



## **Imaging of Breast Cancer Associated with Pregnancy**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author YN designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author IJ managed the analyses of the study. Author SK managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Aims:** To analyze the application of mammography and ultrasound in breast cancer associated with pregnancy.

**Study Design:** Cohort Study.

**Place and Duration of Study:** The study was conducted Republican Specialized Scientific-Practical Medical Center of Oncology and Radiology between 2018 and 2019.

**Methodology:** 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 ultrasound were performed 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%). The common sonographic findings of masses were irregular shapes, irregular margins, mixed echo patterns and posterior acoustic enhancement.

**Conclusion:** Timely diagnosis and adequate therapeutic tactics will significantly improve the results of treatment of breast cancer that has developed against the background of pregnancy.

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**Keywords:** Breast cancer; mammography; ultrasound; pregnancy; lymphadenopathy.

## 1. INTRODUCTION

Over the past 10 years, the incidence of breast cancer (breast cancer) has increased by 32.5%, while the number of women who become ill at a younger age is growing every year [1]. 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 [2]. 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 [3]. According to T. White, 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 [4]. Among the oncologic 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, which brings them closer to the risk group for breast cancer. Pregnant patients more often have a large tumor and metastatic 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 [5]. 60 cases of breast metastases in the placenta without fetal damage have been described [6]. 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) leads to late detection of the tumor in pregnant women; treatment begins with more common stages of the disease than in the general patient population [7]. 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 [2,9]. The most affordable diagnostic method for breast cancer is ultrasound (ultrasound) [10]. 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 [11,12].

## 2. MATERIALS AND METHODS

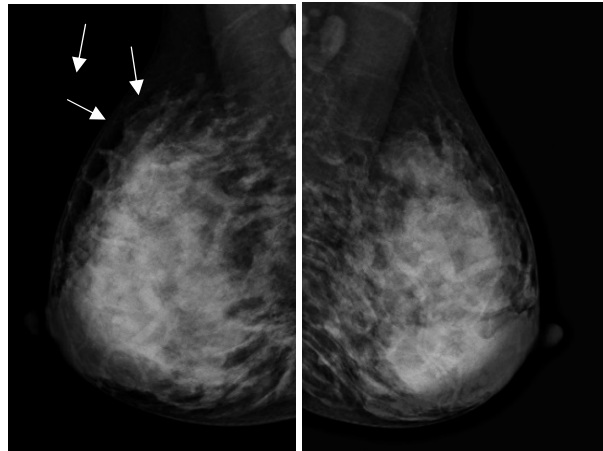
Total of 40 patients diagnosed with breast cancer were associated with pregnancy were included in this study. The study was conducted in the Republican Specialized Scientific and practical Medical Center of Oncology and Radiology, Tashkent between 2018 and 2019. The age of the patients ranged from 26 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: Stage I - 2 (5.0%); Stage II - 13 (32.5%); Stage III - 22 (55%); Stage IV - 3 (7.5%).

## 3. RESULTS AND DISCUSSION

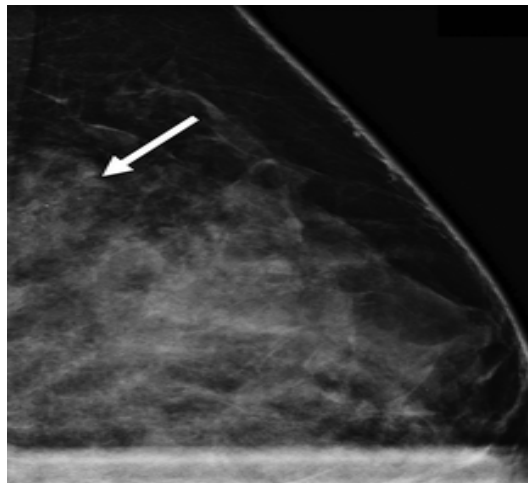
24 (80.0%) of the 30 patients had positive mammographic results. Of all 30 patients. Mammography revealed a heterogeneous (n = 6) or extremely dense (n = 24) mammary gland according to the ACR BI-RADS classification. Mammography showed masses in 6 patients with microcalcifications or without masses were shown in 8 patients (Fig. 2.). Other mammographic data included asymmetric density (n = 10) (Fig. 1).

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

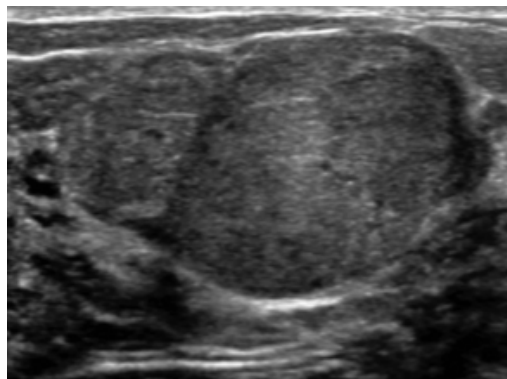
Sonographic results were positive in 26 of 30 patients (86.7%). The most common echographic features of nodular formation were irregular shapes (25 - 83.3%), irregular contours (23 - 86.7%), mixed echo structures (21 - 70.0%) and rear acoustic amplification (19 - 63.3%) (Fig. 3)



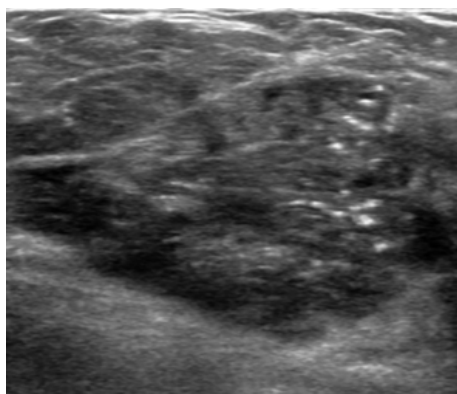
**Fig. 1. Mammography shows highly dense glands and a plot of asymmetric density (arrows) in the upper-outer quadrant of the left mammary gland is shown**



**Fig. 2. Microcalcifications associated with weight (arrow) are best seen with magnification. An ultrasound-guided biopsy revealed medullary breast cancer**



**Fig. 3. Ultrasound showed the formation of a hypoechoic structure with limited boundaries, also with posterior acoustic shading**



**Fig. 4. An ultrasound scan showed an irregular form of formation, a hypoechoic structure with hyperechoic calcification**

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. Calcifications found in 14 patients (Fig. 4).

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 characteristic of large or superficial cysts of the mammary gland. According to Nicklas et al. [9] 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 and adjust high-sensitivity with a minimum harm to foetus [13]. An ultrasound should be performed

for all pregnant or lactating women who detect a palpable breast mass persisting for two or more weeks. 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].

#### **4. CONCLUSION**

This led to the revision of a number of postulates, the incontrovertibility of which was recently absolute. The points of view we have generalized on the problem of breast cancer showed the need for an interdisciplinary approach by doctors of various specialties. Timely diagnosis, initiation, and an adequate amount of treatment increase overall survival in the detection of breast cancer during pregnancy.

#### **CONSENT**

Authors state that written informed consent was obtained from the participants of the study.

#### **ETHICAL APPROVAL**

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

#### **ACKNOWLEDGEMENTS**

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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