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Research Article

Primary Angiosarcoma of the Breast: A 20-Year Single-Institution Experience in China

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Background. Primary angiosarcoma of the breast (PAS) is a rare aggressive tumor with no standardized treatment. The aim of this study was to investigate the characteristics of all primary angiosarcoma of the breast obtained from a single center and the features peculiar to Chinese patients. *Methods.* The medical records at Tianjin Medical University Cancer Institute and Hospital were retrospectively searched to identify all cases of PAS treated in 2000–2019. *Results.* Sixteen cases of PAS were identified, and most involved the left breast. Forty percent of young patients had a history of progressive tumor enlargement with localized pain and skin color changes. The diagnostic accuracy rate was 66.7% for MRI, 75% for core-needle aspiration, and 58.3% for intraoperative fast frozen pathology. The most common surgery was modified radical mastectomy ($n = 9$, 56.25%). All positive margins involved the pectoralis major muscle, and these tumors' mean size was 8.2 cm. All cases were CD34 positive, and the Ki-67 index was ≥30% in 37.5%. Median local or distant recurrence-free survival was 57.6 months for low-to-moderate-grade tumors and 23.5 months for high-grade tumors. Seventy-five percent of the patients were treated with chemotherapy. The average tumor size in patients with relapse-free survival longer than 3 years was 2.2 cm. *Conclusion.* Young patients may have larger and softer breast tumors with skin color changes. MRI and core-needle biopsy should be performed preoperatively. A positive surgical margin at pectoralis major should be noted. Breast prosthesis may be a better reconstruction option. Adjuvant chemotherapy and/or radiotherapy should be considered for large tumors with a high Ki-67 index or high-grade tumors.

1. Introduction

Breast angiosarcoma is an extremely rare but highly malignant tumor, accounting for 0.04–0.05% of all breast malignancies [1, 2] and less than 1% of all sarcomas [3], and has an incidence which is about 6.8 per 100,000 population per year [4].

The first description of mammary angiosarcoma was published by Schmidt in 1887 [5]. Subsequent research identified two main types of breast angiosarcoma, namely, primary (de novo) and secondary (therapy-related). Primary breast angiosarcoma (PAS) typically develops in the mammary parenchyma and may also involve the skin. Although there are no known risk factors for PAS, possible risk factors include trauma and radiation, but there are no definitive data to support this claim [6]. Moreover, PAS usually manifests as a rapidly growing painless lump that mainly affects women aged 30–50 years of age and is more likely to

have local recurrence and distant metastasis, resulting in a poor prognosis [7, 8]. Secondary breast angiosarcoma (SAS) usually arises from cutaneous tissue and gradually invades the breast parenchyma. SAS has two possible causes: previous radiation therapy for breast cancer and chronic lymphedema after axillary lymphadenectomy (Stewart-Treves syndrome). Most cases of SAS occur in women in their 60s and 70s [9, 10].

Diagnosis of breast angiosarcoma is usually delayed because of its rarity and atypical clinical symptoms [11]. Surgery is the cornerstone of treatment for this disease, although there are some reports on use of chemotherapy, radiotherapy, and neoadjuvant chemotherapy [12]. However, because of its low incidence, there is still no standard evidence-based treatment regimen for breast angiosarcoma. Therefore, the recurrence and mortality rates remain high.

Most of the available literature focuses on SAS, whereas PAS has only been described in the form of case reports. Furthermore, there is limited information on the characteristics of Chinese patients with PAS. Therefore, in this study, we retrospectively investigated the clinicopathological characteristics, treatment methods used, and prognosis in patients with PAS admitted to a single center in China over the past 20 years. The relevant literature was reviewed to determine if there are any clinicopathologic feature, treatment, or prognostic differences between Chinese patients with PAS and their counterparts in other countries.

2. Materials and Methods

The paper and electronic medical records at Tianjin Medical University Cancer Institute and Hospital were searched to identify cases of breast angiosarcoma treated between 2000 and 2019. Patients with no history of radiotherapy or chronic lymphedema were diagnosed as having PAS. Clinical and laboratory data were collected. Specific clinical data, including sex, age at diagnosis, history of breast disease, clinical characteristics (tumor size, side, texture, skin color, and boundary), auxiliary examinations, final diagnosis, pathological grade, immunohistochemical index, axillary lymphatic metastasis, treatment (surgery, chemotherapy, and radiotherapy), and follow-up data, were obtained. Follow-up was conducted by telephone and outpatient review.

3. Results

3.1. Patient Characteristics. Seventeen cases of PAS were identified to have been treated at Tianjin Medical University Cancer Institute and Hospital during the study period. After exclusion of one patient who had metastases to the liver and chest wall on presentation to our hospital for treatment, 16 patients were enrolled.

All patients were female and had a median age of 41 years (range 16–73). Five of the women were younger than 30 years and six were older than 50 years. PAS involved the left breast in 10 patients (62.50%), the right breast in five patients (31.25%), and both breasts in one (6.25%).

Tumor size was defined as the largest dimension recorded on the pathology report. This information was missing for one patient. The median tumor size was 6.1 cm (range 1.3–17.0) in the remaining 15 patients. Six of the patients in our study had breast lumps with color changes (red purple or blue or cyan purple). These masses had some common characteristics, namely, progressive enlargement, pain (in 5/6), an unclear boundary, cystic solid or soft texture (5/6), and a large diameter (mean 10.1 cm [range 6–17]). Patients with these masses were younger, with a median age of 24 years (range 16–36). Three patients also had skin edema and nipple retraction. The remaining nine patients did not have any obvious color changes; common features in this group were a small tumor (mean diameter 3.5 cm [range 1.3–7]) and an older median patient age (51 years [range 18–73]). Notably, one patient who underwent surgery for PAS on the right side had a recurrence 3 months later on the left side; the right-sided tumor was large and purple, while the left-sided tumor was small with no obvious change in color.

Seven patients had received treatment at other facilities before presenting to our hospital. Five of these patients underwent surgery for ipsilateral tumor recurrence, which was lumpectomy in four cases and simple mastectomy in one case. The average time to recurrence was 16.8 months. Biopsies were obtained in the remaining two patients: fine-needle aspiration was performed in one (the pathology was fibroadenoma) and core-needle biopsy (CNB) in the other (the result was angiosarcoma). One patient developed a breast mass at 2 months of gestation and terminated her pregnancy at 4 months because of rapid tumor growth.

Blood type was recorded in 14 patients. Eight patients (50.0%) had type B, four (25.0%) had type A, and two (12.5%) had type AB. Five patients (31.25%) had a family history of malignancy.

3.2. Imaging and Biopsy Findings. Ultrasound records were found for 14 patients, all of which reported masses that were hypoechoic or of mixed echogenicity. The mass was well-circumscribed in 11 of these patients and ill-defined in three. Nine of the masses were diagnosed as fibroadenoma, phyllodes tumor, or hamartoma by ultrasonography. Three tumors were defined as vasogenic or lymphangiogenic neoplasms. Only two cases were considered malignant, with an accuracy rate of 14.29%.

Ten patients had mammographic information available. Mammography showed focally increased asymmetric density in six cases and revealed a mass in four. Skin thickening was seen in three cases. Coarse calcification was detected in only one patient. Only four cases were considered to be malignant, with an accuracy rate of 40%. Twenty percent of the masses were thought to be inflammatory lesions.

Magnetic resonance imaging (MRI) was performed in three cases and suggested a diagnosis of angiosarcoma in two, with an accuracy rate of 66.67% (Figure 1). Four patients underwent core-needle aspiration before surgery; the findings were positive for angiosarcoma in three (75%) of these patients.
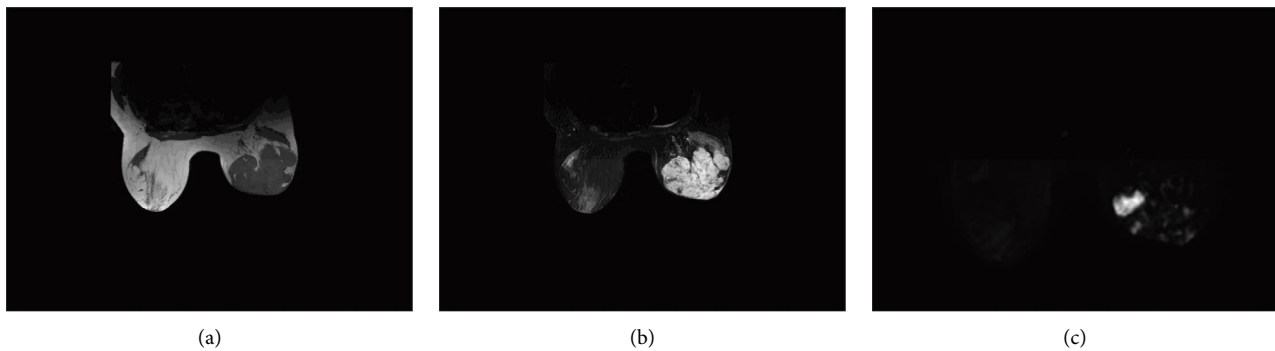
FIGURE 1: Breast MRI of a 19-year-old girl with primary breast angiosarcoma of the right breast. (a) T1-weighted image revealed multiple fused masses with slight hypointense. (b) Hyperintense in fat-suppressed T2-weighted sequence. (c) Diffusion-weighted image demonstrated a high signal.

3.3. Treatment

3.3.1. Surgery. All patients underwent surgery. Two patients had synchronous or metachronous bilateral surgery for angiosarcoma. The most common surgical procedure was modified radical mastectomy ($n = 9$, 56.25%) followed by simple mastectomy ($n = 4$, 25.0%) and tumor resection or wide excision ($n = 3$, 18.75%). Sentinel lymph node biopsy was performed in two patients. Two patients underwent breast reconstruction using either a pedicled latissimus dorsi flap with a breast prosthesis or a transverse rectus abdominus myocutaneous flap.

3.3.2. Pathology. Intraoperative rapid frozen pathology results were available for twelve patients; the tumors in seven of these patients were reported to be vascular or inflammation-related rather than angiosarcoma and were finally confirmed by postoperative paraffin pathology. Fast frozen pathology had an accuracy rate of 58.3%.

The tumors had the appearance of dark purple, gray-red, or brownish masses. Four cases (25.00%) were high grade and nine (56.25%) were moderate grade or low grade; no information on grade was available for three patients.

A good (R0) resection margin was achieved in nine patients (56.25%) and a nonclean (R1) resection margin in four (25.0%). Operation-related data were unknown for three patients (18.75%). Seven of the R0 resection cases underwent modified radical mastectomy, and two underwent simple mastectomy, while two of the R1 resection cases underwent modified radical resection with or without autologous flap reconstruction, one underwent simple mastectomy plus autologous flap reconstruction, and the remaining patient underwent wide resection. The positive margin involved the pectoralis major muscle ($n = 4$), skin ($n = 3$), and axillary soft tissue ($n = 1$). The mean size for tumors with positive margin was 8.2 cm (range 2–11.8).

Immunohistochemistry data were available for nine patients (Figure 2). The tumor cells expressed CD34 ($n = 9$, 100%), CD31 ($n = 8$, 88.89%), factor VIII ($n = 4$, 44.44%), and vimentin ($n = 3$, 33.33%). Information on the Ki-67 index was available for eight cases and was >30% in six. Only two patients had results for estrogen receptor, progesterone receptor, and HER2 status, which was negative in both cases.

Eleven patients underwent axillary or sentinel lymph node dissection. Only one patient had axillary lymph node metastasis, giving a positivity rate of 9.09%.

All the clinicopathological profiles are shown in Table 1.

3.3.3. Adjuvant Therapy. Four patients received a combination of chemotherapy + radiotherapy, and eight received adjuvant chemotherapy. Five patients received triple or quadruple therapy (doxorubicin, ifosfamide, and dacarbazine with or without mesna, i.e., the MAID regimen). Six patients received taxane with gemcitabine or doxorubicin. The chemotherapy regimen for one patient was unknown. Two patients received no adjuvant therapy. No patient received neoadjuvant chemotherapy. All of the treatment-related data are summarized in Table 2.

3.4. Follow-Up

Follow-up information was available for 12 patients. The median follow-up duration was 47 months (range 1–114). Seven of the patients did not develop recurrence or metastasis. The disease-free survival was 7–114 months (Table 3). Two deaths were directly attributed to angiosarcoma. Two patients had ipsilateral or contralateral recurrence in the breast. One patient developed lung and bone metastases one month after surgery. Among the cases with recurrence or metastasis and those that resulted in death, two were histologically high grade and two were intermediate grade. All these patients' clinicopathological findings and follow-up data are listed in Table 3.

4. Discussion

Angiosarcoma of the breast is a rare disease, and the literature on PAS is mostly limited to case reports. Tianjin Medical University Cancer Institute and Hospital is one of the largest cancer centers in China. We reviewed all cases of breast cancer treated at this hospital between 2000 and 2019 and identified only 17 cases of PAS, accounting for less than 0.02% of all malignant breast tumors during this 20-year period. This incidence is lower than in most of the reports in the literature [2, 7, 13].

Breast angiosarcoma has no definite cause. However, loss of p53 function may play a role in its development. Li et al.
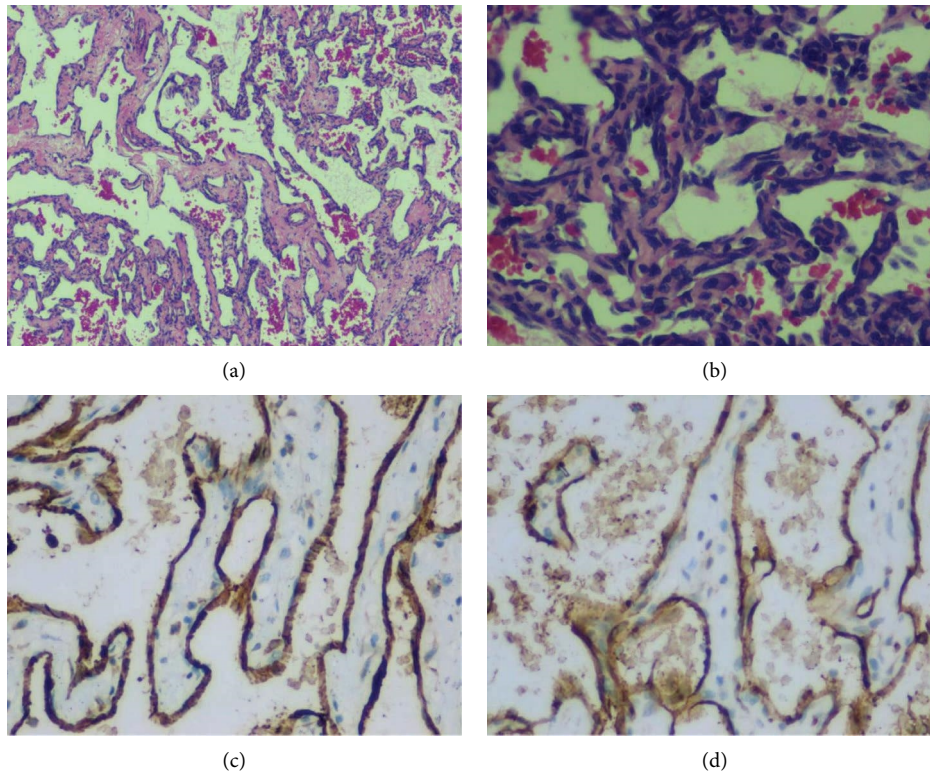
(a)

(b)

(c)

(d)

Figure 2: Histologic examination showed a high-grade primary breast angiosarcoma. (a, b) Multiple irregular vascular channels anastomosed each other with endothelial cells showing nuclear atypia and hyperchromasia (magnification, ×40, ×200). (c) CD31 positive (magnification, ×200). (d) CD34 positive (magnification, ×200).

discovered that restoration of p53 is able to suppress the growth of MDM2-overexpressing angiosarcoma, resulting in tumor stasis and regression in an animal model [14]. Mammalian target of rapamycin (mTOR) may also be involved in the origins of angiosarcoma. Wada et al. reported sensitivity to inhibitors of the PI3K/AKT/mTOR pathway in two cutaneous angiosarcoma cell lines and found that PI3K and mTOR inhibitors could suppress the growth of both cell lines [15].

In our study, the median patient age was 41 years, which is similar to that of the patients in the study reported by Arora, T. K. [1]. Moreover, PAS more often involved the left breast in our patients, as in the study by Kunkiel et al. [16]. However, the prevalence of PAS was higher in the right breast in the studies by Johnson and Garguilo [17, 18].

The masses were found to be large in younger patients around 24 years of age. These masses were typically larger than 6 cm in diameter and usually had a history of significant progressive enlargement accompanied by local pain and skin color changes. Some patients even showed skin edema and nipple retraction. The masses were much smaller in older patients (median age 51 years) at approximately 3.5 cm and did not show any obvious color changes.

PAS does not usually have distinctive characteristics on mammography or ultrasonography. One-third of PAS cases have a completely normal mammographic appearance, with skin thickening, a noncalcified ill-defined mass, or focal asymmetry [12]. On ultrasonography, PAS usually mimics

a benign lesion and may present as a mixed hyperechogenic and well-circumscribed lesion, leading to diagnostic difficulties [19]. These findings are consistent with those in our survey. A diagnosis obtained by MRI may be more accurate than that obtained by mammography or ultrasonography [20, 21]. On MRI, the tumor tends to be hypointense on T1-weighted images and hyperintense on T2-weighted images [22]. On dynamic MRI, high-grade breast angiosarcoma exhibits typical malignant dynamic features with a rapid washout pattern, whereas low-grade tumors show persistent enhancement on delayed images, which can help with differentiation of these masses [23].

Therefore, clinicians should investigate large breast tumors with skin color changes or soft texture in younger patients particularly carefully, even if there is no obvious ultrasonographic or mammographic evidence of malignancy. MRI may play an important role in early diagnosis. Furthermore, CNB could also be recommended according to our findings, which are in line with those of other studies in which CNB could confirm a diagnosis of PAS while fine-needle biopsy had a false-negative rate of approximately 40% [5, 16]. We also found that intraoperative fast frozen pathology had a low accuracy rate. Therefore, we believe that CNB should be performed before surgery to obtain more accurate pathological information for suspicious breast masses, particularly those considered to be angiosarcoma on MRI. To some extent, this could help clinicians make detailed treatment plans and avoid delayed diagnosis or a risk

TABLE 1: Clinicopathological profile of patients with primary angiosarcoma of the breast.

	Total ($n = 16$)	
	n	%
Female	16	100
Age	41 (16–73)	
Side		
Right	5	31.25
Left	10	62.50
Bilateral	1	6.25
Particular clinical symptoms		
Skin color changes	6	37.50
Soft or cystic solid texture	6	37.50
Hard texture	8	50.00
Pain	8	50.00
Nipple retraction and hydroderma	3	18.75
Prior treatment		
Surgery	5	31.25
Needle biopsy	2	12.50
Tumor size(cm)	6.1 (1.3–17)	
Tumor grade		
High	4	25.00
Low to intermediate	9	56.25
Unknown	3	18.75
Ki-67		
≥30	6	37.50
<30	2	12.50
Unknown	10	62.50
Lymph node status		
Positive	1	6.25
Negative	10	62.50
No dissection	5	31.25
Immunohistochemistry		
CD34	9	100
CD31	8	89
Factor-VIII	4	44
Vimentin	3	33
Unknown	7	—

TABLE 2: Treatment data for 16 patients with primary angiosarcoma of the breast.

	Total ($n = 16$)	
	n	%
Type of surgery		
Modified radical mastectomy	9	56.25
Simple mastectomy	4	25.00
Tumor resection	2	12.50
Wide excision	1	6.25
Incisal condition		
R0	9	56.25
R1	4	25.00
Unknown	3	18.75
Axillary lymph node dissection		
ALND	9	56.25
SLNB	2	12.50
No dissection	5	31.25
Adjuvant therapy		
Chemotherapy	8	50.00
Chemotherapy + radiotherapy	4	25.00
Lapatinib	1	6.25
No adjuvant therapy	2	12.50
Unknown	1	6.25

ALND, axillary lymph node dissection; SLNB, sentinel lymph node biopsy.

overall survival between patients who underwent mastectomy and those who underwent breast conservation surgery [28]. Therefore, the best treatment for primary angiosarcoma of the breast is surgery with R0 resection [16, 28, 29]. In our study, all positive margins involved the pectoralis major muscle, suggesting that PAS of the breast not only involves the breast parenchyma but may also invade muscle, and these tumors were usually large in size (mean 8.2 cm [range 2–11.8]). Unfortunately, the follow-up R1 resection data were limited and could not be used to guide the prognosis. Furthermore, two patients with RI resection (the pectoralis major and skin margins were positive) underwent autologous reconstruction. In a study by Gutkin et al., the incidence of autologous reconstruction was 83% and wider margins (≥5 mm) resulted in a low risk of local recurrence [30]. Therefore, a positive margin may increase the risk of recurrence or metastasis, ultimately resulting in failure of reconstruction. Therefore, we are of the opinion that the best reconstruction option for young patients with large PAS may be implantation of a breast prosthesis, which can avoid injury at a donor site if negative margins cannot be guaranteed after surgery. Axillary lymph node dissection (ALND) does not seem to improve the clinical outcome, is unnecessary in the majority of cases, and is only required in patients with large masses invading the axilla [8, 31]. In a review of 280 patients with PAS from ten studies, less than 10% had nodal involvement [32]. Therefore, prophylactic ALND is not recommended, but sentinel lymphadenectomy may be an option.

Immunohistochemistry is important for making a correct diagnosis of PAS [8]. Endothelial expression markers (i.e., CD31, CD34, factor VIII, vimentin, D2-40, and Fli-1) are frequently found to be positive in epithelioid angiosarcoma and are useful for differentiating it from carcinoma

of recurrence because of unclean surgical margins. Another study found that diagnostic performance was higher for 8-G vacuum-assisted breast biopsy than for core biopsy because of better tissue sampling [24]. However, although vacuum-assisted breast biopsy is a reliable and well-tolerated procedure, it may increase the financial burden on patients.

All patients in our study underwent surgery. As far back as 1965, Steingaszner et al. suggested that early and complete surgical excision is the only successful curative treatment for angiosarcoma of the breast [25]. This view is still fully accepted by physicians today. Total mastectomy alone or with axillary node dissection is the preferred surgical treatment [1]. Similar to our findings, modified radical mastectomy and simply mastectomy were the main procedures ($n = 13$, 81.25%) and could help achieve the goal of a negative surgical margin (77.8% vs 75%). However, no patient underwent breast conservation surgery. Some studies have found that the prognosis is similar between patients who undergo breast conservation surgery and those who undergo mastectomy [26, 27]. Furthermore, Abdou et al. found no statistically significant difference in relapse-free survival or

TABLE 3: Clinicopathological findings in 12 patients with follow-up data.

Case No	Age (years)	Side	Color	Texture	Nipple retraction	Hydrod-erma	Tumor size (CM)	Type of surgery	Surgical margin	Tumor grade	Immunohist-Ochemical markers	Lymph node	Adjuvant therapy	Follow-up (months)
1	16	R	Purple	Soft	No	No	11	MRM	R1	II	CD31, CD34, ki-67 30%	0/29	No	7
2	47	R	UK	UK	No	Yes	1.3	MRM	R0	UK	CD34	0/23	Chemo	114
3	57	L	UK	Hard	No	No	2.4	MRM	R0	I	UK	0/23	Chemo	88.3
4	30	L	Red	Soft	Yes	Yes	7	MRM	R0	II-III	UK	0/19	Chemo	54
5	16	L	Red	Cystic	Yes	Yes	8	Mastectomy + SNLB + LDMF	R1	III	CD31, CD34, ki-67 30–60%	0/4	Chemo + Radio	36
6	48	L	UK	Hard	No	No	2.5	MRM	R0	I-II	UK	0/10	Chemo	85
7	16	L	Blue	Hard	No	No	6	MRM	R0	I-II	CD31, CD34, KI-67 70%	UK	Chemo	85
8	31	R	Purple	Cystic	Yes	Yes	17	Mastectomy and skin-grafting	R0	III	CD31, CD34, ki-67 50%	UP	Chemo	3 (contralateral breast relapse)
9	60	L	UK	Hard	No	No	2.4	MRM	R0	I	UK	0/22	No	32 (death)
10	18	R	UK	Cystic	No	No	6	Breast tumor resection	UK	II	CD31, CD34, ki-67 40%	UP	Chemo	6 (ipsilateral breast and lung metastasis)
11	60	L	UK	Hard	No	No	5	Mastectomy + SNLB	UK	III	UK	0/4	Chemo	1 (lung and bone metastasis)
12	54	L	UK	Hard	No	No	7	Mastectomy	R0	II	CD31, CD34, ki-67 < 5%	0/13	Chemo + Radio	44 (death)

L, left; R, right; MRM, modified radical mastectomy; SLNB, sentinel lymph node biopsy; LDMF, latissimus dorsi myocutaneous flap; Chemo, chemotherapy; Radio, radiotherapy; UK, unknown; UP, unperformed.

[33, 34]. CD31 has excellent sensitivity and specificity and is reportedly expressed in 90% of all types of angiosarcoma [35], as in our study. Yan et al. found CD31 to be consistently positive in all their cases [36]. However, CD34 was positive in all our cases, which has not been reported previously. One of our patients was found to have angiosarcoma during pregnancy, but estrogen and progesterone receptor were negative.

In our 16 patients, there was a relationship between tumor grade and the clinical outcome. Median local or distant recurrence-free survival after surgery was 57.6 months in patients with moderate-grade or low-grade tumors and 23.5 months in those with high-grade tumors. These findings are consistent with those of Pandey et al. [37] and Kunkiel et al. [16] but not with those of Nascimento et al. [18], who found no association between tumor grade and the rate of local recurrence, metastasis, or death in their large 49-patient cohort. The Ki-67 index was ≥30% in approximately 37.5% of our cases; however, Ginter et al. found that the Ki-67 index was <1% in all but one case in their survey [38].

Seventy-five percent of our patients were treated with chemotherapy (25% with chemotherapy and radiotherapy). This ratio is higher than in other reports in the literature. However, the available data come from studies with small size samples, and the role and efficacy of adjuvant chemotherapy or radiotherapy are inconclusive for PAS. In some studies, especially those that included tumors with a higher malignancy grade or tumors >5 cm, adjuvant chemotherapy has been shown to be effective in terms of reducing the local recurrence rate and improving relapse-free survival or overall survival [28, 30, 39]. In our survey, most patients' chemotherapy regimens contained anthracycline, a taxane, or gemcitabine. There is also some literature indicating that anthracycline-based or taxane-based chemotherapy regimens seem to improve disease-free survival and overall survival and delay progression of metastatic lesions [40, 41]. Furthermore, Stacchiotti et al. found an overall response rate of 68% in 25 patients with metastatic angiosarcoma treated with gemcitabine alone [42], and Bender et al. demonstrated the effectiveness of gemcitabine in their study [43]. However, most of the available data come from general sarcoma populations rather than specific PAS populations. Adjuvant radiotherapy may improve 5-year overall survival and recurrence-free survival, allowing for better local control [44, 45]. Ghareeb et al. similarly reported that patients with a tumor size >5 cm, which has a higher risk of local recurrence, are more likely to obtain benefit from adjuvant radiation therapy [9]. Antiangiogenic agents like bevacizumab also seem to be effective and well tolerated in patients with metastatic or locally advanced angiosarcoma whether administered alone or in combination with radiotherapy and/or chemotherapy [46]. Other clinical research on molecular disorders, such as PIK3CA-activating mutations, might identify further therapeutic targets [47].

Treatment of PAS still lacks common standards, and the rate of local recurrence is very high. We found that PAS recurred in the operative scar in some patients. Metastases are thought to be primarily hematogenous and most frequently involve bones, lungs, and the liver [16]. It has been reported that approximately 21% of PAS recur in the contralateral breast [48]. Some studies have suggested that tumor size is a prognostic factor, especially when >5 cm [28, 37], which is in line with our finding that the average tumor size for PAS with relapse-free survival longer than 3 years was 2.2 cm. However, there was no difference in survival according to tumor size in the studies by Scow et al. [49] and Rosen et al. [6]. Therefore, as with the degree of tumor differentiation in other studies [44, 50], we could not confirm the prognostic value of tumor size, possibly because of our small sample size.

In this study, we retrospectively analyzed a relatively large group of patients with PAS in China and have provided a detailed description of their clinical characteristics and the treatments they received. We hope that our findings will prompt multicenter prospective randomized controlled trials that can overcome the inherent limitations associated with the low incidence of this diagnosis.

5. Conclusion

The incidence of PAS is extremely low. Young patients' tumor may have large size and soft texture combined with changes in skin color. Because of its poor prognosis, early diagnosis is crucial. But mammography or ultrasonography does not usually show distinctive characteristics, and MRI and CNB should be performed before surgery to obtain a more accurate understanding of the pathology. The surgeon should be aware of the possibility of a positive margin involving the pectoralis major muscle, so breast prosthesis may be a better option for reconstruction. Prophylactic ALND is not recommended, and sentinel lymphadenectomy may be an option. The most difficult problem encountered in the treatment of PAS continues to be the absence of common standards. Adjuvant chemotherapy and/or radiotherapy should be considered for large tumors that have a high Ki-67 index or those that are high grade.

Data Availability

The data that support the findings of this study are available upon request from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Ming Li and Xin Wang contributed equally to this work.

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