Annals of Clinical and Analytical Medicine
Original Research

Imaging of breast cancer associated with pregnancy

Yulduz Nıshanova[1], Igor Juravlov[1], Sevinch Kurbanova[1], Marufjon Salokhıddınov[2]
[1] Department of Diagnostic Radiology, Republican Specialized Scientific and Practical Medical Center of Oncology and Radiology
2 Department of Radiology, Tashkent Medical Academy, Tashkent, Uzbekistan

Abstract
Aim: The dynamics of breast cancer research in recent years has shown that it is the most frequent form of a tumor in women during pregnancy. According to international statistical institutes, this form of the tumor in women under 45 years old accounts for up to 8% of all cases. This study aims to improve imaging techniques in pregnancy-associated breast cancer.
Material and Methods: A total of 30 consecutive patients with breast cancer pathologically diagnosed during pregnancy were included in this study. The ages of the patients ranged from 26 to 49 years. Both mammography and sonography were performed in all 30 patients.
Results: Mammography revealed positive findings in 24 (80,0%) of 30 patients, even though all 30 patients had dense breasts. Mammographic findings included masses without calcifications, masses with calcifications, calcifications with axillary lymphadenopathy, a mass with axillary lymphadenopathy, calcifications alone, asymmetric density alone, and diffuse skin and trabecular thickening alone. Sonographic findings were positive and showed masses in 26 of 30 patients (86,7%).
Discussion: Asymmetric density, axillary lymphadenopathy, and local thickening of the skin and trabeculae were also useful for detecting mammographic abnormalities in these patients. Sonographic sensitivity was 86.7% in our study. We found some interesting results that differ from the appearance of breast cancer in non-pregnant women with ultrasound. Timely diagnosis and adequate therapeutic tactics will significantly improve the results of the treatment of breast cancer that has developed against the background of pregnancy.

Keywords
Sonography; Mammography; Calcification; Solid; Skin

DOI: 10.4328/ACAM.20198 Received: 2020-05-03 Accepted: 2020-06-04 Published Online: 2020-06-15 Printed: 2020-06-30 Ann Clin Anal Med 2020;11(Suppl 3): S284-287
Corresponding Author: Marufjon Salokhiddinov, Radiology Department, Tashkent Medical Academy, Farabi Street, Olmazor city, Uzbekistan.
E-mail: marufjonsalokhiddinov@gmail.com T: +998999992408
Corresponding Author ORCID ID: https://orcid.org/0000-0002-4061-0327

Introduction

Over the past 10 years, the incidence of breast cancer has increased by 32.5%, while the number of women who become ill at a younger age is growing every year [9]. At the same time, the number of women planning a pregnancy after 30-35 years is also increasing. Therefore, it can be expected that the convergence of these age groups may lead to an increase in the incidence of breast cancer in pregnant women in the coming years. When a breast cancer diagnosis is made during pregnancy or within 1 year, it can be said that the patient has breast cancer associated with pregnancy [5]. It should be noted that the incidence of breast cancer ranges from 0.2% to 3.8% breast cancer cases or 1 in every 3,000 to 10,000 pregnancies [1]. According to White T, based on a study of 45,881 women, breast cancer develops during pregnancy or shortly after birth in 2.8% of the examined, and according to another report, 7.3% of women under the age of 45 suffering from breast cancer are pregnant or lactating [11]. Among the oncological pathology of pregnant women, breast cancer takes the first place, accounting for 15-17%. This is facilitated by an increase in the incidence rate and social aspects. Women more often give birth at 30–40 years of age, that brings them closer to the risk group for breast cancer. Pregnant patients more often have a large tumor and metastatically changed regional lymph nodes. By the time of diagnosis, the average size of the tumor ranges from 5-6 cm to 15 cm, the percentage of common forms is from 72 to 85%, metastases to internal organs are detected in 20% of cases [10]. Sixty cases of breast metastases in the placenta without fetal damage have been described [2]. Difficulties in diagnosing an objective (increase in volume and change in breast density, a complication of lactation and subjective (psychological "unpreparedness" for diagnosis of a malignant tumor in both the patient and the doctor) lead to late detection of the tumor in pregnant women; treatment begins with more common stages of the disease than in the general patient population [6]. Nevertheless, most of these reports still boil down to a description of individual clinical cases or limited in the number of series of observations. The most difficult during pregnancy is the staging process and the assessment of the presence of distant metastases in the lungs, liver, bones, and brain [8]. For these purposes, it is possible to conduct ultrasound, X-ray examination, and magnetic resonance imaging without contrast. Computed tomography is contraindicated during pregnancy [2, 7]. The most affordable diagnostic method for breast cancer is ultrasound (ultrasound) [3]. Mammography is possible to clarify the diagnosis, however, the sensitivity of the method decreases during pregnancy due to an increase in the concentration of extracellular fluid and a decrease in the contrast of adipose tissue [4, 12].

Material and Methods

Examinations and treatments were carried out at the Republican Specialized Scientific and Practical Medical Center of Oncology and Radiology, Tashkent between 2016 and 2019. A total of 30 patients diagnosed with breast cancer associated with pregnancy were included in this study. Consents were obtained from the participants of the study.

The age of the patients ranged from 26 to 49 years (on average 32 years). In the anamnesis of relatives of the 1-2 lines, breast cancer was observed in 6 women (15%). Pregnant women had a histopathological type of breast cancer; infiltrating ductal cancer was found in 31 (77.5%); infiltrating lobular cancer in 6 (15%); medullary cancer in 3 (7.5%). The distribution of the stages was as follows: Stage I - 2 (5.0%); Stage II - 13 (32.5%); Stage III - 22 (55%); Stage IV - 3 (7.5%).For fetal protection, pelvic lead apron was utilized to reduce unnecessary fetus radiation. Also, the position of patients was corrected before taking a radiograph to reduce the number of repeat examinations from unsatisfactory views.

Results

Twenty-four(80.0%)ofall30patientshadpositivemammographic results.. Mammography revealed a heterogeneous (n = 6) or extremely dense (n = 24) mammary gland according to the ACR BI-RADS classification. Mammography showed masses with microcalcificationin 6 patients or without masses were shown in 8 patients (Figure 2.). Other mammographic data included asymmetric density (n = 10) (Figure1).

Axillary lymphadenopathy (n = 7), and diffuse thickening of the skin and trabeculae (n = 1) were detected. In 6 patients (20.0%), the results of mammography were negative because the mammary gland was extremely dense.

Sonographic results were positive in 26 of 30 patients (86.7%). The most common echographic features of nodular formation were irregular shapes (25 - 83.3%), irregular contours (23 - 86.7%), mixed echo structures (21 - 70.0%) and rear acoustic amplification (19 - 63.3%) (Figure 3) Four nodular formations with complex echo signals had a pronounced cystic appearance. The effects of surrounding tissues could be observed in 15 patients, including changes in the ducts (in the form of expansion) -10, thickening and deformations of the ligaments (n = 2), (n = 7) and axillary lymphadenopathy was detected in 8 cases.

Discussion

In our study, mammographic sensitivity was 80%. Although nodules were not distinguishable, typical malignant microcalcifications can be detected even in a very dense mammary gland. Asymmetric density, axillary lymphadenopathy, and local thickening of the skin and trabeculae were also useful for detecting mammographic abnormalities in these patients. Sonographic sensitivity was 86.7% in our study. We found some interesting results that differ from the appearance of breast cancer in non-pregnant women with ultrasound. Posterior amplification was observed in 19 patients (63.3%). This posterior amplification is usually observed in benign lesions of the mammary gland and is a characteristic of large or superficial cysts of the mammary gland. According to Nicklas et al. [7], posterior reinforcement is found in 12% carcinomas. Liberman et al. stated in their study that mammographic findings were present in 78% cases, including mass, suspicious calcification, and diffusely increased parenchymal density and axillary lymph node metastases occurred in 65% cases. An ultrasound is the main radiological examination for a pregnant or lactating woman with a palpable breast mass [13]. The most important thing is to locate a suspicious palpable breast mass

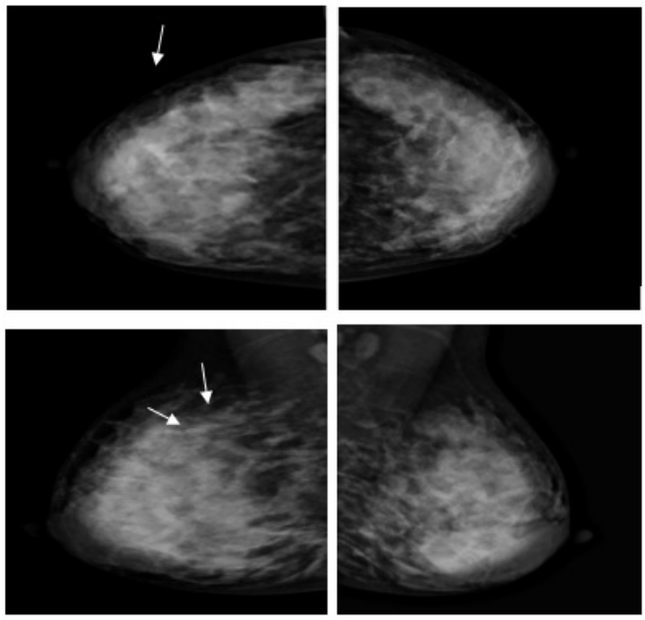

Figure 1. A 35-year-old woman, at 20 weeks gestation with invasive ductal carcinoma. In two projections of both mammary glands, highly dense glands and a plot of asymmetric density (arrows) in the upper-outer quadrant of the left mammary gland are shown.

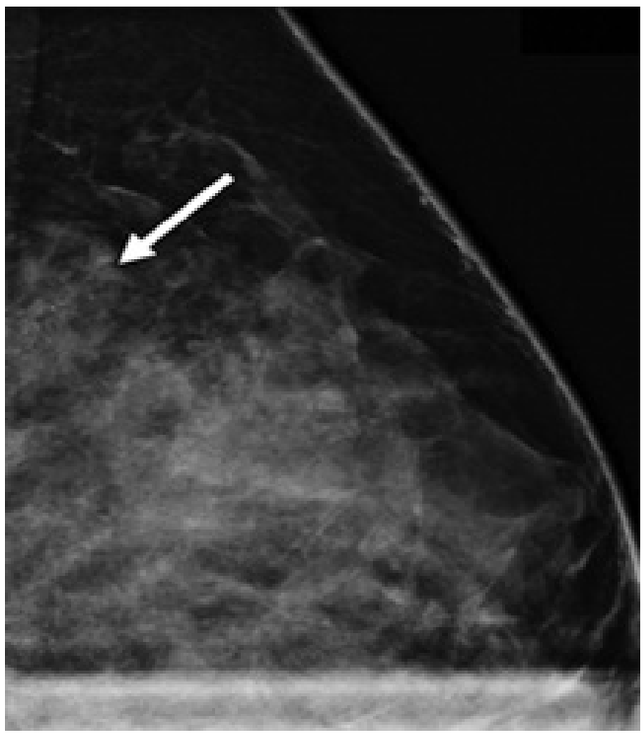

Figure 2. A 29-year-old woman, at 30 weeks gestation. Microcalcifications associated with weight (arrow) are best seen with magnification. An ultrasound-guided biopsy revealed medullary breast cancer.

and adjust high-sensitivity with minimum harm to fetus [13]. An ultrasound should be performed for all pregnant or lactating women who detect a palpable breast mass persisting for two or more weeks. The expedience of ultrasound in clarifying malignancy of a breast mass is well explained in the studies that reported 99% sensitivity and 99% negative predictive value for detecting pregnancy-associated breast cancer [14, 15].

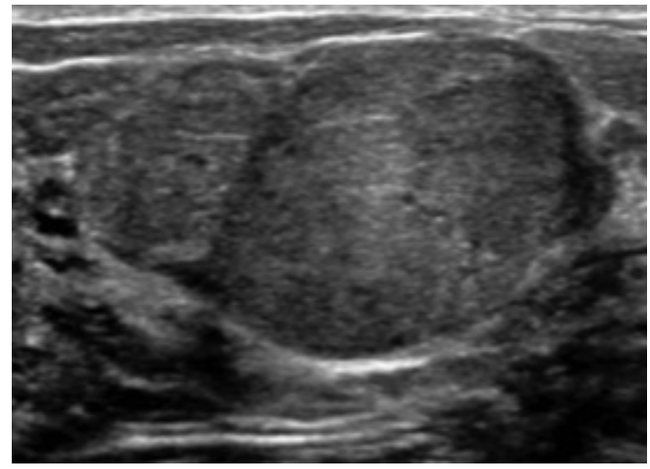

Figure 3. An echogram of the left breast of the same patient with a new palpable mass. Ultrasound showed the formation of a hypoechoic structure with limited boundaries, also with posterior acoustic shading.

Conclusion

The incidence of pregnancy-associated breast cancer might increase in the future as more women postpone childbearing to middle age. Ultrasound imaging is the initial imaging of choice for the evaluation of palpable abnormality in pregnant and lactating women. Palpable solid and complex cystic masses identified during pregnancy and lactation warrant biopsy. Mammography and ultrasound are essential complementary tests in women with palpable abnormalities and suspected pregnancy-associated breast cancer, as mammography detects otherwise occult malignant microcalcifications.

Acknowledgment
We would like to express our sincere gratitude to Professor Marat Khodjibekov, Head of Radiology Department to support our research.

Scientific Responsibility Statement
The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement
All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

Funding: *None*

Conflict of interest
None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

References
1. Parokonnaya A.A. Breast cancer and pregnancy (clinical features, diagnosis and treatment, prognosis). Moscow: Dis. Dr. Honey Sciences; 2009.
2. Azim HA Jr, Santoro L, Russell-Edu W, Pentheroudakis G, Pavlidis N, Peccatori FA. Prognosis of pregnancy-associated breast cancer: a meta-analysis of 30 studies. Cancer Treat Rev 2012; 38(7): 834-42. DOI: 10.1016/j.ctrv.2012.06.004.
3. Alexander A, Samlowski WE, Grossman D,Bruggers CS , Harris RM , ZoneR JJ, et al. Metastatic Melanoma in Pregnancy: Risk of Transplacental Metastases in the Infant. J Clin Oncol. 2003;21(11): 2179–86. DOI: 10.1200/JCO.2003.12.149.
4. Behrman RH, Homer MJ, Yang WT, Whitman GJ. Mammography and fetal dose. Radiology. 2007; 243(2): 605. DOI: 10.1148/radiol.2432060791.
5. Gemignani ML, Petrek JA, Borgen PI. Breast cancer and pregnancy. Surg Clin North Am. 1999; 79(5): 1157–63. DOI: 10.1016/s0039-6109(05)70066-9.
6. Liberman L, Giess CS, Dershaw DD, Deutch BM, Petreck JA. Imaging of pregnancy-associated breast cancer. Radiology. 1994; 191(1):245–8. DOI:

10.1148/radiology.191.1.8134581.
7. Nicklas AH, Baker ME. Imaging strategies in the pregnant cancer patient. Semin Oncol. 2000; 27(6): 623-32.
8. Saber A, Dardik H, Ibrahim IM, Wolodiger F. The Milk Rejection Sign: A Natural Tumor Marker. Am Surg. 1996; 62(12): 998–9.
9. Samuels TH, Liu F, Yaffe M, Haider M. Gestational breast cancer. Can Assoc Radiol J. 1998; 49(3): 172– 80.
10. Pavlidis N. Cancer and pregnancy: what should we know about the management with systemic treatment of pregnant women with cancer? Eur J Cancer. 2011;47 (Suppl. 3):S348-52. DOI: 10.1016/S0959-8049(11)70199-X.
11. White TT. Prognosis for Breast Cancer for Pregnant and Nursing Women: Analysis of 1413 Cases. Surg Gynecol Obstet. 1995; 100(6):661–6.
12. Yang WT, Dryden MJ, Gwyn K, Whitman GJ, Theriault R. Imaging of breast cancer diagnosed and treated with chemotherapy during pregnancy. Radiology. 2006; 239(1): 52. DOI: 10.1148/radiol.2391050083.
13. Vashi R, Hooley R, Butler R, Geisel J, Philpotts L. Breast imaging of the pregnant and lactating patient: imaging modalities and pregnancy-associated breast cancer. AJR Am J Roentgenol. 2013; 200(2): 321–8. DOI: 10.2214/AJR.12.9845.
14. Joshi S, Dialani V, Marotti J, Mehta TS, Slanetz PJ. Breast disease in the pregnant and lactating patient: radiological-pathological correlation. Insights Imaging. 2013; 4(5): 527–38. DOI: 10.1007/s13244-012-0211-y.
15. Ahn BY, Kim HH, Moon WK, Pisano ED, Kim HS, Cha ES, et al. Pregnancy and lactation-associated breast cancermammographic and sonographic findings. J Ultrasound Med. 2003; 22(5): 491. DOI: 10.7863/jum.2003.22.5.491.

How to cite this article:
Yulduz Nıshanova, Igor Juravlov, Sevinch Kurbanova, Marufjon Salokhıddınov. Imaging of breast cancer associated with pregnancy. Ann Clin Anal Med 2020;11(Suppl 3): S284-287