Granular Cell Tumor of the Male Breast With Nipple Retraction and Pectoralis Major Invasion Treated With Mastectomy: A Case Report

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Granular cell tumor is a rare disease, and it is even rarer in the male breast. Although it is typically a benign tumor, due to its features and image findings, it can be easily misdiagnosed and managed as a malignant tumor. Therefore, the extent of the surgery can inappropriately be expanded. To avoid misdiagnosis and overtreatment, surgeons must perform a careful evaluation. We describe a case of a granular cell tumor of the male breast treated with mastectomy.

Key Words: Breast, Male, Granular cell tumor, Mastectomy, Pectoralis muscles

INTRODUCTION

A granular cell tumor (GCT) is usually a benign neoplasm originating from peripheral nerve cells. GCTs can occur in any organ, most frequently in the head, neck, and upper gastrointestinal tract [1]. GCT is a rare tumor, accounting for approximately 0.5% of all soft tissue tumors [2,3]. GCT in the breast is an even rarer disease [4,5]. GCT in the male breast is extremely rare [6]. In addition, GCTs have malignant potential: approximately 1%–2% of GCTs are considered malignant [7]. Although GCTs have a low malignant potential, they are often suspected to be malignant in clinical practice. This is because GCT is usually a palpable solitary mass with an infiltrative growth pattern [8]. Although the likelihood is low, GCTs can occur in the male breast. If a man has a very hard tumor in his breast that has invaded the surrounding tissue and is highly suspicious of invasive carcinoma, it may still be a benign GCT. To avoid misdiagnosis and overtreatment, surgeons must perform a careful evaluation.

CASE REPORT

A 48-year-old man visited our hospital because of a huge protruding mass in his left breast. He noticed the mass 2–3 years ago without any symptoms. The breast mass was very hard and fixed, and it looked as if it was invading his breast skin and nipple. The patient had no medical history, but he had a sister with a history of breast cancer. Breast ultrasonography revealed a hypoechoic mass approximately 4.0 cm in size with increased vascularity in the left upper-inner breast (Figure 1A and B). A core needle biopsy of the mass was performed, and GCT was suspected. Contrast-enhanced breast magnetic resonance imaging (MRI) and contrast-enhanced chest computed tomography (CT) were conducted to evaluate the breast lesion and lung metastases, respectively, with axillary staging. On MRI and CT images, the mass was 47 mm in diameter and showed a spiculated heterogeneous feature with a plateau kinetic pattern. Moreover, it was also seen to involve the skin and pectoralis muscle (Figure 2A and B). Although no significant axillary or mediastinal lymphadenopathy existed, malignancy could not be ruled out on preoperative examinations.

Since the patient was a man, he did not want to leave any breast tissue behind and wanted it removed as cleanly as possible. Therefore, a mastectomy with adjacent pectoralis muscle was performed. During the surgery, a frozen section biopsy of the resection margins was performed and was negative for tumor cells. On gross examina-
The tumor was poorly circumscribed with a white-to-yellow feature. The margins were uninvolved by tumor cells: 2.5 cm from the lateral margin, 1 cm from the medial margin, 0.1 cm from the superficial margin, 0.1 cm from the deep margin, 2 cm from the superior margin, and 1.5 cm from the inferior margin. On microscopic examination, the tumor was located beneath the skin and had an infiltrative margin. The tumor was composed of sheets of polygonal cells with abundant eosinophilic granular cytoplasm and round to oval nuclei. Mitosis, necrosis, and nuclear pleomorphism suggestive of malignancy were absent. Immunohistochemically, the tumor cells were positive for S-100 protein and CD68 but negative for cytokeratin. The Ki-67 labeling index was low (< 2%). This case was finally diagnosed as atypical GCT.

**DISCUSSION**

GCT is a rare tumor. The name GCT is derived from the abundant eosinophilic granules in the cytoplasm, but its histogenesis is still controversial [3]. The most widely accepted suggestion is that GCT is of neural origin, the Schwann cells. This is because GCT is positive for specific immunohistologic staining for S-100 protein, CD68, and neuron-specific enolase [9]. In our case, the S-100 protein was also positive. GCTs mostly occur in the oral cavity but may also occur anywhere in the body [4]. GCT in the breast is a rare disease, accounting for 5%–8.5% of all GCTs and 0.1% of all breast neoplasms [4,5]. It is known to be more common in African-American premenopausal women. However, a direct association with estrogen or progesterone has not been established [1]. The incidence of breast GCT is much lower in
men, occurring in 6.6% of all breast GCTs. The ratio of men to women is about 1.9 [10].

On physical examination, breast GCTs are solitary, unilateral, hard, painless masses [4]. Typically, breast GCTs are benign tumors, but even benign breast GCTs tend to infiltrate adjacent tissues. GCTs are often accompanied with skin and nipple retractions and are fixed to the pectoralis muscle [9]. Clinically, these features can make GCTs appear as invasive breast carcinomas and lead to misdiagnosis [11]. Although many features of breast GCTs mimic malignancy, there are also differences. Breast GCTs usually occur in the upper-inner quadrant of the breast, while invasive breast carcinomas usually occur in the upper-outer quadrant [1]. This frequent localization correlates with the course of the cutaneous sensory nerve of the supraclavicular nerve [1,4]. In our case, the lesion was in the upper-inner quadrant of the breast and also accompanied with retraction of the skin and nipple and fixation to the pectoralis muscle.

Even benign breast GCTs tend to infiltrate adjacent tissue; thus, wide local excisions achieving negative margins are needed [10]. If the lesion is adequately resected, a good long-term prognosis and low recurrence rate can be expected. Approximately 2%–8% local recurrence rate has been reported 8–10 years after excision for benign breast GCTs [6,10]. Sentinel lymph node biopsy and adjuvant radiation therapy are not necessary for benign breast GCT [11]. However, sentinel lymph node biopsy and chemotherapy should be considered for malignant breast GCTs as they can spread to lymphovascular systems [12]. Therefore, an appropriate preoperative evaluation should be performed before surgery to detect malignancy. However, no imaging test can completely determine the malignancy of breast GCTs or show their characteristics.

Features of breast GCTs in imaging such as ultrasonography, mammography, or breast MRI generally infer a suspected malignancy [3]. In our case also, although there was no significant axillary or mediastinal lymphadenopathy, and core needle biopsy revealed suspected benign GCT, malignancy could not be completely ruled out due to the invasive features of the pectoralis muscle on preoperative radiologic examinations. Since malignancy could not be ruled out, a frozen

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**Figure 3.** Pathologic examination of the granular cell tumor. (A) Low magnification view showing a tumor with infiltrative margin (hematoxylin and eosin [H&E], × 1). (B) Tumor cells with abundant eosinophilic granular cytoplasm and round to oval nuclei (H&E, × 200). (C) Diffuse S-100 protein-positive immunoreactivity. Nuclear positivity is indicated by a red circle, and cytoplasmic positivity is indicated by a yellow arrow (× 100). (D) Diffuse CD68 positive immunoreactivity. Cytoplasmic positivity is indicated by yellow arrows (× 100).
section biopsy was performed during surgery to determine the presence of malignancy. All frozen section specimens were negative for malignancy, and the sentinel lymph node biopsy could be omitted.

The final pathologic diagnosis in our case was an atypical GCT of the breast. Fanburg-Smith et al. [13] proposed six histologic criteria for malignant GCT. These criteria included necrosis, spindling of the tumor cells, vesicular nuclei with large nucleoli, increased mitotic rate (>2 mitoses/10 high-power fields at 200× magnification), a high nuclear-to-cytoplasmic ratio, and pleomorphism. They classified the GCT as histologically malignant if it met three or more of the six criteria. The GCT was classified as benign if it met none of the criteria or had only focal pleomorphism. It was classified as atypical if it met one or two criteria. Our case met two criteria: vesicular nuclei with large nucleoli and nuclear pleomorphism.

From the perspective of the surgeon, we have provided an overall summary of the GCT in the male breast, which is a rare case, and the methods used to diagnose and manage the patients. GCTs are usually benign tumors, but they have malignant potential and can mimic other malignancies. Surgeons can easily misdiagnose GCT as invasive breast cancer, which can lead to overtreatment, such as an unnecessary sentinel lymph node biopsy. However, incomplete excision can also lead to local recurrence. In this case, since the tumor had invaded the pectoralis muscle and skin and caused nipple retraction, mastectomy was considered an appropriate treatment for the male patient. A core needle biopsy of the tumor was performed before surgery, and a frozen section biopsy was performed on the resection margins during surgery to avoid an unnecessary sentinel lymph node biopsy. As physicians who diagnose and treat breast GCT, surgeons must make an accurate diagnosis and provide appropriate treatment by considering these unique features of GCTs.

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

REFERENCES