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REVIEW ARTICLE

Breast Cancer During Pregnancy: A Literature Review

Selsabila BOUACHA, Hanène DJEDI

ABSTRACT

Breast cancer in pregnancy presents a unique intersection between clinical urgency and the imperative to preserve fetal health, requiring a nuanced multidisciplinary approach that respects both medical evidence and individual patient values. This article explores diagnostic and therapeutic strategies and summarizes current recommendations to support clinicians facing this challenging clinical scenario.

Keywords: Breast cancer, pregnancy, multidisciplinary care, chemotherapy, surgery.

Medical Oncology Department, Cancer Center
University Hospital Annaba, ALGERIA

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Correspondance to: Selsabila BOUACHA
E-mail : dr.bouacha.selsabila@gmail.com

1. INTRODUCTION

Pregnancy-associated breast cancer (PABC), defined as breast cancer diagnosed during gestation or within the first year postpartum, is a rare but increasingly recognized clinical situation, affecting 1 in 3,000 pregnancies and accounting for nearly 7% of all breast cancers diagnosed per year. The incidence of PABC is only expected to rise because of the increasing incidence of breast cancer rates in young women and delayed childbearing. PABC is often triple negative or human epidermal growth factor receptor 2 (HER2) positive (1). PABC poses significant challenges in diagnosis, staging, and treatment planning due to physiological changes in pregnancy and concerns for fetal safety (2,3). The prognosis for PABC is conflicting, with some studies indicating worse outcomes compared with non-PABC, whereas others showed a similar prognosis when matched by age, stage, and tumor biology (1). This review synthesizes evidence from 2010 to 2025 on PABC. We included original studies, systematic reviews/meta-analyses, and clinical guidelines from ESMO, ASCO, and NCCN.

2. DIAGNOSTIC AND CLINICAL CHALLENGES

Breast changes in pregnancy, such as engorgement and glandular proliferation, often obscure palpable masses and delay diagnosis. Ultrasound remains the preferred initial imaging modality due to its safety. Mammography, while less sensitive in dense breast tissue, can be safely used with abdominal shielding. MRI without gadolinium may be considered after the first trimester if necessary (2,4). Abdominal x-rays, computed tomography scans, nuclear imaging, and magnetic resonance imaging are contraindicated in pregnancy.

For systemic staging, use chest x-ray with abdominal shielding for lung lesions, abdominal ultrasound for liver lesions and MRI of the spine without contrast and x-ray of long bones with abdominal shielding for bone lesions. A core needle biopsy is recommended to confirm suspicious lesions (10,11).

Histopathological characteristics of PABC tend to be more aggressive, with higher rates of triple-negative and HER2-positive subtypes, leading to a poorer prognosis. Timely biopsy is critical, and delays should be minimized (5).

3. THERAPEUTIC STRATEGIES

Treatment decisions must be tailored to gestational age, cancer stage, tumor biology, and patient preferences.

a. Surgery: Mastectomy is preferred during pregnancy, especially in early gestation, to avoid delaying radiation after breast-conserving surgery (lumpectomy). Breast-conserving surgery can be considered in the second or third trimester if adjuvant chemotherapy is needed, and radiation can be postponed until after delivery without significant delay. Surgery is safe in any trimester, with the second trimester being optimal. Sentinel lymph node biopsy is not discouraged, but blue dye is contraindicated because of fetal risk, so technetium-99m sulfur colloid can be safely used. Axillary nodal dissection can be safely performed if indicated (3,6).

b. Radiation therapy: Radiation therapy should be avoided throughout pregnancy to prevent fetal exposure. Limited data exist on breastfeeding during radiation; if breastfeeding, it is recommended to use the non-affected breast because of decreased milk production and the risk of mastitis in the radiated breast (3,6).

c. Systemic therapy:

• *Chemotherapy* should be avoided in the first trimester to minimize fetal risk. Most safety data in pregnancy are with regimens using various combinations of doxorubicin, cyclophosphamide, and fluorouracil. The most commonly used regimen is doxorubicin and cyclophosphamide every 3 weeks (to avoid the need for granulocyte colony-stimulating factors [G-CSFs]) (4,5). Limited safety data exist on taxanes, with weekly paclitaxel preferred if used. Capecitabine, the oral form of FU, is unsafe in pregnancy. Carboplatin appears safe, but since it is often paired with anti-HER2 drugs or immunotherapy, its use is best delayed until after delivery. Chemotherapy can be given as a neoadjuvant or adjuvant, following standard guidelines on the basis of tumor stage and biology.

• *Other agents:* The anti-HER2 drug, trastuzumab, is contraindicated in pregnancy because of the risk of oligohydramnios. The other anti-HER2 drugs, like pertuzumab, trastuzumab emtansine, trastuzumab deruxtecan, and neratinib, are also not recommended because of the potential for fetal death and birth defects based on their mechanism of action (although there is a paucity of safety data). Similarly, cyclin-dependent kinase (CDK) 4/6 inhibitors and other antibody-drug conjugates are not recommended during pregnancy because of the risk of fetal harm on the basis of their mechanism of action.

• *Endocrine therapy:* tamoxifen, aromatase inhibitors, and gonadotropin-releasing hormone agonists/antagonists are contraindicated during pregnancy (6).

• *Breastfeeding* should be avoided during all systemic therapies (chemotherapy, targeted therapy, and endocrine therapy) because of the risk of drug excretion in the breast milk and adverse effects on the infant. Breastfeeding is allowed in the first 2 weeks after delivery for colostrum (as systemic therapy is usually paused for at least 3 weeks before and, if paused for 2 weeks after delivery, with breastfeeding permitted only 4 weeks after the last dose) and can be continued if no further systemic therapy is needed. Lactation is only allowed 4 weeks after the last chemotherapy dose.

d. Supportive care medications: Antiemetics like metoclopramide, promethazine, ondansetron (in second and third trimesters), granisetron, NK1 antagonists, and analgesics like acetaminophen and opioids are safe in pregnancy. Corticosteroids like dexamethasone, which readily cross the placenta, should be used sparingly because of the risk of fetal growth restriction and neurocognitive defects, whereas steroids with lower placental transfer, such as prednisolone, methylprednisolone, and hydrocortisone, could be preferred. Low molecular weight heparin is the preferred anticoagulant. G-CSF and erythropoietin are safe when necessary. Breastfeeding safety counseling is essential even with supportive care medications.

Some of the practical considerations in the management of PABC include the following:

1. Multidisciplinary discussions and close communication among oncology (surgical, medical, and radiation oncology, genetics, and psychosocial services) and obstetrics are necessary before finalizing any treatment plans, with surgery only occurring at institutions with available neonatal and obstetric support for fetal monitoring (5).

2. Young patients have a higher likelihood of harboring BRCA (2%-29%) or other high-risk pathogenic mutations and should be offered genetic counseling. Discussions on oncofertility and referrals to reproductive medicine are important.

3. Monitoring and surveillance after cancer treatment is the same as non–pregnancy-related breast cancer. Attempting pregnancy post-treatment raises concerns about prognosis, but current evidence suggests no negative effects. The POSITIVE trial indicated that women with hormone receptor–positive breast cancer can safely interrupt adjuvant endocrine therapy after 18-30 months for up to 2 years without increasing short-term recurrence risk (with a median follow-up of 41 months), although long-term follow-up is needed. Women with breast cancer (including triple negative and HER2 positive) are generally advised to wait for 2 years post-treatment before conception, as most recurrences occur early; however, some data suggest that waiting longer than 6 months after treatment for localized cancer, particularly triple-negative or HER2-positive cancer, may not be necessary, as they do not require any endocrine therapy interruption. Women with stage IV cancer are advised to avoid pregnancy (1) (table 1).

Table 1. Summary of recommendations for the management of breast cancer during pregnancy (10).

Treatment modality	Recommendation
Breast surgery	Both mastectomy and breast-conserving surgery are appropriate
Sentinel node biopsy	Avoid blue dye. Low-dose Tc-labeled albumin nanocolloid is feasible
Radiation therapy	Can be considered only in selected cases
Chemotherapy	Can be administered only after the first trimester. Discontinue at least 3 weeks before the planned delivery date.
Supportive medication	Granulocyte colony-stimulating factor and ondansetron can be safely administered. Methyprednisolone or prednisolone are preferred steroids
Endocrine therapy	Avoid
Trastuzumab and other HER2-targeted agents	Avoid
Immune checkpoint inhibitors	Avoid
Cyclin-dependent kinase 4/6 inhibitors	Avoid

4. ETHICAL AND PSYCHOSOCIAL CONSIDERATIONS

The diagnosis of cancer during pregnancy raises profound ethical questions. Balancing maternal autonomy with fetal safety requires open communication and shared decision-making. Some patients may opt to delay treatment to protect the fetus, while others prioritize aggressive management. The care team must respect these choices while clearly communicating risks and outcomes (1,2). Psychosocial support is paramount. Patients may experience intense anxiety, guilt, and fear for both their own health and that of their unborn child. Access to psychological counseling and peer support can significantly alleviate distress (2).

5. CONCLUSION

PABC embodies the intersection of two major life events: cancer and pregnancy. Optimal management relies on early diagnosis, collaborative care, and a sensitive approach to ethical dilemmas. As evidence evolves, clinicians must stay informed and compassionate to guide patients through this challenging journey.

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