



REVIEW PAPER

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The use of imaging tests to obtain optimal margins in breast surgery

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ABSTRACT

Introduction. The proper negative margins (R0) breadth in the breast - conserving surgery for invasive breast cancer (IBC) and ductal carcinoma in situ (DCIS) is very important. The presence positive surgical margins (R1) is associated with the necessity of reoperation. It delays the adjuvant therapy and psychologically burdens the patient. The re-operation increases the costs of treatment. The introduction of mammography (MMG) increased detection of DCIS by 20%. With the increase in malignancy, cancer detection decreases in MMG, inversely in MRI groving. Effective preoperative and intraoperative diagnosis aims to reduce the number of R1 resections.

Aim. The size of the tumor next to its biology, determines the clinical course of the tumor. The accurate analysis of imaging tests is important.

Material and methods. This analysis was performed using a systematic literature search.

Results. Adequate surgical margins in breast cancer surgery for breast cancer have been reviewed. It is important to know if the cancer is multifocal and what the extent of the tumor is.

Conclusion. The adequacy of margins is important for adjusting the volume of excision. It is avoiding unnecessary resection of healthy breast tissue. It is essential for a good cosmetic result and the local recurrence rate. The combination of breast MRI with conventional breast imaging resulted in the lover rate of the R1 resectios and the lower rate of the re-operation.

Keywords. breast conserving surgery, ductal carcinoma in situ, extensive itraductal component, invasive breast cancer, lobular carcinoma in situ

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Introduction

Currently, in women with non-invasive breast cancer (DCIS - ductal carcinoma in situ) and in the majority with invasive breast cancer (IBC - invasive breast cancer), a breast-saving procedure is performed.¹⁻⁴³ It is very important to obtain negative surgical margins (R0). The presence of positive surgical margins (R1) is associated with the necessity of reoperation. The reoperation delays the adjuvant treatment and psychologically burdens the patient. The re-operation increases the costs of treatment. DCIS is a form of cancer cell proliferation in the breast ducts. DCIS cells do not exceed the basement membrane of the wires. The untreated DCIS almost always passes in the IBC. Until 1980, DCIS represented 1% of detected breast cancers. The introduction of mammography (MMG) increased detection by 20%. The MMG image for the detection of cancer includes microcalcifications, the presence of the nodule, the presence of nodules, asymmetry of the parenchyma, the presence of enlarged ducts, increased density of the parenchyma. The study demonstrated that patients with calcifications have an increased risk of local and distance recurrence subsequent to BCS.¹³ About 20% of DCIS cannot be detected in MMG. This is due to the small size of the cancer and the lack of microcalcifications. Preoperative breast MRI combined with conventional imaging results in a lower rate of surgical margin involvement and reoperations in patients.³¹ Magnetic Resonance Imaging (MRI) detects from 77-96% DCIS and 90-100% IBC. With the increase in malignancy, cancer detection decreases in MMG, inversely in MRI-growing. MRI seems to be a better method for screening breast cancer. However, MRI is expensive and not always available. Currently used mainly to estimate the extent of the tumor before BCS.¹ Surgical margins in BCS are a strong prognostic factor for the recurrence of local cancer. The goal of BCS is to completely remove the tumor and get the best cosmetic effect.¹⁻²⁰ During this year's conference in St. Gallen found that the width of the margins is not important. In the case of IBC, it is enough that the ink (the method for determining the boundaries of surgical cutting in the postoperative material) will not cover the tumor tissue. This is to remove the smallest amount of healthy tissue. This prevents breast asymmetry and improves the quality of life and patient satisfaction.²¹⁻⁴¹ It has been proven that the presence of inc on the tumor surface increases the possibility of cancer recurrence in the same breast.¹⁻⁴² For women with DCIS, a margin of 2mm is adequate. The presence of R1 margins in DCIS and IBC greatly increases the possibility of cancer recurrence. This risk does not decrease after adjuvant radiotherapy, systemic chemotherapy or hormonotherapy.¹⁻³⁰ The presence of R1 margins in LCIS does not increase the possibility of cancer recurrence. It is not certain whether this is similar

with pleomorphic LCIS.³ Young women under 40 have a higher risk of relapse after BCT. This risk is comparable to the risk after mastectomy. Cancers in young women are more aggressive than in older women. This is due to the biology of the tumor.¹⁻³⁰ In the case of an IBC with a large intra-line component, there is a very high probability that there are numerous DCIS outbreaks. Removal of the tumor with the presence of EIC is associated with recurrences of cancer, especially in young women. Even if the operating margins are R0, MMG or MRI monitoring is recommended. In the case of microcalcification in MMG or changes in MRI, reoperation is recommended. The percentage of reoperations due to R1 resection is up to 38%. Reoperation is a psychological burden for the patient, the therapy is delayed, the cosmetic effect worsens and the costs of treatment are increased. Effective preoperative and intraoperative diagnosis aims to reduce the number of R1 resections. Information on the risk of local recurrence (lobular cancer type, histological malignancy, receptor status, young age) is also important.⁴¹⁻⁴² Intraoperative methods for determining surgical margins play a key role. Intraoperative US (Ultrasonography) may cause reduction of positive margins. US provide useful information to the surgeon for incision site and extension of margin.^{35,36,37} Endoscopy – assisted breast – conserving surgery (EBCS) was developed about ten years ago. Nowadays some studies have noticed the advantage of EBCS. The oncological outcomes and the aesthetic outcomes admissible. There is the less noticeable scar. A long-term follow – up studies are necessary to inquiry this method. The other findings showed the poor prognosis of the HER-2 subtype. It is due to increased residual microscopic tumor rests after BCT. This information may help surgeons to choose the most useful surgical treatment.¹⁸ Palpation examination, clip tagging, intraoperative histopathological examination, tissue X-ray, belong to the older methods and they have variable accuracy. Several studies describe the benefits of intraoperative ultrasound and shaving. Intraoperative ultrasound is more time-efficient but poorly detects DCIS. It has been proved that the use of intraoperative ultrasound reduces the amount of R1 resection compared to using clip or palpation. The use of shaving increases the detection of multifocal cancers. These cancers can be non-palpable or invisible in ultrasound.¹⁻⁴¹ A newer method is radio frequency spectroscopy (MarginProbe). An electromagnetic wave is used to identify the cancer tissue. Radifrequency spectroscopy is a new technique that analyzes the specimen. Several technologies such as Spectroscopic Optical, Fluorescence, X-ray, High-Frequency Ultrasound Techniques, Optical Coherence Tomography (OCT) with Interferometric Synthetic Aperture Microscopy (ISAM) can be used as an intraoperative method for analysis margins. OCT generates images that are the same as ultrasound but with

higher resolution. This method significantly reduce the number of reoperations.⁴³

Conclusion

The adequacy of margins is important for adjusting the volume of excision. It is avoiding unnecessary resection of healthy breast tissue. It is essential for a good cosmetic result and the local recurrence rate. The combination of breast MRI with conventional breast imaging resulted in the lower rate of the R1 resections and the lower rate of the re-operation.

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