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**REVIEW**

- 2916 DNA methylation detection methods used in colorectal cancer  
*Zhan YX, Luo GH*

**ORIGINAL ARTICLE****Case Control Study**

- 2930 Expression and predictive value of miR-489 and miR-21 in melanoma metastasis  
*Mo H, Guan J, Yuan ZC, Lin X, Wu ZJ, Liu B, He JL*

**Observational Study**

- 2942 Association of stiff-person syndrome with autoimmune endocrine diseases  
*Lee YY, Chen IW, Chen ST, Wang CC*
- 2953 Hyperthyroid heart disease in pregnancy: Retrospective analysis of a case series and review of the literature  
*Shan D, Bai Y, Chen QH, Wu YX, Chen Q, Hu YY*
- 2963 Changes of serum inflammatory factors and miR-145 expression in patients with osteoarthritis before and after treatment and their clinical value  
*Wang XZ, Li WX*

**Prospective Study**

- 2976 Immediate muscle strengthening by an end-effector type gait robot with reduced real-time use of leg muscles: A case series and review of literature  
*Hwang CH*

**Randomized Clinical Trial**

- 2986 Comparison of perceived pain and patients' satisfaction with traditional local anesthesia and single tooth anesthesia: A randomized clinical trial  
*Al-Obaida MI, Haider M, Hashim R, AlGheriri W, Celur SL, Al-Saleh SA, Al-Madi EM*

**SYSTEMATIC REVIEW**

- 2995 Treatment of laryngopharyngeal reflux disease: A systematic review  
*Lechien JR, Mouawad F, Barillari MR, Nacci A, Khoddami SM, Enver N, Raghunandhan SK, Calvo-Henriquez C, Eun YG, Saussez S*

**CASE REPORT**

- 3012 Keratoconus in a patient with Alport syndrome: A case report  
*Moshirfar M, Skanchy DF, Gomez AT, Ronquillo YC, Buckner B, Hoopes PC*

- 3018** Successful multidisciplinary clinical approach and molecular characterization by whole transcriptome sequencing of a cardiac myxofibrosarcoma: A case report  
*Saponara M, Indio V, Pizzi C, Serban ED, Urbini M, Astolfi A, Paolisso P, Suarez SM, Nannini M, Pacini D, Agostini V, Leone O, Ambrosini V, Tarantino G, Fanti S, Niro F, Buia F, Attinà D, Pantaleo MA*
- 3027** Laparoscopic hysterectomy as optimal approach for 5400 grams uterus with associated polycythemia: A case report  
*Macciò A, Chiappe G, Lavra F, Sanna E, Nieddu R, Madeddu C*
- 3033** Malignant sweat gland tumor of breast arising in pre-existing benign tumor: A case report  
*An JK, Woo JJ, Hong YO*
- 3039** Bronchobiliary fistula after ramucirumab treatment for advanced gastric cancer: A case report  
*Kim HB, Na YS, Lee HJ, Park SG*
- 3047** Severe heterotopic ossification in a seronegative spondyloarthritis patient after cervical Bryan disc arthroplasty: A case report  
*Huang CW, Tang CL, Pan HC, Tzeng CY, Tsou HK*
- 3055** Underlying IgM heavy chain amyloidosis in treatment-refractory IgA nephropathy: A case report  
*Wu HT, Wen YB, Ye W, Liu BY, Shen KN, Gao RT, Li MX*
- 3062** Diagnosis of myocardial infarction with nonobstructive coronary arteries in a young man in the setting of acute myocardial infarction after endoscopic retrograde cholangiopancreatography: A case report  
*Li D, Li Y, Wang X, Wu Y, Cui XY, Hu JQ, Li B, Lin Q*
- 3069** Hemophagocytic lymphohistiocytosis complicated by polyserositis: A case report  
*Zhu P, Ye Q, Li TH, Han T, Wang FM*
- 3074** Hair regrowth following fecal microbiota transplantation in an elderly patient with alopecia areata: A case report and review of the literature  
*Xie WR, Yang XY, Xia HHX, Wu LH, He XX*
- 3082** How should congenital absence of cruciate ligaments be treated? A case report and literature review  
*Lu R, Zhu DP, Chen N, Sun H, Li ZH, Cao XW*
- 3090** Kaposi's sarcoma manifested as lower gastrointestinal bleeding in a HIV/HBV-co-infected liver cirrhosis patient: A case report  
*Zhou QH, Guo YZ, Dai XH, Zhu B*
- 3098** Primary renal synovial sarcoma: A case report  
*Cai HJ, Cao N, Wang W, Kong FL, Sun XX, Huang B*
- 3104** Type I neurofibromatosis with spindle cell sarcoma: A case report  
*Zhang Y, Chao JJ, Liu XF, Qin SK*

- 3111** Primary hypoparathyroidism accompanied by rhabdomyolysis induced by infection: A case report  
*Ding LN, Wang Y, Tian J, Ye LF, Chen S, Wu SM, Shang WB*
- 3120** Effects of combined rTMS and visual feedback on the rehabilitation of supernumerary phantom limbs in a patient with spinal cord injury: A case report  
*Lu YS, Tong P, Guo TC, Ding XH, Zhang S, Zhang XJ*
- 3126** Clear cell sarcoma of soft tissue in pleural cavity: A case report  
*Chen YT, Yang Z, Li H, Ni CH*
- 3132** Primary hyperparathyroidism in a woman with multiple tumors: A case report  
*Hui CC, Zhang X, Sun JR, Deng DT*
- 3138** Gastric adenocarcinoma mimicking a submucosal tumor: A case report  
*Cheng XL, Liu H*
- 3145** Hypereosinophilia, mastectomy, and nephrotic syndrome in a male patient: A case report  
*Wu J, Li P, Chen Y, Yang XH, Lei MY, Zhao L*
- 3153** Flapless immediate implant placement into fresh molar extraction socket using platelet-rich fibrin: A case report  
*Sun XL, Mudalal M, Qi ML, Sun Y, Du LY, Wang ZQ, Zhou YM*
- 3160** Advanced primary amelanotic malignant melanoma of the esophagus: A case report  
*Zhang RX, Li YY, Liu CJ, Wang WN, Cao Y, Bai YH, Zhang TJ*

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## Malignant sweat gland tumor of breast arising in pre-existing benign tumor: A case report

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### Abstract

#### BACKGROUND

Sweat glands belong to skin appendages. Sweat gland tumors are uncommon, especially when they occur as malignant tumors in the breast. We report a case of malignant sweat gland tumor of the breast, including imaging and pathological findings.

#### CASE SUMMARY

A 47-year-old woman visited our hospital with a non-tender palpable lesion in her left breast. The lesion had not shown changes for 10 years. However, it recently increased in size. Sonography showed a well circumscribed cystic lesion with internal debris and fluid-fluid level. Magnetic resonance imaging showed a well circumscribed oval mass with T1 hyper-intensity compared to muscle and T2 high signal intensity. There was a small enhancing mural component in the inner wall of the mass. The tumor was resected. Its pathologic result was a malignant transformation of benign sweat gland tumor such as hidradenoma. The lesion was treated with excision and radiation therapy. At 1-year follow up, there was no local recurrence or metastasis in the patient.

#### CONCLUSION

In the case of a rapid growing cystic mass in the nipple and subareola, it is necessary to distinguish it from a malignant sweat gland tumor.

**Key words:** Sweat gland neoplasm; Breast; Ultrasonography; Magnetic resonance imaging

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**Core tip:** Sweat gland tumors of the breast are rare. They are clinically similar to benign

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cutaneous lesions. Imaging findings of sweat gland tumors have been rarely reported. This case will help us understand types of sweat gland tumors, the distinction between cutaneous and breast parenchymal lesions, and differential diagnosis of cutaneous lesions.

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## INTRODUCTION

The human body mainly consists of two types of sweat glands: Eccrine and apocrine sweat glands<sup>[1]</sup>. Eccrine glands are distributed in the palms, soles, axillae, and forehead while apocrine glands are mostly distributed in the axilla and anogenital area<sup>[2]</sup>. Apocrine glands can secrete a proteinaceous viscous sweat with a unique odor. The breast is sometimes regarded as a modified apocrine gland<sup>[3]</sup>. Eccrine sweat glands can secrete hypotonic sweat consisting mostly of water and electrolytes to control body temperature<sup>[4]</sup>. Sweat gland tumors are uncommon, especially when they occur in the breast. They have complex classification. These tumors have been reported under different names<sup>[4]</sup>. We report a case of malignant sweat gland tumor of the breast treated with excision and radiation therapy.

## CASE PRESENTATION

### Chief complaints

A 47-year-old female patient presented with a palpable lesion protruding from the left areola. This lesion was first noted 10 years earlier and had not shown changes. However, recently it noticeably increased in size.

### History of past operation

She underwent breast augmentation surgery with silicone implants eight years ago.

### Physical examination

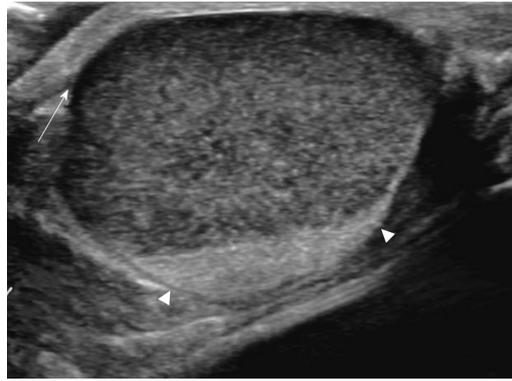
Physical examination revealed a soft, fluctuating, mobile, and non-tender mass measuring approximately 4 cm in size. Part of the overlying skin was slightly greenish in appearance with mild protrusion. However, there was no ulcer or other skin changes.

### Imaging examination

Sonography showed a well circumscribed oval cystic lesion with internal hyperechoic debris and fluid-fluid level. There was no internal blood flow on color doppler study. The mass broadly contacted with dermis, compressing the breast parenchyma (Figure 1). Breast magnetic resonance imaging (MRI) was performed to check breast implants, on which the lesion could also be evaluated. MRI showed a well circumscribed oval mass of left subareolar area measuring 3.9 cm. The lesion attached to the cutaneous layer of the areola and compressed the breast parenchyma. Thin fatty layer was noted between the mass and the breast parenchyma, suggesting separated mass from the breast. The lesion showed T1 hyper-intensity compared to muscle and high T2 signal intensity. On post-contrast fat saturation T1-weighted image, the mass showed a well-circumscribed thin and even enhancing wall. There was a small enhancing mural component in the inner wall of the mass (Figure 2). It was not detected on ultrasound because internal debris filling the mass masked the mural component. In differentiation of the lesion, we overlooked the enhancing solid portion and considered the lesion as benign such as epidermal inclusion cyst.

### Pathological examination

The tumor was resected due to its persistent and growing tendency. The mass was well demarcated with dense fibrous tissue. It was located between the breast parenchyma and the areola. The mass showed deep khaki color. It was filled with brownish and tan necrotic mucoid fluid. Microscopically, the lesion was



**Figure 1** Ultrasonography showing a well circumscribed oval cystic mass. Hyperechoic debris and fluid-fluid level were noted within the mass. The lesion broadly contacted with dermis (arrow), compressing the breast parenchyma (arrowheads).

predominantly cystic, measuring 3.5 cm × 2.5 cm × 2.4 cm with solid portion of 1 cm × 0.3 cm carcinoma and benign tissue of less than 0.1 cm. The carcinoma was composed of epithelial cells with clear or eosinophilic cytoplasm, prominent nucleoli, and frequent mitosis. Suspicious microinvasion to the fibrous cystic wall was noted (Figure 3). Resection margin was less than 1 mm and free of pathology. There was no lymphovascular invasion. Cytokeratin expression of the tumor showed positive for CK7 but negative for CK20. It was moderately positive for Ki-67, reflecting cell proliferation. Regarding other results in immunohistochemistry, it was positive for P63, C-erbB-2, and P53, but negative for estrogen and progesterone receptor.

## FINAL DIAGNOSIS

Based on its history of a longstanding cutaneous mass, residual benign tissue, histology, and immunohistochemistry results of the carcinoma, the pathologic result was concluded to be malignant transformation of benign sweat gland tumor such as hidradenoma.

## TREATMENT

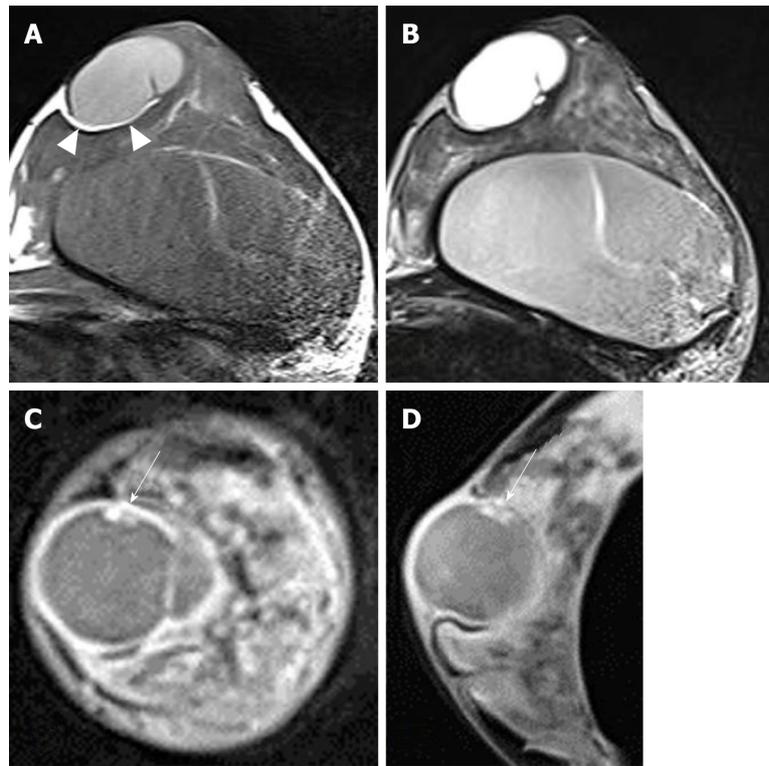
Depending on the pathological result of malignancy after resection, further surgery was considered. However, the lesion was well separated from the surrounding tissue at the time of operation and the specimen margin had no pathology. Moreover, additional lesions or pathological lymph nodes were not found on positron emission tomography-computed tomography (CT) performed after malignant diagnosis. Therefore, no further surgery was performed. Radiation therapy was performed at the site of excision.

## FOLLOW-UP AND OUTCOME

The first follow-up was performed by ultrasound at six months after surgery. At 1-year follow up, she underwent mammogram, breast ultrasound, chest and abdominal CT, and bone scan. No local recurrence or metastasis was found in the patient.

## DISCUSSION

Skin appendages are specialized skin structures located within the dermis and focally within the subcutaneous fatty tissue. They have three histologically distinct structures: The pilosebaceous unit, eccrine sweat glands, and apocrine glands. Tumors from skin appendages exhibit morphological differentiation toward one of these different types. Pilosebaceous units contain hair follicle and sebaceous glands. Eccrine and apocrine glands are origins of cutaneous sweat gland tumors. Skin adnexal lesions may display more than one line of differentiation. Thus, precise classification is difficult<sup>[5]</sup>. Furthermore, cutaneous sweat gland tumors are uncommon. Their



**Figure 2 Breast magnetic resonance imaging showing a well-circumscribed oval mass of the left subareola.**  
 A: The lesion attached to cutaneous layer of subareola and compressed the breast parenchyma. It showed a T1 hyper-intensity compared to signal in muscle. Thin fatty layer was seen between the mass and breast parenchyma (arrowheads). Breast implant was noted in the retromammary area; B: On T2-weighted axial image, the lesion showed a high signal intensity; C, D: On post-contrast fat saturation T1-weighted coronal (C) and sagittal (D) images, the mass showed a well-circumscribed thin and even enhancing wall. There was a small enhancing mural component in the inner wall of the mass (arrows).

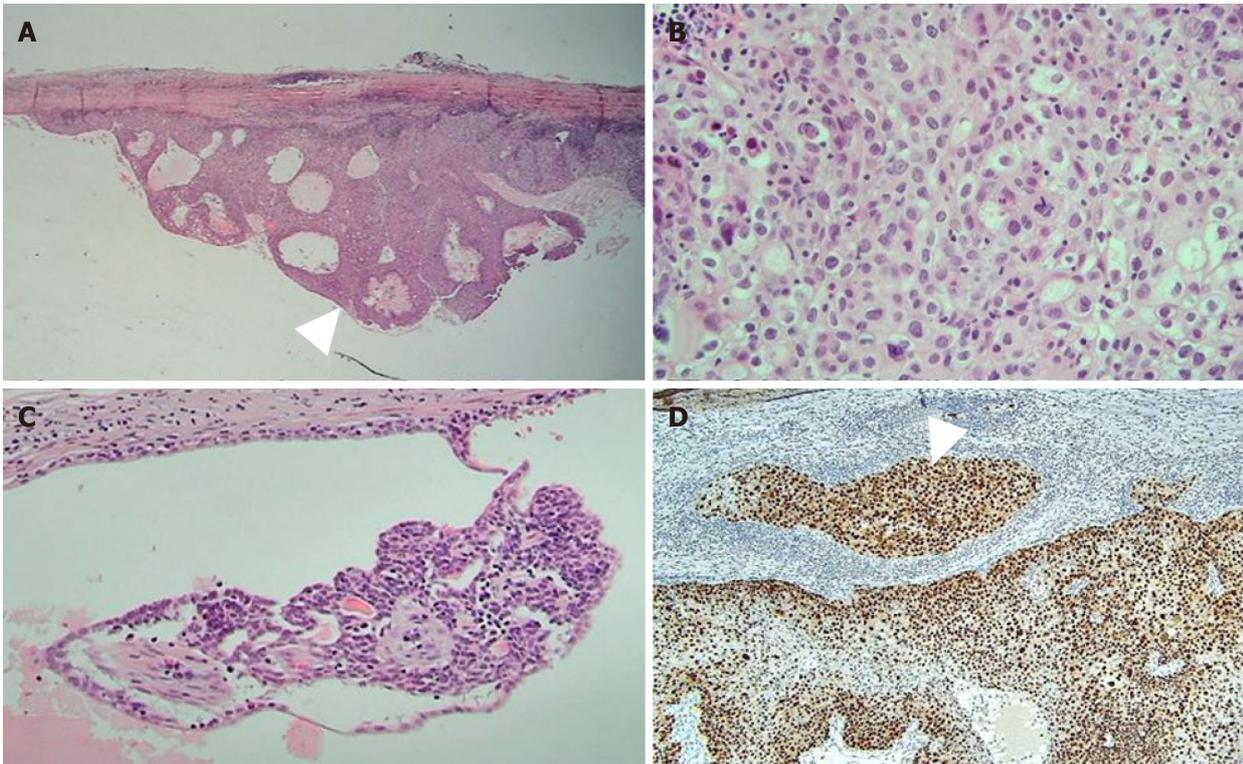
classification is very complex with a wide histopathological spectrum and different terms to describe the same neoplasm<sup>[4]</sup>. Thus, morphologic evaluation is very important for skin adnexal lesions. Special or immunohistochemical staining may occasionally serve as ancillary tool<sup>[5]</sup>.

In the present case, features first considered for diagnosis were location, morphology, and cell elements. This lesion was located in the dermal and subcutaneous layer without epidermal connection. The tumor was cystic with focal solid component. Main cellular components were cells having clear or eosinophilic cytoplasm with frequent mitosis. A very small benign component remained within the mass. These findings strongly suggested malignant transformation of hidradenoma or hidradenocarcinoma<sup>[5,6]</sup>.

Hidradenoma is a benign tumor that usually appears as a solitary skin-colored lesion. It can be larger than 2 cm in diameter. It can occur at any anatomical location and age<sup>[7,8]</sup>. It is classified as poroid hidradenoma of eccrine cell origin and clear cell hidradenoma of apocrine cell origin. Apocrine nodular hidradenoma is more frequent than eccrine variant. However, both subtypes could be present in the same lesion. It might be a solid and/or a solid-cystic mass in about 90% of cases<sup>[2,9]</sup>.

Most cases of hidradenocarcinoma arise *de novo*. However, the tumor may also arise in pre-existing hidradenoma<sup>[10]</sup>. Hidradenocarcinoma has been reported in various names, including malignant nodular/clear cell hidradenoma, malignant clear cell acrospiroma, clear cell eccrine carcinoma, and primary mucoepidermoid cutaneous carcinoma. Tumor cells are similar to nodular hidradenoma. However, they can exhibit cytonuclear atypia with increased mitotic activity. There may be evidence of nodular hidradenoma remnants. Invasive growth patterns are not universally seen. Carcinomas can be distinguished from benign hidradenomas by the presence of active mitosis and cell polymorphism.

Immunohistochemistry results can support pathologic diagnosis. In our study, CK7 was positive. It was expressed in secretory coil of normal eccrine and apocrine glands. P63 is a marker of myoepithelial cells seen in most sweat gland tumors. It can be considered to differentiate the secretory coil of sweat glands. It is expressed in most of traditional apocrine tumors<sup>[7]</sup>. P63 is useful in a panel of antibodies for



**Figure 3 Photomicrographs of the cystic mass.** A: Photomicrograph demonstrating predominantly cystic mass with solid portion of carcinoma (arrowhead) [Hematoxylin and Eosin (HE) staining,  $\times 20$  magnification]; B: The carcinoma was composed of epithelial cells with clear or eosinophilic cytoplasm, prominent nucleoli, and frequent mitosis (HE staining,  $\times 400$  magnification); C: Residual benign tissue was smaller than 0.1 cm (HE staining,  $\times 200$  magnification); D: Microinvasion to fibrous cystic wall was noted (arrowhead) (P53 staining,  $\times 100$  magnification).

immunohistochemical differential diagnosis between sweat gland carcinoma other than primary cutaneous apocrine carcinoma and skin metastasis of breast carcinoma<sup>[11]</sup>. Estrogen and progesterone receptors are often positive in skin tumors with eccrine differentiation<sup>[4]</sup>. However, they were not expressed in the present case. P53 is present in some sweat gland carcinomas. It is rarely present in benign tumors. Ki 67 reflects cell proliferation. Mitotic rate is an important indicator of malignancy<sup>[7]</sup>. It was moderately positive in the present case.

Imaging findings of hidradenoma or carcinoma have been rarely reported. Wortsman *et al*<sup>[12]</sup> have reported sonographic findings of cystic mass including solid portion, inner septa, internal moving echo mimicking snow falling, and fluid-fluid level with anechoic and hypoechoic fluid. Cho *et al*<sup>[13]</sup> have reported a sonographic finding of an oval, well circumscribed complex echoic mass in the subcutaneous layer. Another report has presented well-demarcated cystic masses with echolucent area and irregular mural nodules protruding from the cystic wall<sup>[14]</sup>.

Maldjian *et al*<sup>[15]</sup> have described MRI findings of complex cystic mass with fluid levels of the cystic portion and enhancing solid component. The cystic portion demonstrated low to intermediate T1 intensity and high T2 signal intensity. Mullaney *et al*<sup>[16]</sup> have reported two MR findings of benign hidradenomas with complex cystic masses. The cystic component showed low to high T1 signal intensity and high T2 signal intensity while mural masses demonstrated low intensity T1 and T2 signals with no or homogeneous enhancement<sup>[16]</sup>. Different signal intensities of cystic components can result from relative differences in hemorrhage and sweat gland secretions.

The most common location of hidradenoma or hidradenocarcinoma in the breast has been reported to be the nipple and subareolar region<sup>[17-21]</sup>. There have been reports of circumscribed high-density masses on mammograms and cystic masses with significant solid components or mural nodule on sonogram<sup>[7,22,23]</sup>.

Nodular hidradenoma should be completely removed as malignant transformation may occur in other parts of the lesion. In addition, hidradenoma has a recurrence rate of approximately 12% unless fully excised, especially for lesions with irregular peripheral margins<sup>[10]</sup>. Hidradenocarcinomas do not always behave aggressively. However, they can have aggressive course with metastasis and/or local recurrence. Primary treatment is extensive local resection with or without lymph node dissection<sup>[24,25]</sup>.

## CONCLUSION

Malignant sweat gland tumors of the breast are rare. They may appear similar to benign cystic masses. However, if the lesion develops in the nipple and subareolar area with rapid enlargement, it is necessary to distinguish it from malignant cystic lesion. Ultrasonography is useful as a primary modality while MRI is better for characterizing features of tumors with superior resolution. Pathologic confirmation is very important because the lesion may be similar to benign lesion in physical examination and/or imaging studies. Because treatment methods for malignant sweat gland tumors have not been fully established yet, complete excision with negative margin is important. Additional treatment such as radiation therapy could be considered.

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