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Improving educational effectiveness in teaching radionuclide-negative breast cancer through comprehensive radiodiagnosis

Dekhkambayeva Z.A., Tashkent Medical Academy,
Nishanova.Y.X Phd Tashkent Medical Academy,
Tashboeva N.A Tashkent Medical Academy

Abstract. This article analyzes the factors that cause breast cancer, the importance of complex radiological and ultrasound methods in early diagnosis and comparative diagnosis of dangerous and safe breast tumors, and the issues of teaching students how to analyze examination results and demonstrating them in practice.

Keywords: Radionegative SBS, breast, ultrasonography, mammography, MRI, medical education and practice, differential diagnosis, educational effectiveness

Introduction: Breast cancer is one of the most common and widespread tumor diseases among women. Scientists have determined that SBS is more common in women over 50 years old, have a genetic disease, drink a lot of alcohol, have not had children, have taken hormonal drugs for more than 1 year, and have been exposed to radiation. Early detection of breast cancer is of crucial importance in modern oncology. However, radionegative cases pose a great diagnostic challenge. Radionegative breast cancer (RN-SBS) is a pathological condition that is not detected on routine mammography but is confirmed by other examinations, and it is most often found in women with dense breast tissue.

Studies have shown that the sensitivity of mammography decreases to 50% in dense tissue. This reduces the possibility of early detection of the disease and delays its clinical presentation. In cases of RN-SBS, many patients have a false negative result, which means that the disease is not detected until it is at a late stage.

It is in such cases that an expanded diagnostic approach - that is, the use of complex radiodiagnostic (CNT) methods - becomes of great importance. This approach is relevant both for clinical decision-making and for teaching complex cases in education.

Breast Cancer (BCC) According to WHO, 25% of all women worldwide are diagnosed with breast cancer. In 2022, this disease was diagnosed in 2 million women and 627,000 deaths were observed. This oncological process affects not only women, but also men, but much less often than women. According to data, 6-12 men are diagnosed in Uzbekistan every year. BCC is more common in women aged 20 to 80, after 40 years the risk of developing breast cancer is 5-8 times higher than at the age of 60. Risk factors for developing breast cancer include obesity, diabetes, hypertension, lack of physical activity, alcoholism, radiation therapy for breast cancer, low breastfeeding, having your first child after the age of 30, and hormone therapy after menopause. That is, the risk of developing breast cancer is associated with impaired function of the hormone-producing organs.

Materials and research methods

Research methodology: Today, the leading methods for diagnosing breast cancer include X-ray mammography, ultrasound, Doppler function, MRI, and ultrasound-guided puncture biopsy, etc.

UTT examination is also used as an independent method for detecting tumors in combination with mammography. Ultrasound examination clearly visualizes tissues of different densities, anatomical structures in the breast.

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In addition, the advantages of this method are the absence of radiation exposure to the patient's body and the possibility of repeated use of this method, especially in cases where X-ray mammography is limited, for example, during pregnancy and lactation. According to studies conducted by Ivanov L.I., ultrasound is a highly informative method for diagnosing SBS with a sensitivity of 92.3%, specificity of 84.1% and diagnostic efficiency of 88.9%.

Mammography plays a significant role in the early detection of SBS, and it was found that this examination method provides 80% accurate information in cancer. It was found that this examination method is of great importance in the early detection and prevention of not only cancer, but also precancerous diseases.

In many countries, mammography is the primary method used to diagnose breast diseases. Mammography has several important advantages that make this method an important tool in the diagnosis of breast diseases:

Sensitivity to nodes: mammography is good at detecting the classification and other changes of the mammary glands, which allows for the early detection of cancer and cancer.

Research objective; To determine the diagnosis of tumor detection in radionegative tumors using complex radiological and ultrasound methods. And to develop methods for teaching students

Main part

In the genesis of SBS, dysfunction of the pituitary gland, thyroid gland and ovaries is of particular importance. Another factor that increases the risk of cancer is the presence of SBS in the mother in this generation, which increases the risk of breast cancer. In this, gene mutations BRCA1 and BRCA2 are important.

The first signs of breast cancer are breast swelling, changes in the color of the skin around the breast and its surface, nipple retraction, colorless fluid or blood discharge from the nipple, and enlargement of peripheral lymph nodes can be observed.

SBS occurs in 4 stages

Stage 1 - the size of the tumor does not exceed 2 cm. There is no metastasis in the lymph nodes

Stage 2 - the diameter of the tumor is 2-5 cm, the lymph nodes under the armpit are affected by the tumor. Lymph node damage is observed

Stage 3 is divided into 2 stages

Stage 3A - the diameter of the tumor is more than 5 cm, the lymph nodes are very large, they are attached to each other and to the surrounding tissues.

3B - at this stage, redness of the skin, the appearance of "orange peel", the tumor may be of various sizes. At this stage, the skin of the chest, internal mammary lymph nodes or chest wall are affected.

Stage 4 - the tumor reaches all lymph nodes and the spleen, liver, lungs, brain are also affected by metastases.

More than 60% of people with SBS can detect such a lump by palpation. However, since this method is not so effective, early detection of breast cancer is carried out by mammography.

SBS diagnosis includes mammography, UTT, MRI and CT, analysis of CA15-3 oncomarkers in the blood, ultrasound examination of abdominal organs, lymph nodes, biopsy, ductography, immunohistochemical examination. Mammogram takes pictures of the entire breast. This method allows you to see any changes in the breast. For preventive purposes, it is recommended to undergo a mammogram every year after the age of 45.

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Ultrasound examination is an independent method of detecting tumors, and is also used in conjunction with mammography. Ultrasound examination clearly shows the anatomical structures of the breast, tissues of different densities.

Another method of examination, MRI, is used to accurately diagnose SBS, but this method is more expensive than other methods. In this method, changes in breast tissue are seen with high accuracy. In some cases, it is possible to make an accurate diagnosis even without the use of a contrast agent in the diagnosis of SBS. However, the MRI method also depends on the period of the menstrual cycle during which it was performed, and this can lead to inaccurate information. According to a number of authors, X-ray negative breast cancer occurs in 15-40% of cases, thereby reducing the effectiveness of mammographic screening. Thus, the sensitivity of mammography in women of different ages has been shown to decrease by up to 53%. The formation of visual skills in diagnostics plays an important role in the clinical training of students in higher medical education institutions. Teaching complex diagnostic cases such as X-ray negative breast cancer requires a high level of professional competence and the use of modern methods from the teacher.

Clinical case study training: Students are given tasks to analyze multimodal images (MRI, CT, PET) based on real disease histories related to RN-SBS.

Use of simulation technologies: A virtual diagnostic environment is created using special radiological programs, in which students evaluate tissues in artificial conditions.

Transdisciplinary approach: By integrating the disciplines of radiology, oncology, and pathology, students not only study images, but also master clinical decision-making.

This approach prepares students to identify diagnostically complex diseases such as RN-SBS and choose an appropriate diagnostic strategy for them. As a result, the effectiveness of the learning process increases, i.e. theoretical knowledge is transformed into practical competence.

Conclusion

Radionegative breast cancer is one of the conditions with low sensitivity in medical practice, and relying on mammography alone is not enough to diagnose it. Complex radiological diagnostic methods - ultrasound, MRI, PET, and digital tomosynthesis - are highly effective in diagnosing RN-SBS.

By integrating these technologies into the medical education process, students will gain the skills to deeply study complex diagnostic cases, develop clinical thinking, and make independent decisions. The results of practical studies have proven that this approach increases the real educational effectiveness of this approach.

Recommendations:

1. It is necessary to include separate practical classes on complex radiodiagnostic methods in radiology courses of higher medical education institutions.

2. Interactive simulators and methods based on real clinical case analysis should be widely introduced in teaching visual diagnostics.

3. Young specialists can be better prepared for practice by teaching special clinical protocols for RN-SBS.

4. It is necessary to strengthen interdisciplinary integration in medical education - it is necessary to harmonize the disciplines of oncology, pathomorphology, and radiodiagnostics.

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