare vascular tumors in the breast. It's usually seen in adult female patients at any age (19 to 82 years) (13) and tend to be located superficially (14). Capillary and cavernous hemangiomas are the two main subtypes. Breast hemangiomas may have nonspecific features on mammograms as an oval solid mass with circumscribed margins and may contain internal phleboliths (15, 16). The sonographic and MRI features of hemangiomas are variable. The lesions may display an oval shape with circumscribed, microlobulations or indistinct margins and variable echotexure. MRI appearances depend on the size and subtype of the hemangioma (14). Hemangiomas are iso-intense on T1WI and hyper-intense on T2WI with hypo-intense areas as calcifications, pheboliths and fibrous tissue. On DCE-MRI, it shows an early and diffuse enhancement. And thrombosis and draining vessels are commonly seen in large lesions (17). Mucinous carcinoma usually occurs in women older than 55 years (18). Pure mucinous carcinoma commonly presents with homogeneous hyper-intense on T2WI and mild or rim enhancement in the early phase with gradual peripheral to center enhancement on DCE-MR images. Mixed mucinous carcinoma can be identified by an irregular solid component that presents with iso- or hypo-intense on T2WI and strong early enhancement. Phyllodes tumors of the breast occur in all age groups but are more likely to occur in women between 35–55 years (19). Strong lobulation, and cystic components as heterogeneous internal echogenicity on US, heterogeneous intensity and enhancement on MRI, and hypo-intense capsules on T2WI were frequently seen (20). Cystic changes with an irregular wall on ultrasound suggested malignant. On MRI, low ADC value, areas of lower intensity to normal breast tissue on T2WI and a cystic lesion with thick and irregular wall were in favour of malignant (21). Myxoid fibroadenoma is a histologic subtype of breast fibroadenoma with a hypocellular stroma component and abundant myxoid matrix content (22) and occurs in approximately 40% of female patients with Carney complex

(23). Myxoid fibroadenomas in patients with Carney complex are usually numerous (23). Myxoid fibroadenoma commonly presents as hypo-intense on T1WI and hyper-intense on T2WI with rapid homogenous enhancement and washout on DCE-MRI (24). US findings of a myxoid fibroadenoma are similar with those of a simple fibroadenoma, as oval, parallel, circumscribed, homogeneous isoechoic or hypoechoic mass with thin internal echogenic septation.

The local recurrence rate of SAM could be as high as 30%-40% with a time to recurrence from 2 to 216 months (median time = 12 months) (25, 26). Since the major cause of local recurrence is incomplete resection, complete excision with negative margins and regular follow-up after surgery are recommended (1, 2).

In conclusion, the authors present the case of a 25-year-old Chinese woman with SAM in the subareolar region of the breast with no evidence of Carney complex. Preoperative imaging characteristics were in accordance well with the pathological findings. An irregular complex cystic and solid lesion with multiple thin echogenic septa, enhancement of the posterior echo, and increased chaotic blood flow within the mass might be the characteristics of SAM on US. Strongly hyperintense on STIR T2WI with a honeycombed appearance and gradual centripetal enhancement on DCE-MR images might be the most critical features of SAM on the breast MRI. Therefore, when a young woman presents with a superficial slow-growing breast lump with these US and MRI features, SAM could be considered.

Abbreviations

SAM: Superficial angiomyxoma; US: Ultrasonography; BI-RADS: Breast Imaging Reporting and Data System; MRI: Magnetic resonance imaging; T1WI: T1 weighted imaging; T2WI: T2 weighted imaging; STIR: short time inversion recovery; DCE-MRI: dynamic contrast enhanced magnetic resonance imaging; ADC: apparent diffusion coefficient; EMA: epithelial membrane antigen; SMA: smooth muscle actin; ER: estrogen receptor; PR: progesterone receptor; PAS: periodic acid-Schiff.

Declarations

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Authors' contributions

TM, JW and YC: managed and followed up on the outcome of the patient. HY: breast ultrasound review. LC: pathological review. QZ and SW: breast MRI review. All authors contributed to the article and approved the submitted version.

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Availability of data and materials

Not applicable.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Written informed consent was obtained from the patient for publication of this Case report and any accompanying images. A copy of the written consent is available for review by the Editor of this journal if necessary.

Competing interests

The authors declare that they have no competing interests.

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References

1. Ali N, Child CS, Michaelides M, Olver JM. Recurrence of a rare skin tumour: superficial angiomyxoma in the eyelid. Can J Ophthalmol. 2011; 46(2):205-6.
2. Basak S, Rogers S, Solomonsz AF. Superficial angiomyxoma of the vulva: a case report of a rare cutaneous tumour. J Obstet Gynaecol. 2011; 31(4):360-1.
3. Carney JA, Gordon H, Carpenter PC, Shenoy BV, Go VLW. The complex of myxomas, spotty pigmentation, and endocrine overactivity. Medicine (Baltimore) .1985; 64(6): 270–83.
4. Kamilaris CDC, Faucz FR, Voutetakis A, Stratakis CA, Carney complex. Exp Clin Endocrinol Diabetes. 2019;127(2-03):156-64.
5. Iwashita W, Kurabayashi A, Tanaka C, Naganuma S, Kawamura T, Aki F, Furihata M. Superficial Angiomyxoma of the Nipple in a Japanese Woman: A Case Report and Review of Literature. Int J Surg Pathol. 2020; 28(6):683-7.

6. Calonje E, Guerin D, McCormick D, Fletcher CD. Superficial angiomyxoma: clinicopathologic analysis of a series of distinctive but poorly recognized cutaneous tumors with tendency for recurrence. Am J Surg Pathol. 1999; 23(8):910-7.
7. Allen PW, Dymock RB, MacCormac LB. Superficial angiomyxomas with and without epithelial components. Report of 30 tumors in 28 patients. Am J Surg Pathol. 1988;12(7): 519-30.
8. Victoria Martínez AM, Sánchez Carazo JL, Alegre de Miquel V. Superficial angiomyxoma of the nipple: a case report of an infrequent cutaneous tumour. Dermatol Online J. 2016; 22(10):13030.
9. Kumar N, Deo S. Angiomyxoma of the male breast. Breast J. 2020; 26(9):1851.
10. Izquierdo FM, Martin L, Burgos F, Lacruz C, Fine-needle aspiration cytology of superficial angiomyxoma (myxoid perifollicular fibroma): report of a case. Diagn Cytopathol. 1995; 3(3):247-51.
11. Dubin I., Mortazavi S., Yu T., Riahi I.R., Baker J.L. Superficial angiomyxoma of the breast in a 16-year-old girl without carney's complex: A case report. Breast J. 2021;27(12):887-889.
12. Petscavage-Thomas JM, Walker EA, Logie CI, Clarke LE, Duryea DM, Murphey MD. Soft-tissue myxomatous lesions: review of sa- lient imaging features with pathologic comparison. Radiographics. 2014;34: 964-980.
13. Lesueur GC, Brown RW, Bhathal PS. Incidence of perilobular hemangioma in the female breast. Arch Pathol Lab Med. 1983; 107: 308- 310.
14. Ameen R, Mandalia U, Marr AA, McKensie P. Breast Hemangioma: MR Appearance with Histopathological Correlation. J Clin Imaging Sci. 2012;2:53.
15. Brodie C, Provenzano E. Vascular proliferation of the breast. Histopathology. 2008;52:30-44.
16. Mesurolle B, Sygal V, Lalonde L, Lisbona A, Dufresne MP, Gagnon JH, et al. Sonographic and mammographic appearances of breast haemangiomas. AJR Am J Roentgenol 2008;191:17-22.
17. Chung EM, Cube R, Jall GJ, Gonzalez C, Stocker JT, Glassman LM. Breast masses in children and adolescents: radiologic-pathologic correlation. Radiographics. 2009;29:907-931
18. Bitencourt AG, Graziano L, Osório CA, Guatelli CS, Souza JA, Mendonça MH, Marques EF. MRI Features of Mucinous Cancer of the Breast: Correlation With Pathologic Findings and Other Imaging Methods. AJR. 2016; 206(2):238-46.
19. Guillot E, Couturaud B, Reyal F, Curnier A, Ravinet J, Laé M, Bollet M, Pierga JY, Salmon R, Fitoussi A. Management of phyllodes breast tumors. Breast J. 2011; 17(2): 129-37.
20. Wurdinger S, Herzog AB, Fischer DR, Marx C, Raabe G, Schneider A, Kaiser WA. Differentiation of phyllodes breast tumors from fibroadenomas on MRI. AJR. 2005; 185(5):1317–21.
21. Yabuuchi H, Soeda H, Matsuo Y, Okafuji T, Eguchi T, Sakai S, Kuroki S, Tokunaga E, Ohno S, Nishiyama K, Hatakenaka M, Honda H. Phyllodes tumour of the breast: correlation with MR findings and histologic grade. Radiology. 2006; 241(3):702–9.
22. Lozada JR, Burke KA, Maguire A, Pareja F, Lim RS, Kim J, Gularte-Merida R, Murray MP, Brogi E, Weigelt B, Reis-Filho JS, Geyer FC. Myxoid fibroadenomas differ from conventional fibroadenomas: a hypothesis generating study. Histopathology. 2017;71(4):626-34.

23. Courcoutsakis NA, Tatsi C, Patronas NJ, Lee CCR, Prassopoulos PK, Stratakis CA. The complex of myxomas, spotty skin pigmentation and endocrine overactivity (carney complex): Imaging findings with clinical and pathological correlation. Insights Imaging.2013;4(1);119-133.
24. Basara AI, Balci P. Fibroadenomas: a multidisciplinary review of the variants. Clin Imaging. 2021;71:83-100.
25. Calonje E, Guerin D, McCormick D, et al. Superficial angiomyxoma: clinicopathologic analysis of a series of distinctive but poorly recognized cutaneous tumors with tendency for recurrence. Am J Surg Pathol. 1999; 23(8):910-917.
26. Allen PW. Myxoma is not a single entity: a review of the concept of myxoma. Ann Diagn Pathol. 2000; 4(2):99-123.

Figures

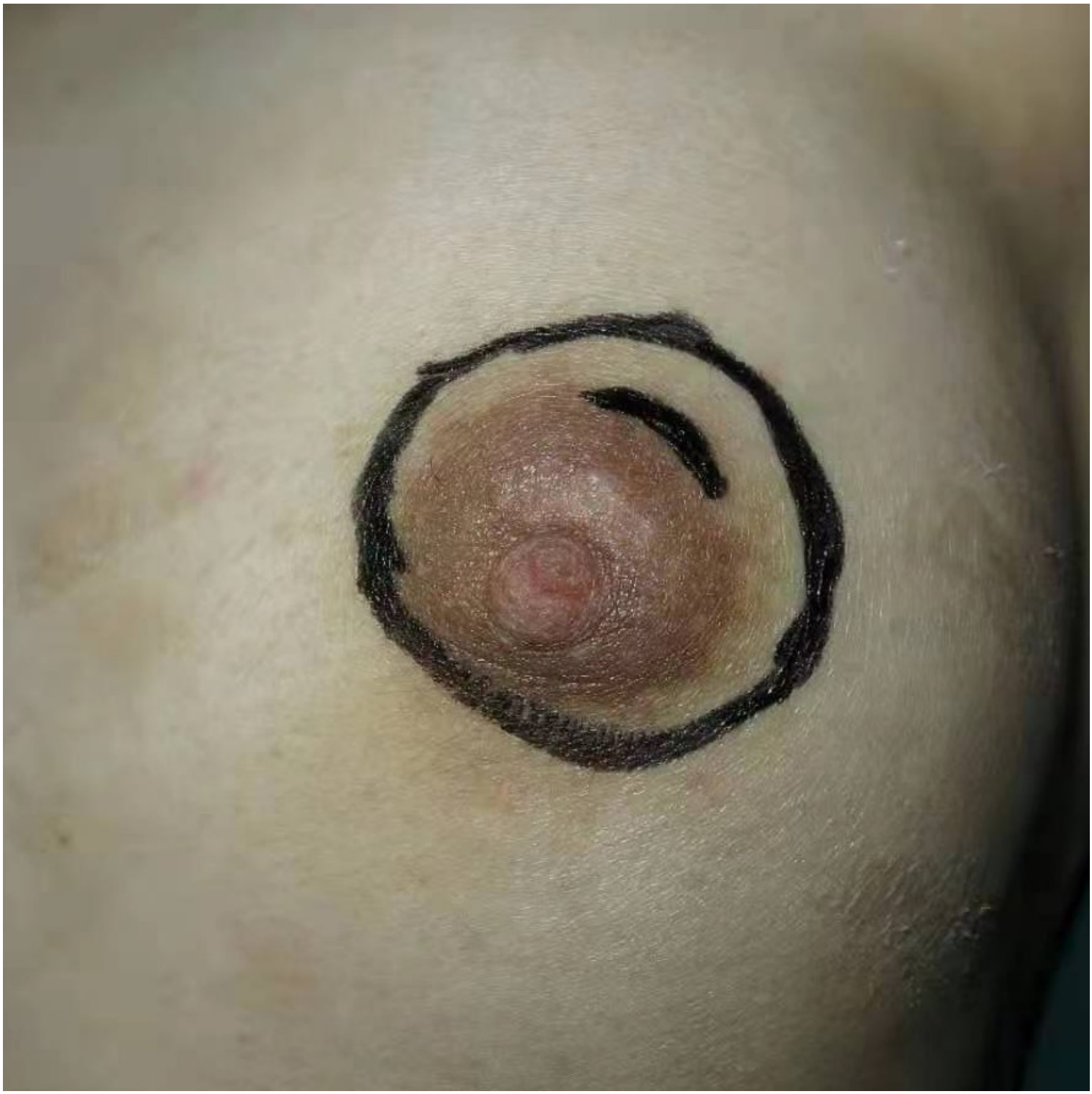

Figure 1

A soft lump in the left subareolar region, close to the nipple.

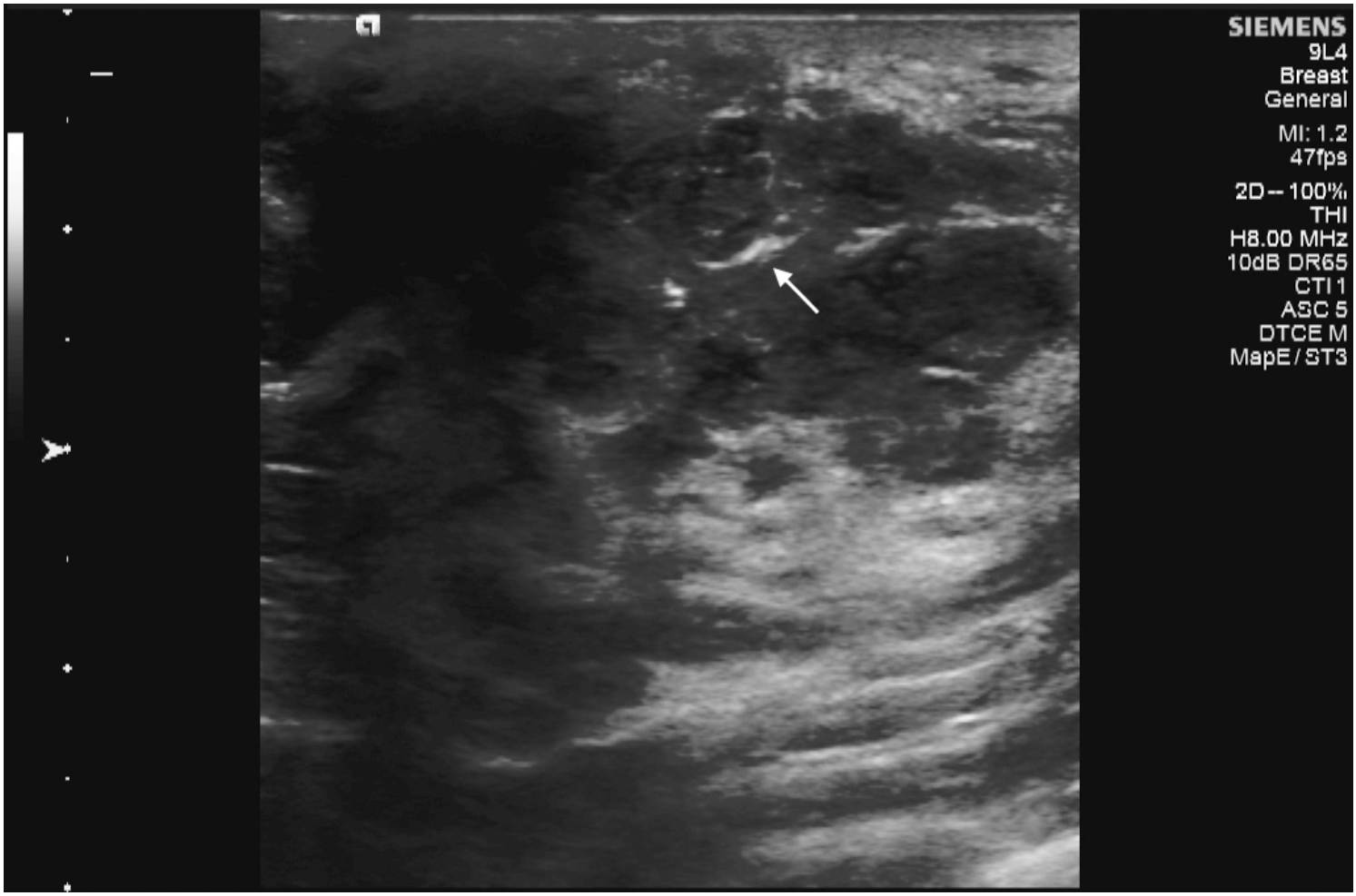

Figure 2

Ultrasonography (US) demonstrated an irregular complex cystic and solid lesion, parallel to the skin, with multiple thin echogenic septa (white arrow), enhancement of the posterior echo, and microlobulated margins.

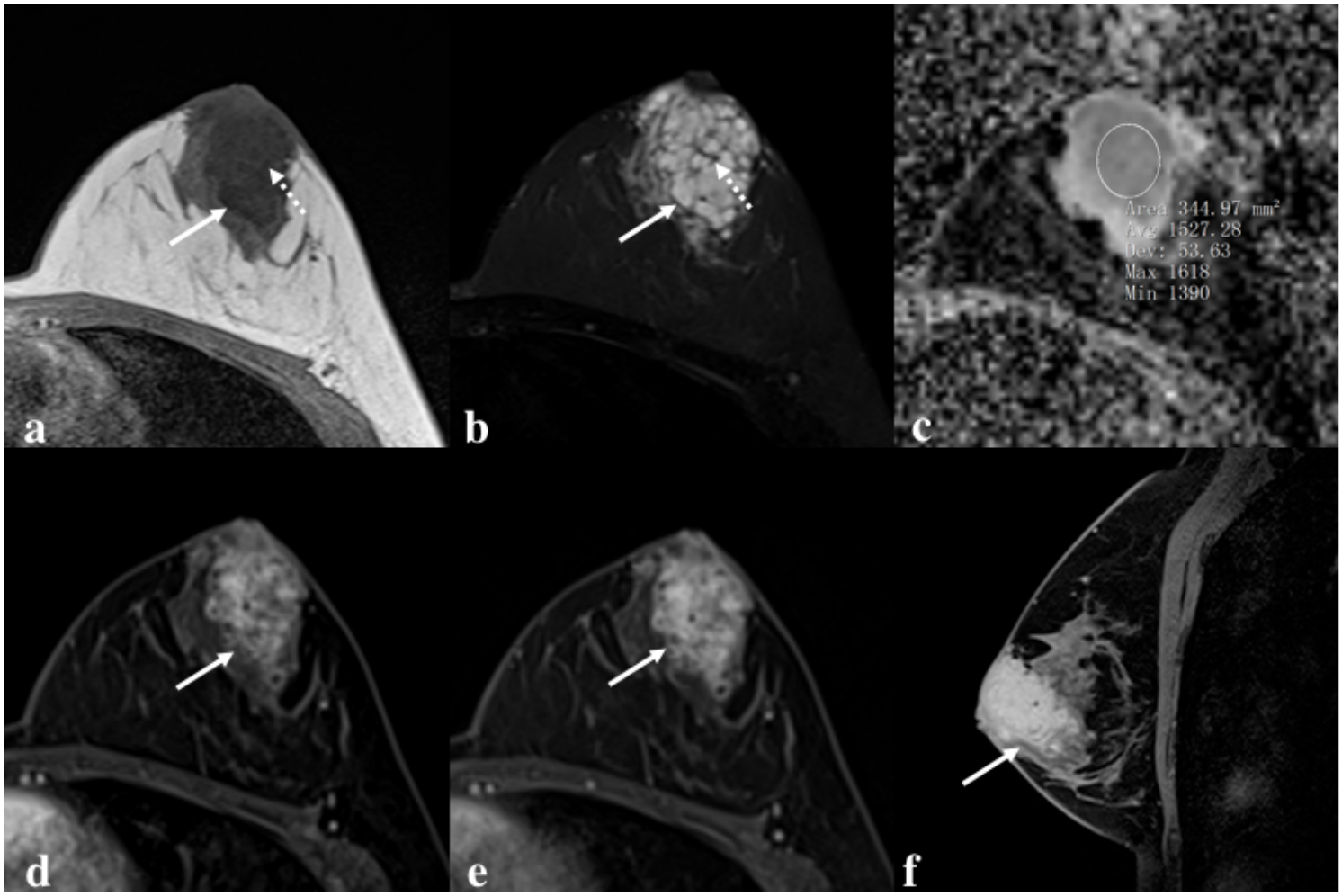

Figure 3

A Breast MR axial T1-weighted image shows an irregular mass of hypo-intensity (white arrow) with multiple short-linear iso-intense internal septations (white dotted arrow). **B** Axial STIR T2-weighted image shows the mass was strongly bright (white arrow) with multiple short-linear hypo-intense internal septations (white dotted arrow) which had a honeycombed or spongy appearance. **C**ADC map shows the mass with an ADC value of 1.527×10-3mm2/s. **D,E** Axial post-contrast T1-weighted image with fat suppression at 65s and 195s after contrast agent injection shows clustered small peripheral ring enhancement (white arrow) and gradual enhancement toward the center (white arrow). **F** Sagittal delayed phase post-contrast T1-weighted image shows strong heterogeneous enhancement (white arrow).

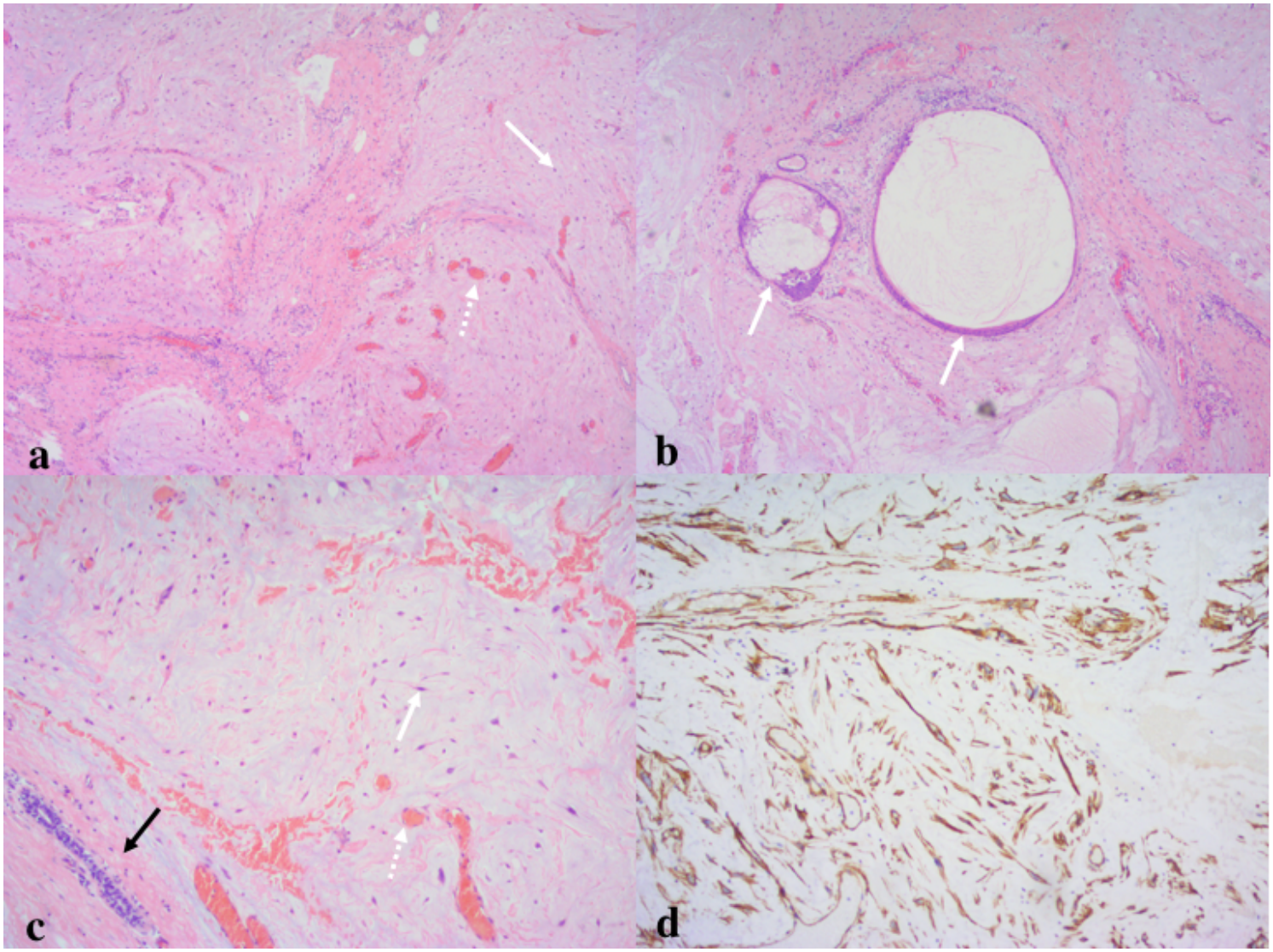

Figure 4

A Histologic, immunohistochemical staining of superficial angiomyxoma. The lesion consists of extensive myxoid stroma separated by fibrous tissue. Scattered bland spindle fibroblastic cells (white arrow) and thin-wall blood vessels (white dotted arrow) were embedded in the myxoid stroma (H&E stain, 40 × magnification). **B** Epidermoid cysts with thin strands of squamous epithelium (white arrow) can be noted in the tumor (H&E stain, 40 × magnification). **C** Scattered bland spindle or stellate fibroblastic cells with no atypia (white arrow) and elongated thin-walled blood vessels (white dotted arrow) were embedded in abundant myxoid stroma (H&E stain, 100 × magnification). Normal mammary ducts (black arrow) were entrapped at the periphery. **D** Positive immunohistochemical staining of the spindle cells by CD34 (100 × magnification).