

Management of Phyllodes Tumor of the Breast: A Single Centre Experience

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ABSTRACT

Background: Phyllodes tumors (PT) are rare fibroepithelial neoplasms of the breast that represent 0.3% to 1% of all primary breast tumors and may occur in benign, borderline or malignant forms.

Objectives: To describe the clinical characteristics, surgical management, and outcomes of PT treated at a tertiary center in Oman.

Materials and methods: A retrospective review of all PT cases managed between 2011 and 2024 at the Breast Program of Sultan Qaboos Comprehensive Cancer Care and Research Centre/University Medical City was conducted. Demographic, pathological, surgical, adjuvant treatment, and outcome data were analyzed.

Results: Seventeen Omani women were identified. Histological subtypes included malignant in 9 patients (52.9%), borderline in 6 (35.2%), and benign in 2 (11.7%). Breast-conserving surgery was performed in 13 patients (76.4%); 9 required re-excision for margin clearance, and 1 declined further surgery. Axillary staging was performed in 8 patients (47.1%) due to clinically suspicious nodes, with no pathological involvement detected. Adjuvant radiotherapy was administered to 3 patients (17.6%) with malignant PT. During a mean follow-up of 5.4 years (range 1-13 years), local recurrence occurred in 2 patients (11.7%) and distant metastases in 4 patients (23.5%).

Conclusion: PT in this cohort frequently required margin re-excision, highlighting the importance of maintaining a high index of suspicion, integrating oncoplastic surgical techniques, and adopting a multidisciplinary management approach. Selective axillary assessment based on preoperative evaluation and multidisciplinary discussion may help minimize unnecessary axillary surgery.

Keywords: Phyllodes tumor; Breast; Management.

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INTRODUCTION

Phyllodes tumors (PT) are rare fibroepithelial neoplasms of the breast that represent 0.3% to 1% of all primary breast tumors and 2% to 3% of fibroepithelial tumors [1, 2].

The 2019 World Health Organization (WHO) classification of breast tumors classifies PT as benign, borderline, and malignant according to five morphological parameters: stromal atypia, stromal cellularity, stromal overgrowth, mitotic count, and tumor borders [3].

There appears to be a difference in the incidence among ethnic groups, being greater in Asians and Latina whites [4]. These tumors affect women between the ages of 30 and 55 years (median age, 45 years), but there are a few cases at extremes of age [5]. They differ histologically from the other fibroepithelial tumors-fibroadenomas- by stromal cellularity and atypia, and clinically by having the potential for local recurrence and general metastatic dissemination. It is estimated that between 10% -40% of PTs are malignant, and these can metastasize in approximately 22% of cases and have a local recurrence rate of around 30% [6].

Surgery remains the mainstay of treatment, and where the tumor size to the breast size ratio is optimum, wide local excision with the intention of obtaining margins of >1 cm. Narrow margins are associated with increased risk of local recurrence; however, they are not an absolute indication for mastectomy when partial mastectomy fails to achieve a margin width of ≥ 1 cm [7].

In view of the hematogenous route of spread, resembling that of other sarcoma, the axillary lymph nodes are rarely involved, and hence dissection is not routinely recommended [8]. There is an ongoing debate about the role of adjuvant chemotherapy and radiotherapy in malignant PT, as there is a lack of large prospective trials, given the rarity of this neoplasm [8].

Controversy also exists as to which biological markers are of diagnostic and prognostic value, such as Ki67 (MIB-1), P53, ER/PR receptors, HER2/Neu (ERBB 2), EGFR, c-Kit (CD117), and c-myc [9].

Local recurrences can occur in all cases of PT with an overall rate of 21%, within a range of 10%-17% for benign, 14%-25% for borderline, and 23%-30% for malignant cases, according to the fifth edition of the WHO classification [3]. Distant recurrences are rarer and occur in borderline and malignant PT [10].

Few studies have addressed the management of PT in the Middle East and the region, with available reports largely originating from Kuwait, Saudi Arabia, the UAE, Lebanon, and Egypt [1, 11–14]. Variability in surgical approach, optimal margin width, the need for re-excision to achieve adequate margins, and the indications for adjuvant therapy remain key gaps in the existing regional literature. This study represents the first analysis of PT in Oman and aims to describe the clinicopathologic characteristics, management strategies, and clinical outcomes of PT in the Omani population.

MATERIALS AND METHODS

A retrospective review was conducted of all patients diagnosed with PT and treated at the Breast Program of Sul-

tan Qaboos Comprehensive Cancer Care and Research Centre (SQCCRC), University Medical City (UMC), between 2011 and 2024. Patients diagnosed or treated outside our center for whom no clinical records were available were not included. Histological confirmation was obtained for all cases. Data were collected from the hospital's Electronic Patient Records (EPR) and pathology laboratory database, including information on age, sex, menopausal status, method of presentation (new patient or referred patient), type of primary surgery, postoperative histology (including tumour grade and lymph node status if applicable), need for further surgery, type of further surgery, and requirement for adjuvant treatment (chemotherapy and radiotherapy). Follow-up data included the incidence of local recurrence or metastatic disease, the site of recurrence, treatment administered for recurrent disease, and the outcome.

Surgical treatment was determined from the operation notes; wide excision was defined by the recorded intention to obtain 1 cm clearance of the lesion, while lumpectomy involves excision of the tumor with a limited rim surrounding normal breast tissue. The definite diagnoses of recurrence were based on the pathologic report from resected specimens/biopsy (local or distant recurrent lesion). All specimens were reassessed for diagnosis, defined by the WHO criteria for the classification of breasts in 2019 [3].

The study was approved by the Institutional Review Board and Ethics Committee (ID SQCCRC-IRB&EC-2025-24-1), and individual consent for this retrospective analysis was waived.

RESULTS

Seventeen female patients were identified, most of whom were premenopausal and younger than 50 years at diagnosis. Malignant PTs were the most frequent subtype (52.9%), followed by borderline and benign lesions. Nearly half of the patients underwent their initial surgical procedure at another institution prior to referral. Breast-conserving surgery (BCS) was performed in most cases (76.4%), with mastectomy reserved for selected patients requiring more extensive resection. Immediate implant-based reconstruction was performed in two mastectomy patients. Axillary staging was performed selectively in 47.1% of cases based on clinical suspicion of nodal involvement; however, no nodal metastases were observed. Inadequate margins at initial excision were noted in 58.8% of patients, necessitating additional surgery in most cases. Adjuvant radiotherapy was administered to 3 patients (17.6%) with malignant disease. Systemic chemotherapy was used only in patients with metastatic malignant PTs (Table 1).

During follow-up, both local and distant recurrences were observed. Local recurrence occurred in 2 patients (12%) and was managed surgically. Distant metastatic disease occurred in 24% of patients with borderline and malignant subtypes and was associated with poor outcomes (Table 2).

DISCUSSION

PTs are rare fibroepithelial neoplasms of the breast, accounting for 0.3% to 1% of all primary breast tumors and 2% to 3% of fibroepithelial tumors [1, 2]. In our cohort study of 17 Omani female patients with PTs, 2 (11.7%) were benign, 6 (35.2%) were borderline, and 9 (52.9%) were malignant. This distribution differs from the typical observed proportions, where benign PTs are most common, followed by

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Table 1. Demographic, clinical, pathological, operative, and follow-up characteristics of patients with benign, borderline, and malignant Phyllodes tumors (PTs).*

Variable	Overall	PTs		
		Benign (No= 2)	Borderline (No= 6)	Malignant (No=9)
Age per years				
Mean Age	36.6	33.5	46	31
Range	21-53	24-43	32-53	21-44
Menopausal status				
Pre- menopausal, n (%)	16 (94.1)	2 (100)	5 (83.3)	9 (100)
Post- menopausal, n (%)	1 (5.8)	0	1 (16.6)	0
Laterality				
Right, n (%)	8 (47)	0	3 (50)	5 (55.5)
Left, n (%)	9 (52.9)	2 (100)	3 (50)	4 (44.4)
Way of Presentation				
Referred, n (%)	7 (41.1)	0	2 (33.3)	5 (55.5)
New patient, n (%)	10 (58.8)	2 (100)	4 (66.6)	4 (44.4)
Type of Initial surgery				
BCS: Lumpectomy, n (%)	4 (23.5)	0	1 (16.6) close margin	3 (33.3) close margin
BCS: WLE, n (%)	9 (52.9)	2 (100) 1 close margin	5 (83.3) 3 with close margin	2 (22.2) close margin
Mastectomy, n (%)	4 (23.5)	0	0	4 (44.4)
Type of Further surgery				
Wider Excision, n (%)	6 (35.2)	0	3 (50)	3 (33.3)
Mastectomy, n (%)	3 (17.6)	0	1 (16.6)	2 (22.2)
Type of axillary staging				
Not done, n (%)	5 (29.4)	2	0	3 (33.3)
SLNB, n (%)	6 (35.2)	0	1 (16.6)	5 (55.5)
ALNC, n (%)	2 (11.7)	0	1 (16.6)	1 (11.1)
Adjuvant Radiotherapy				
Yes, n (%)	3 (17.6)	0	0	3 (33.3)
No, n (%)	14 (82.3)	2 (100)	6 (100)	6 (66.6)
Outcomes				
Local recurrence, n (%)	2 (11.7)	1 (50)	0	1 (11.1)
Metastasis, n (%)	4 (23.5)	0	1 (16.6)	3 (33.3)
Follow-up period per years	1-13	1-13	1-13	1-13

* BCS: Breast conserving surgery, WLE: Wide local excision, SLNB: Sentinel lymph node biopsy, ALNC: Axillary lymph node clearance.

borderline and malignant PTs (60-75%, 15-20%, and 10-20%, respectively) [15]. This discrepancy may be because patients diagnosed with benign PTs in Oman often receive treatment in general hospitals without referral to specialized centers, potentially leading to a lower incidence of benign cases captured in our cohort. It is also possible that our patient population exhibits a different distribution of tumor subtypes compared to reports from regional and other geographic areas [11, 12].

The mean age of presentation in our cohort is 37 years, and it varies depending on the grade of tumor, while benign and malignant PTs tend to present at a younger age group (mean age group of 33.5 years and 31 years, respectively), the borderline PT presents later at a mean age of 46 years. Our findings is comparable to those reported amongst Asian patients. While in Western countries, it tends to be present in the elderly age group [15]. This finding may reflect stromal and hormonal factors associated with aging, as well as screening practices that identify PTs more frequently in perimenopausal women. The prevalence of PTs in the right and left breasts in our patients is comparatively similar, which is consistent with other study [16].

The wide local excision (WLE) is generally the suggested treatment for PTs, which entails removing the tumour with

at least a 1 cm margin of healthy tissue [8]. While this approach is for PTs, patients with large malignant tumours or a high tumour-to-breast tissue ratio may require a mastectomy [17]. Studies have indicated that for benign PTs with positive margins, additional excision is not recommended due to the low risk of recurrence [18]. A meta-analysis of 45 studies found that a positive margin is predictive of local recurrence in malignant PTs but not in benign or borderline tumours [19]. The National Comprehensive Cancer Network (NCCN) guidelines advise maintaining a margin of ≥ 1 cm in borderline and malignant PTs, as narrower margins increase the risk of local recurrence. However, failure to achieve a ≥ 1 cm margin with breast-conserving surgery does not necessarily indicate the need for mastectomy [7].

In the current study, the most performed primary surgery was breast-conserving surgeries, in the form of either lumpectomy or WLE, in 13 patients, which is aligned with other studies [12, 20]. Of those 13 patients who underwent breast conserving surgery, 9 patients required additional surgery to achieve clear margins in the form of further excision to clear margins in 6 patients, while 3 patients underwent completion mastectomy. To minimize the need for further surgery, a high index of suspicion of malignant PTs is crucial, based on the

Table 2. Details of the recurrent disease, its management, and outcome of the benign, borderline, and malignant phyllodes tumors (PTs).*

Case	Initial Grade	Age (yrs)	Initial Surgery	Recurrence			Pathology at Recurrence	Treatment	Outcome
				Interval	Pattern	Site			
1	Benign	24	WLE	1 year	Local	Breast	Benign PT	WLE	Disease-free at 1 year
2	Borderline	41	WLE + SLNB	7 years	Distant	Spine (Cauda Equina Syndrome), muscle, sacrum	High-grade sarcoma	Palliative RT, 35 Gy in 10 fractions + 1 cycle doxorubicin	Died after 3 months
3	Malignant	28	Lumpectomy (close margin); Declined further surgery	<1 year	Local	Breast	Malignant PT with sarcomatous change (16 cm)	Completion mastectomy + SLNB + RT	Died (external hospital)
4	Malignant	21	Mastectomy + ALNC + RT	7 years	Distant	Lung, left atrium	Metastatic pleomorphic sarcoma	Pseudo-neoadjuvant chemo + lung lobectomy & partial resection of left atrium	Alive
5	Malignant	32	Mastectomy + reconstruction	2 years	Distant	Lung, pleura, femur, fibula	Metastatic malignant PT	Palliative chemo: 1 st Line: Ifosfamide and Doxorubicin; 2 nd Line: Docetaxel/ Gemcitabine	Died after 3 months

* PT: Phyllodes tumor, WLE: Wide local excision, SLNB: Sentinel lymph node biopsy, RT: Radiotherapy, ALNC: Axillary lymph node clearance.

history of a rapidly growing lesion. The association between tumor size and malignancy is controversial [21]. In addition, we advocate planning oncoplastic surgery to ensure adequate margins without compromising the aesthetic outcome [22].

Although axillary staging is not generally included in the standard surgical management of PT, since hematogenous spread is the main mode of metastasis and lymph node involvement is extremely rare, there is some data on its use [7]. A study by Gullett and colleagues reported that among 1,035 PT cases, 9.0% of patients underwent axillary sampling of 10 or more lymph nodes. Only nine patients (3.4%) had positive lymph nodes [5]. In another study of 1,238 patients, Adesoye et al. reported that one in four patients had axillary sampling with a low rate of positive nodes (0.1% and 2.1% after BCS and mastectomy, respectively) [23]. While a study from Kuwait reported axillary surgery in 26% of their cohort with no nodal metastasis [11].

At our centre, triple assessment is routinely performed for both the breast and axilla, with axillary staging offered to patients with malignant or borderline PTs when lymph node involvement is suspected or confirmed. None of the patients in our cohort had preoperative confirmation of axillary nodal metastasis. Despite this, axillary surgery was performed in 8 patients, including seven axillary samplings and one axillary lymph node clearance. The decision to proceed was based on pre- or intra-operative identification of clinically suspicious lymph nodes despite a negative preoperative assessment.

A previous study reported that 10-15% of patients may present with clinical lymphadenopathy due to reactive hyperplasia associated with tumour necrosis or infection rather than metastatic disease [24], which may explain the findings in our cohort. All our patients were counselled preoperatively regarding surgical management, including the limited role of axillary surgery and the rarity of lymph node involvement in PT. Nevertheless, eight patients opted to undergo axillary surgery if lymph nodes appeared suspicious pre- or intra-operatively, accounting for the relatively high rate of axillary procedures; however, none demonstrated histopathological nodal involvement. Our practice has evolved to rely on preoperative axillary assessment and to omit axillary surgery when triple assessment demonstrates no lymph node involvement. Multidisciplinary team discussion remains essential to identify the small subset of patients who may still require axillary intervention despite negative preoperative findings.

There is no definitive consensus on the role of radiotherapy and chemotherapy in treating PTs [14]. While some studies advocate for adjuvant radiation in malignant PT to improve local control, particularly in patients who undergo BCS, the evidence for its use after total mastectomy is less compelling [25, 26]. One study indicated that patients with high-risk features, such as large tumor size, close or positive surgical margins, hypercellular stroma, high nuclear pleomorphism, elevated mitotic rate, necrosis, increased tumor vascularity, and recurrence, might benefit from adjuvant radiotherapy, though

its use remains controversial [27]. As a result, the decision to recommend adjuvant radiotherapy in borderline and malignant PT should be considered on a case-by-case basis [14].

In our study, 3 out of 9 patients with malignant PTs received adjuvant radiotherapy, all following mastectomy, with one patient receiving it after excision of recurrent disease without prior radiotherapy.

In our practice, adjuvant radiotherapy is selectively considered for malignant PTs with close or positive margins (<1 cm) when re-excision is not feasible, regardless of surgical approach, while we do not offer adjuvant radiotherapy to patients with borderline PT due to their limited representation in radiation studies [26]. This prioritization of margin clearance during excision of malignant PT accounts for the high re-excision rate in our cohort. Radiotherapy is also considered for recurrent disease, large tumors, or chest wall involvement, in accordance with NCCN and UK sarcoma-based recommendations [7, 28].

No randomized trials have defined the role of systemic therapy in malignant PTs; existing data are confined to small case series and reports, which often highlight favorable outcomes [14, 18]. Endocrine therapy is ineffective in malignant PTs despite the presence of estrogen receptors in the epithelial components of the tumor. This is likely because the stromal components, which are believed to drive the tumor's malignant behavior, do not express these receptors [29]. Furthermore, there is no clear evidence supporting the use of adjuvant chemotherapy, and some studies advocate the use of adjuvant chemotherapy for soft tissue sarcomas, typically using doxorubicin and ifosfamide, for patients with malignant PTs after consultation with a sarcoma center [18].

During the mean follow-up period of 5.4 years (minimum 1 year- maximum 13 years), the local recurrence rate in our study group was 2 out of 17 patients. In contrast, other studies reported an overall local recurrence rate of 14-21%, with varying recurrence rates based on tumour grade [7].

In our cohort, the local recurrence occurred within one year of diagnosis, in contrast to other studies which report an average time to recurrence after treatment completion of approximately 13.8 months [17].

Our overall distant recurrence rate was seen in 4 patients, involving three patients with initial malignant PT and one with borderline PT, all of whom developed distant metastatic malignant PT. The time to recurrence ranged from 2 to 7 years. Our result is not far from other studies, which showed that the overall distant metastatic rate ranges from 2.7-27.1% with an average of 5.6% [25]. In their overview, Koh et al. noted that the likelihood of distant metastasis increases with higher tumor grade [24]. However, we cannot derive this conclusion due to the small number in our cohort. The treatment of these patients and their outcomes were discussed earlier. The present study is the first to address PTs in Oman, though it has several limitations. It is a single-center, retrospective study with a relatively small sample size, reflecting the rarity of this disease within the Omani population. Moreover, patients with borderline and malignant PTs are preferentially referred to our tertiary center, whereas benign cases are commonly managed in local general hospitals. This referral pattern likely contributed to both the limited cohort size and the higher proportion of malignant tumors observed compared with benign cases. Furthermore, as nearly half of the patients in our cohort underwent their initial investigations and surg-

eries outside our center, we were unable to evaluate certain variables such as the relationship between initial tumor size and histopathology, or the concordance between preoperative imaging/biopsy and final histopathological results.

CONCLUSION

This study is the first to investigate PTs in Oman and provides valuable insights into the presentation and management of these rare breast tumors. In this cohort, PTs frequently required margin re-excision, underscoring the importance of maintaining a high index of suspicion, integrating oncoplastic surgical techniques, and adopting a multidisciplinary management approach. Selective axillary assessment based on preoperative evaluation and multidisciplinary discussion may help minimize unnecessary axillary surgery. Further research, especially larger prospective studies including all tertiary and general hospitals, is crucial to better understand the incidence and optimal management of PTs in Oman. Moreover, exploring the role of adjuvant therapies in high-risk cases could improve patient outcomes.

ETHICAL DECLARATIONS

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Ethics Approval and Consent to Participate

This study was reviewed and approved by the Institutional Review Board and Ethics Committee at Sultan Qaboos Comprehensive Cancer Care and Research Centre/University Medical City (ID SQCCRC-IRB&EC-2025-24-1), and individual consent for this retrospective analysis was waived.

Consent for Publication

Not applicable as there is no need for participants' photos or personal information.

Availability of Data and Material

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request, subject to ethical approval and data sharing agreements.

Competing Interests

The authors declare that there is no conflict of interest.

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Use of Artificial Intelligence

The authors used artificial intelligence for minor language editing; all scientific content and interpretation were done by the author.

Authors' Contributions

All authors were responsible for conceptualization, design, and manuscript writing. All authors read and approved the final version of the manuscript.

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