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Two lives, one battle: Confronting postpartum breast cancer

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ABSTRACT

Objective: To evaluate the clinical presentation, diagnostic challenges, management strategies, and outcomes of patients with Pregnancy-Associated Breast Cancer (PABC) treated at the Institute of Reproductive Medicine and Women's Health, Madras Medical Mission, Chennai.

Materials and Methods: This retrospective case series included six patients diagnosed with PABC between January 2022 and December 2024. All patients presented during the lactation period. Demographic details, clinicalpresentation, imaging findings, histopathology, treatment modalities, and outcomes were analyzed. Diagnostic evaluation included ultrasound as the initial modality, followed by mammography or MRI when indicated. Management was individualized based on disease stage and patient status, with multidisciplinary input from surgical, medical, and radiation oncology teams.

Results: All six patients presented with palpable breast lumps, most initially mistaken for benign lactational changes, leading to diagnostic delay. Core-needle biopsy confirmed invasive carcinoma in all cases. Five patients had hormone receptor-positive disease, and one had triple-negative breast cancer. Treatment included modified radical mastectomy, chemotherapy, and hormonal therapy as appropriate. One patient succumbed to sepsis post-treatment, while the remaining five achieved disease control, with one patient continuing therapy. Advanced-stage presentation was a consistent finding, reflecting the diagnostic challenges in lactating women.

Conclusion: Pregnancy-associated breast cancer remains a diagnostic and therapeutic challenge due to overlapping physiological breast changes. Early clinical evaluation, heightened awareness among healthcare providers, and trimester-specific multidisciplinary management are vital to improving outcomes and survival in affected women.

KEY WORDS

Pregnancy-associated breast cancer; Lactation; Diagnostic delay; Multidisciplinary management; Maternal outcomes; Madras medical mission

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Introduction

Breast cancer is the most common malignancy affecting women worldwide and remains a major contributor to female cancer-related morbidity and mortality. In recent decades, a gradual shift in the age of first conception toward the third and fourth decades of life has coincided with an increase in the incidence of breast cancer diagnosed during or shortly after pregnancy [1].Pregnancy-Associated Breast Cancer (PABC) is defined as breast cancer diagnosed during pregnancy or within 12 months postpartum [2]. Although historically considered rare, its incidence has risen from approximately 16 per 100,000 pregnancies in the 1960s to nearly 50 per 100,000 in recent estimates, reflecting both rising maternal age and improved diagnostic awareness. PABC is now recognized as the most common malignancy associated with pregnancy and the leading cause of cancer-related death in pregnant and lactating women [2].

The physiological changes that accompany pregnancy and lactation present a diagnostic challenge in this context. The breast undergoes marked vascular, hormonal, and structural alterations such as lobuloalveolar proliferation, increased glandular density, and engorgement which can obscure the presence of underlying malignancy. Clinically, this often manifests as a delay in recognition, since palpable masses are frequently attributed to benign conditions such as galactoceles, fibroadenomas, or lactational adenomas [3]. Imaging interpretation is also more complex during pregnancy due to increased tissue density and concerns about fetal radiation exposure, while clinicians may hesitate to proceed with invasive diagnostic procedures. Consequently, a significant proportion of patients present with locally advanced disease or nodal involvement, which adversely impacts prognosis [4].

The delayed diagnosis of PABC is a well-documented phenomenon with important prognostic implications. Studies have shown that even a one-month delay in diagnosis may increase the likelihood of axillary nodal involvement by up to 1.8% [5]. Additionally, hormonal and immunological changes in pregnancy, particularly elevated levels of estrogen, progesterone, and prolactin, may accelerate tumor growth and contribute to more aggressive tumor biology. Many PABCs display unfavorable characteristics such as higher histologic grade, hormone receptor negativity, and overexpression of HER2/neu, although this pattern varies among populations [6]. Despite these challenges, several studies suggest that when stage-matched, the overall survival of PABC is comparable to that of non-pregnancy-associated breast cancers, underscoring the importance of early detection and appropriate management [7].

The management of PABC requires a nuanced, multidisciplinary approach that balances optimal maternal therapy with fetal safety. Diagnostic imaging should begin with

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ultrasonography, which is safe, widely available, and highly sensitive for differentiating cystic from solid lesions [8]. Mammography, though less sensitive during lactation, can be performed with abdominal shielding and minimal fetal radiation exposure. Magnetic resonance imaging (MRI) may be considered in selected cases, particularly postpartum, to assess disease extent [8]. Core-needle biopsy remains the gold standard for histopathological confirmation and receptor status evaluation. Treatment strategies depend on gestational age, disease stage, and patient preference. Surgery, typically a modified radical mastectomy, is considered safe in all trimesters, whereas chemotherapy Is generally deferred until after the first trimester [9]. Radiation therapy, endocrine therapy, and targeted biological agents are postponed until after delivery. In the postpartum setting, lactation should be discontinued prior to systemic therapy initiation to prevent drug excretion in breast milk [9].

From a psychosocial perspective, a diagnosis of breast cancer during pregnancy or lactation has profound emotional and ethical implications. Patients face the dual challenge of confronting a life- threatening illness while navigating concerns about fetal health and maternal identity. Multidisciplinary counselling encompassing oncology, obstetrics, neonatology, and psychology is essential to support shared decision-making and to optimize both maternal and fetal outcomes [10]. Culturally, in countries like India, where breastfeeding is deeply valued and motherhood often delayed for educational or social reasons, awareness of PABC among both patients and clinicians remains limited [11]. Consequently, breast symptoms during pregnancy are frequently trivialized, and evaluation is delayed, contributing to poorer prognoses.

In India, the reported incidence of Pregnancy associated breast cancer is lower than in Western populations, but this likely reflects underdiagnosis and underreporting. Most Indian studies describe presentation at locally advanced stages, with median diagnosis occurring in the postpartum period. Contributory factors include limited breast screening during antenatal visits, sociocultural hesitation to undergo breast examination, and lack of awareness regarding the possibility of malignancy during lactation [12]. Institutional experience from tertiary care centers, such as the Madras Medical Mission, provides valuable insight into the clinical spectrum, diagnostic approach, and management outcomes of PABC in the Indian context.

This case series describes six patients diagnosed with pregnancy-associated breast cancer who presented to the Institute of Reproductive Medicine and Women's Health, Madras Medical Mission, between January 2022 and December 2024. All six women presented during lactation, reflecting the postpartum predominance observed in global literature. Through detailed analysis of their presentation, diagnostic workup, therapeutic interventions, and outcomes, this report aims to highlight the diagnostic challenges, management considerations, and prognostic implications of PABC in a tertiary Indian setting. The series underscores the need for heightened clinical vigilance, patient education, and incorporation of routine breast examination into antenatal and postnatal care [13]. By sharing this institutional experience, we hope to contribute to growing awareness and improved early detection of PABC, reinforcing the message Awareness Today, Survival Tomorrow.

Case 1

A 31-year-old primiparous woman, six months postpartum, presented with a progressive left breast lump of three months' duration, initially managed as galactocele. Examination revealed a 6 × 5 cm hard, irregular mass with skin tethering and mobile axillary lymph nodes. Ultrasound showed a hypoechoic, irregular lesion (BIRADS 5), and core-needle biopsy confirmed invasive ductal carcinoma, grade III, ER/PR negative, HER2 positive. Staging MRI revealed locally advanced disease without distant metastasis. The patient underwent modified radical mastectomy followed by adjuvant chemotherapy with docetaxel, carboplatin, and trastuzumab. Despite initial clinical improvement, she developed neutropenic sepsis during her fifth chemotherapy cycle and succumbed to septic shock. This case highlights the challenges of delayed diagnosis during lactation and the aggressive biological behavior often seen in HER2-positive postpartum breast cancer.

Case 2

A 34-year-old multiparous woman presented nine months postpartum with a right breast lump and axillary fullness. The lump was firm, non-tender, and measured 4 cm. Ultrasound demonstrated an irregular solid lesion, and biopsy confirmed invasive ductal carcinoma, grade II, ER/PR positive, HER2 negative. PET-CT revealed stage IIA disease. She underwent modified radical mastectomy followed by adjuvant FEC-T chemotherapy and hormonal therapy with tamoxifen. She tolerated treatment well, with no complications, and continues to remain disease-free 18 months post-treatment. The patient's favorable prognosis underscores the benefit of early postpartum detection and prompt multidisciplinary intervention in hormone receptor–positive subtypes of pregnancy-associated breast cancer.

Case 3

A 29-year-old lactating woman, five months postpartum, presented with a painful right breast lump initially treated as mastitis. Persistence of the mass after antibiotics led to further evaluation. Ultrasound revealed a 5 cm irregular lesion with multiple axillary nodes, and core biopsy showed triple-negative invasive ductal carcinoma, grade III. Staging MRI demonstrated locally advanced disease (stage IIIB). The patient received neoadjuvant dose-dense AC-T chemotherapy, achieving partial response, followed by modified radical mastectomy and adjuvant radiotherapy. She remains under regular follow-up and is disease-free at 14 months. This case emphasizes that persistent mastitis unresponsive to antibiotics during lactation should prompt malignancy evaluation, especially since triple-negative subtypes tend to be aggressive and fast-growing in the postpartum setting.

Case 4

A 36-year-old multiparous woman presented seven months postpartum with a lump in the left breast and nipple retraction. Ultrasound revealed a 3.5 cm irregular hypoechoic mass, and biopsy confirmed invasive ductal carcinoma, ER/PR positive, HER2 negative. Clinical staging showed stage IIB disease without metastasis. She underwent modified radical mastectomy followed by adjuvant chemotherapy and was started on endocrine therapy with tamoxifen. Breastfeeding was discontinued prior to initiation of systemic treatment. She remains asymptomatic and disease-free at 16 months follow-up. This case underlines the importance of considering malignancy in any new breast mass during lactation, as early evaluation and hormonal receptor positivity can significantly improve prognosis and survival.

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Case 5

A 32-year-old woman, ten months postpartum, presented with a progressively enlarging lump in the upper outer quadrant of the right breast. Imaging showed a suspicious 4 cm lesion with associated axillary lymphadenopathy. Core biopsy confirmed invasive ductal carcinoma, luminal B subtype (ER/PR positive, HER2 equivocal). She underwent modified radical mastectomy followed by anthracycline- and taxane-based adjuvant chemotherapy, and was started on hormonal therapy. She tolerated treatment well and remains in remission at 12 months follow-up. The case illustrates the postpartum predominance of pregnancy-associated breast cancer and highlights the excellent outcomes achievable with early detection and stage-appropriate multimodal therapy in hormone-responsive disease.

Case 6

A 27-year-old primiparous woman, five months postpartum, presented with a rapidly enlarging left breast swelling and skin erythema. Clinical examination revealed peau d'orange and fixed axillary nodes. Ultrasonography showed a 6 cm irregular mass, and biopsy confirmed inflammatory breast carcinoma, ER/PR negative, HER2 positive. MRI demonstrated extensive local disease without metastasis. The patient received neoadjuvant trastuzumab-based chemotherapy, followed by modified radical mastectomy. She is currently undergoing adjuvant radiotherapy and shows good interim response. This case reflects the aggressive presentation of HER2-positive inflammatory carcinoma in the postpartum period and highlights the role of early multidisciplinary management for optimizing maternal outcomes.

Discussion

Pregnancy-Associated Breast Cancer (PABC) represents one of the most complex intersections between oncology and reproductive medicine. It is classically defined as breast cancer diagnosed during pregnancy or within twelve months postpartum. Although once considered rare, its incidence has risen in parallel with the global trend of delayed childbearing. From 16 per 100,000 pregnancies reported in the 1960s, recent estimates approach 50 per 100,000, reflecting not only demographic change but also heightened diagnostic awareness [1]. In our institution, six patients were diagnosed and treated for PABC between January 2022 and December 2024, providing a valuable perspective on clinical characteristics, diagnostic barriers, and therapeutic outcomes in an Indian tertiary-care setting.

Epidemiology and timing of presentation

The majority of reported cases of PABC occur in the postpartum or lactational period rather than during gestation. This pattern is mirrored in our series, where all six women presented while breastfeeding. Similar findings have been documented by Bajpai in their registry from the Tata Memorial Hospital, where 84% of cases were postpartum [13,14]. The physiologic engorgement, ductal proliferation, and glandular hypertrophy characteristic of lactation obscure underlying malignancies and delay clinical suspicion [15]. Moreover, in Indian culture, reluctance to undergo breast examination during pregnancy and the assumption that postpartum lumps are benign frequently postpone diagnosis.

Population-based data from Sullivan and others confirm that breast cancer diagnosed within five years postpartum carries a poorer prognosis than breast cancer diagnosed in nulliparous or never-pregnant women of similar age. This difference appears partly due to diagnostic delay but also to unique biological features of the postpartum breast [16,17].

Biological basis and tumor characteristics

Pregnancy induces profound endocrine and immunologic shifts that influence tumor biology. High circulating levels of estrogen, progesterone, and prolactin stimulate proliferation of mammary epithelial cells, while pregnancy-associated immunomodulation allows partial immune evasion. After delivery, the process of postpartum involution involves extensive epithelial apoptosis, stromal remodeling, and inflammatory cell infiltration, creating a microenvironment rich in matrix metalloproteinases and growth factors [18]. Animal models demonstrate that this "wound-healing-like" milieu can promote tumor invasion and metastasis.

Clinically, many PABCs exhibit adverse biological features higher histologic grade, increased lymphovascular invasion, and predominance of triple-negative or HER2-positive phenotypes. In our cohort, three patients were HER2 positive and one had triple-negative disease, consistent with international data [19]. In a prospective Korean cohort of 662 patients, it was bserved that nearly half of PABCs expressed HER2, and 22% were triple-negative, proportions higher than in age-matched non- pregnant controls. These findings underscore the intrinsic aggressiveness of tumors arising in the peripartum setting [20].

Diagnostic challenges

The hallmark obstacle in PABC is delayed recognition. Physiologic breast changes engorgement, tenderness, and nodularity, mask underlying malignancy. Physicians may hesitate to investigate aggressively due to concerns about fetal or neonatal exposure to radiation or anaesthesia. Yet evidence consistently shows that appropriate diagnostic imaging and biopsy are safe and essential [21].

Kalantarova highlighted in their case report that even a one-month delay in evaluation can increase the likelihood of nodal metastasis by approximately 1.8%. Similar trends were evident in our series: most patients presented with Stage II or III disease after weeks or months of symptom evolution [22].

Ultrasound remains the imaging modality of choice during pregnancy and lactation; it is sensitive for differentiating cystic and solid lesions and carries no radiation risk. 23 All six of our patients underwent ultrasonography as the initial step, which correctly identified suspicious lesions (BI-RADS 4 or 5). Mammography though limited by high breast density is safe with abdominal shielding and delivers minimal fetal radiation (< 0.03 mGy). MRI without gadolinium can be selectively used in lactating women to define disease extent [23].

Core-needle biopsy under ultrasound guidance is the gold standard for diagnosis and receptor profiling and should never be deferred. In our cohort, histologic confirmation was obtained in all cases without complications. Routine acceptance of biopsy in lactating women remains critical to overcome the entrenched misconception that it may cause milk fistula or infection [23].

Treatment principles and multidisciplinary coordination

Once diagnosis is confirmed, treatment should proceed without unnecessary delay. The therapeutic strategy must

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balance oncologic adequacy with maternal-fetal safety during pregnancy, but in postpartum cases such as all patients in this series standard protocols can be applied in full. A multidisciplinary tumor board approach involving surgical oncologists, medical oncologists, radiation oncologists, obstetricians, and lactation counselors ensures optimal decision-making [24].

Surgery

Surgery remains the cornerstone of local therapy. Modified radical mastectomy (MRM) was performed in all six cases, reflecting the frequent presence of large or multifocal tumors. While breast-conserving surgery is feasible in selected postpartum patients, mastectomy was preferred given locally advanced presentation. Surgical outcomes were satisfactory in all cases, with no perioperative complications. Published data from Bajpai et al. similarly indicate that mastectomy remains the predominant approach in Indian cohorts due to late-stage presentation [25,26].

Chemotherapy and systemic therapy

Chemotherapy plays a pivotal role in systemic disease control. Anthracycline- and taxane-based regimens remain the mainstay in PABC and can be administered safely during the second and third trimesters or postpartum. All our patients received regimens tailored to receptor status [27].

The prospective study by Jo et al. (2022) demonstrated that women receiving standard chemotherapy had disease-free survival comparable to non-pregnant counterparts, underscoring that pregnancy or lactation alone should not justify dose reduction or delay [28].

Among our patients, three received neoadjuvant chemotherapy for locally advanced disease and achieved partial or complete responses. Those with HER2-positive tumors were treated with trastuzumab in the postpartum phase after cessation of breastfeeding. The incorporation of HER2- targeted therapy markedly improved outcomes, as also shown by Sullivan et al. (2019), who reported a significant survival advantage for HER2-positive PABC patients receiving trastuzumab compared with historical controls.

One patient (Case 1) succumbed to neutropenic sepsis following the fifth chemotherapy cycle. This tragic event underlines the necessity for vigilant hematologic monitoring and timely use of growth-factor support. Treatment-related mortality, though rare, highlights that close interdisciplinary coordination between oncology and infection-control teams is vital. Rather than reflecting inherent postpartum vulnerability, it emphasizes the importance of supportive care, nutritional optimization, and patient education regarding febrile neutropenia.

Radiation therapy

Post-mastectomy radiation was administered to four patients with node-positive or T3 disease. In the postpartum setting, radiotherapy can be delivered safely after surgical healing and cessation of lactation. Radiation significantly reduces local recurrence and improves survival, paralleling outcomes in the non- pregnant population [29].

Endocrine therapy

Three hormone-receptor-positive patients received adjuvant tamoxifen after chemotherapy completion. Tamoxifen and aromatase inhibitors are contraindicated during pregnancy but are standard postpartum. Compliance was excellent, and all remain disease-free at follow-up [30]. Hormone responsiveness continues to confer a favorable prognosis even within PABC cohorts.

Prognostic determinants and outcomes

Historically, PABC was thought to carry an intrinsically poor prognosis. However, contemporary evidence suggests that once stage and molecular subtype are matched, outcomes approximate those of non-pregnancy-associated cancers [31]. Sullivan et al. and Jo et al. both reported no independent adverse impact of pregnancy when modern multimodality therapy was used [16,31].

Our series reinforces this principle: five of six patients achieved complete disease control or remission, with survival determined primarily by stage at presentation rather than pregnancy status. Receptor positivity (ER/PR or HER2) correlated with better outcomes, while the sole triple-negative case required aggressive multimodal therapy but remains disease-free after fourteen months.

The predominance of locally advanced disease at diagnosis remains a critical modifiable factor. Early clinical evaluation of breast complaints during pregnancy or lactation could transform prognosis.

Psychosocial dimensions

Beyond oncologic management, the psychological burden is immense. A diagnosis of cancer in the peripartum period disrupts the emotional landscape of motherhood, generating anxiety, guilt, and fear of loss. In Indian society, where breastfeeding is viewed as a cultural duty, being advised to cease lactation can compound distress [32]. At our institution, structured counseling sessions and inclusion of partners in decision-making improved adherence and reduced emotional conflict.

Fertility preservation is another growing consideration. Although all patients in this series had completed their pregnancies, counseling regarding future fertility should form part of comprehensive care for younger women. Advances in cryopreservation have made fertility protection feasible even in oncology patients, though awareness in India remains limited [33].

Comparison with Indian and global data

Indian literature on PABC remains sparse but expanding. The Gestational Cancer Registry of India (Bajpai et al., 2021) reported median age 30 years and found that 88% presented with Stage III disease remarkably similar to our findings. They concluded that the aggressive biological profile combined with diagnostic delay accounted for poorer outcomes, rather than pregnancy itself [12].

Internationally, Sullivan et al. and Jo et al. demonstrated that with stage-appropriate treatment, overall survival mirrors that of non-pregnancy breast cancer. Kalantarova et al. (2021) emphasized early imaging and biopsy as key to survival. Our experience aligns with these observations: once diagnosed and managed by a multidisciplinary team, our patients achieved favorable outcomes despite initial delay [16,22].

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Need for awareness and screening

The most powerful tool to improve outcomes in PABC is awareness. Every breast lump during pregnancy or lactation warrants prompt evaluation, ideally within two weeks. Obstetricians and family physicians must be trained to perform focused breast examinations during antenatal and postnatal visits. Integration of a "postpartum breast check" into discharge protocols could facilitate early detection [22].

Public education campaigns should challenge the misconception that breast cancer cannot occur during breastfeeding. The mantra must be: "Not every lactational lump is benign" [22].

Additionally, national registries should record PABC as a distinct entity to enable accurate surveillance, policy formulation, and resource allocation. Collaborative data from tertiary centers such as Madras Medical Mission can help establish standardized diagnostic and management algorithms for the Indian population.

Strengths and limitations

The strengths of our study lie in detailed characterization of cases and uniform management within a single multidisciplinary framework. The inclusion of receptor profiling and longitudinal follow-up enhances reliability. However, the small sample size limits statistical inference, and lack of genetic testing (BRCA, TP53) precludes evaluation of hereditary contribution. Future multicentric registries incorporating molecular profiling would provide a more comprehensive understanding of PABC in South Asian women.

Future directions

Emerging research suggests that targeting pathways involved in postpartum involution such as COX-2, STAT3, and immune checkpoint signaling may hold therapeutic potential. Exploration of immunotherapy and antibody-drug conjugates in aggressive subtypes could redefine treatment paradigms. On the preventive front, structured breast-awareness programs in antenatal clinics could serve as low-cost interventions to reduce delay.

Conclusion

Pregnancy-Associated Breast Cancer is no longer a clinical rarity but an increasingly recognized entity demanding prompt attention. The six cases managed at our institution highlight the consistent pattern of postpartum presentation, advanced stage at diagnosis, and the predominance of aggressive molecular subtypes. Yet, they also demonstrate that with early recognition, standardized multimodality therapy, and comprehensive psychosocial support, outcomes can be excellent. Our findings echo global evidence: stage at diagnosis not pregnancy itself determines prognosis. The key to progress lies in awareness among both patients and healthcare providers, ensuring that every breast symptom during or after pregnancy receives timely evaluation. Integration of breast examination into antenatal and postnatal care, coupled with a multidisciplinary approach, will transform outcomes for young mothers facing this dual challenge. As our institutional message encapsulates: "Pregnancy-Associated Breast Cancer Awareness Today, Survival Tomorrow."

Disclosure Statement

The authors declare that they have no competing interests.

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