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Radioguided Occult Lesion Localisation (ROLL) for Excision of Non-Palpable Breast Lesions, a Personal Experience in a Patient with Multifocal Breast Cancer

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ABSTRACT

Background: Breast conservation therapy (BCT) is the standard of care for early stage breast cancer. The procedure can be a challenge for the surgeon if the lesion is non-palpable. For excision of non-palpable breast lesions, they should be localized precisely before surgery. There are different techniques such as the WGL (Wire Guided Localization), ROLL (Radio-guided Occult Lesion Localization), etc. Some centers consider ROLL as the gold standard technique for excision of non-palpable breast lesions.

Case presentation: A 44-year-old woman with multifocal breast cancer presented to the breast clinic. Her imaging including MRI scan confirmed the presence of three tumors in the left breast and malignant looking nodes in the left axilla. Under ultrasound guidance, Core Needle Biopsy (CNB) of the breast lesions and Fine Needle Aspiration (FNA) of two lymph nodes in the left axilla were performed. Pathology of all three masses confirmed Invasive Ductal Carcinoma (IDC) and FNA of the lymph nodes was suspicious for malignancy. She was treated with breast conserving surgery using the ROLL technique. All three tumors were excised with adequate margins and axillary lymph node dissection was performed. The cosmetic results were satisfactory.

Conclusion: The ROLL technique is simple to perform and has several advantages compared to the WGL. We recommend this procedure, especially in multifocal non-palpable lesions.

Introduction

Breast conservation therapy (BCT) is the standard of care for early stage breast cancer.¹ The goal of breast conserving surgery is complete excision of lesions with negative margins to optimize the surgical outcome. Many studies have compared BCT and mastectomy but did not find any significant differences in "Overall Survival" (OS) and "Disease Free Survival" (DFS).^{2,3}

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The procedure can be a challenge for the surgeon if the lesion is non-palpable. More than 25% of breast lesions which are detected on mammography, ultrasound scan, and MRI scan are non-palpable clinically.⁴⁻⁶ For excision of non-palpable breast lesions, they should be localized precisely before surgery. There are different techniques such as WGL (Wire Guided Localization), ROLL (Radio-guided Occult Lesion Localization), RSL (Radio-guided Seed Localization), IOUS (Intra-Operative Ultrasound), CAL (Cryoprobe-Assisted Localization); and HUG (Hematoma-directed Ultrasound Guided).⁷ The WGL and ROLL are the two techniques widely used for excising non-palpable breast lesions nowadays.

ROLL has been used since 1996 when it was introduced by European Institute of Oncology in



Milan. Some centers consider it as the gold standard technique for excision of non-palpable breast lesions.⁸ In the ROLL technique, about 4 to 6 hours before surgery, a small dose (0.2-0.5 mCi) of a solution containing a high molecular weight radioactive tracer and albumin colloid radio-labelled with ^{99m}Tc is injected with a needle into the center of the lesion under stereotactic or ultrasound scan guidance. In the operating room, a handheld Gamma probe is used during the operation to guide surgical resection.^{4,6,9-12}

By definition, the lesions are multicentric when two or more malignant lesions are in different quadrants or more than 5 cm apart. Multifocal lesions are in the same quadrant or less than 5 cm apart.^{1,2}

BCT is not an absolute contraindication in multifocal cancers provided that negative margins can be achieved after excising all lesions with reasonable cosmetic results. Although WGL is widely used in surgical practice, there are some data showing ROLL may be more effective and reliable.⁸

We hereunder report a patient with multifocal breast cancer who underwent the ROLL technique for localizing the lesions.

Case presentation

A 44-year-old woman with a family history of breast cancer in her cousin was referred to breast clinic with a lump in her left breast. On examination, there was a 2.5 cm mobile firm mass in the upper central area of the left breast with palpable mobile lymph nodes in her left axilla.

We referred her for an ultrasound scan and the radiologist reported three masses: 1) An irregular hypoechoic mass in the upper outer quadrant (2 o'clock) measured 27*27 mm (BIRAD 5) 2) A microlobulated hypoechoic mass in the upper outer quadrant (3 O'clock) measured 9*7 mm (BIRADS 4b) 3) A microlobulated hypoechoic mass in the upper inner quadrant (10 O'clock) measured 7*6 mm (BIRADS 4a). Ultrasonography also showed suspicious lymph nodes with cortical thickening in the left axilla. She therefore had one palpable tumor (top lesion in Figure 1) and the other two lesions were not palpable (lower lesions in the same figure).



Figure 1. Three lesions in the upper part of the left breast

Mammography showed a speculated mass in the upper outer quadrant of the left breast (BIRADS 5) (Figure 2).

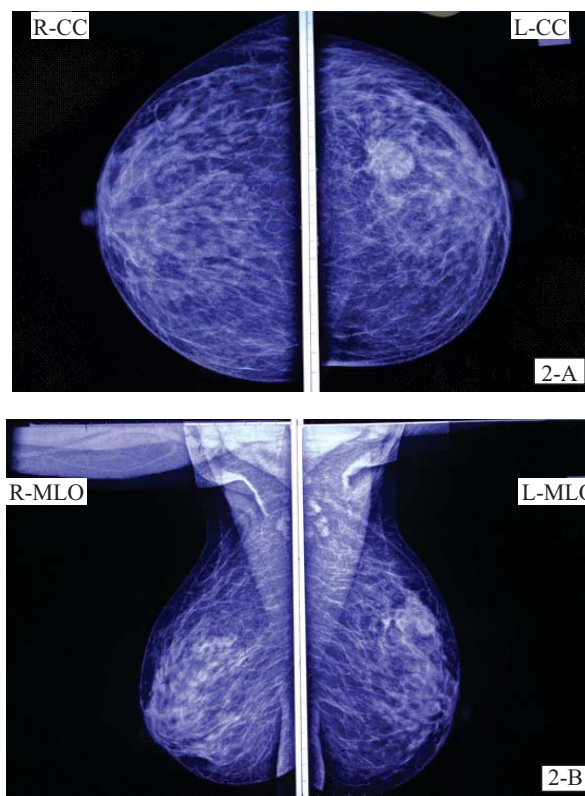


Figure 2. A- Right and left craniocaudal view of both breasts on mammography. B- Right and left medio lateral view of both breasts on mammography

MRI scan confirmed the presence of three tumors in the left breast and malignant looking nodes in the left axilla. Under ultrasound guidance, Core Needle Biopsy (CNB) of the breast lesions and Fine Needle Aspiration (FNA) of two lymph nodes in left axilla were performed. Pathology of all three masses confirmed Invasive Ductal Carcinoma (IDC), and FNA of the lymph nodes was suspicious for malignancy.

As MRI scan did not show any other lesions, breast conserving surgery was planned using the ROLL technique. The two non-palpable masses were injected with a small dose (0.2-0.5 mci) of Technetium (TC)-99m with a needle into the center of the tumor under ultrasound scan in the morning of the surgery. During the surgery with the guide of a gamma probe, all three masses were excised and axillary lymph node dissection was performed. Specimens were sent for definite pathological diagnosis.

Pathology reported all three masses were excised with adequate margins. The closet margin of the three tumors was 7mm, 14mm, and 5mm and skin was free of tumor. From 20 lymph nodes resected, 7 were involved by the tumor.

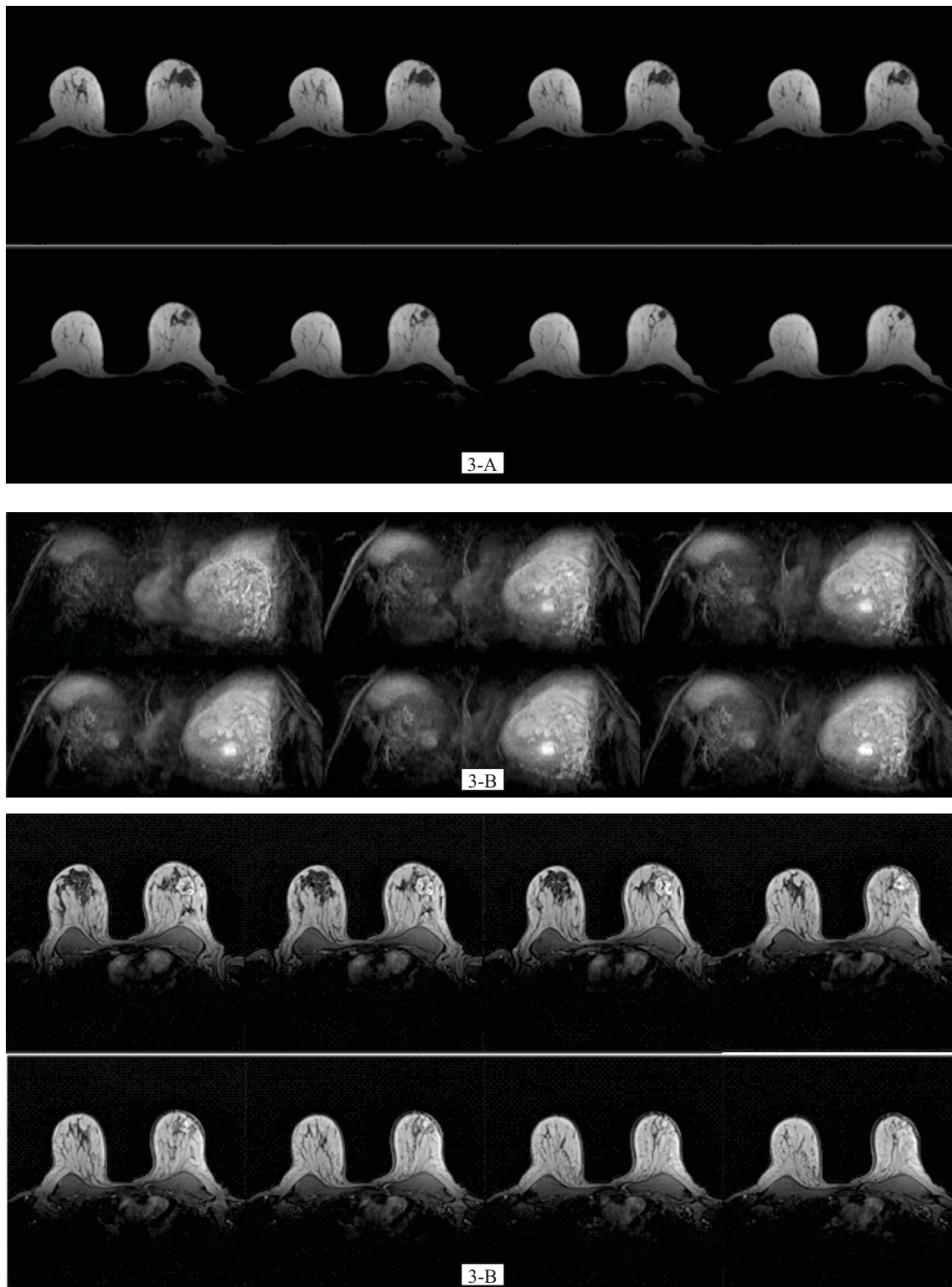


Figure 3. Dynamic MRI scan of both breasts without (3-A) & with (3-B) contrast showing enhanced masses in the upper outer quadrant of the left breast

Discussion

The goal of breast conserving surgery is complete excision with negative margins to optimize the surgical outcome. The procedure can be a challenge for the surgeon in non-palpable lesions. Although wire localisation is widely used in practice, it has several drawbacks. In a significant number of patients, there is a long distance from the entry point

of wire to the lesion which can complicate the surgery, including long incisions and difficulties to reach the lesion. There are cases when wire breaks during the operation and causes a lot of stress for the surgeon and potentially compromises the surgery. The tip of the wire is not always obvious during the surgery; therefore, the surgeon sometimes performs a wider excision to make sure the lesion has been



removed, which means extra breast tissue loss. Specimen X-ray is necessary to confirm excision but this facility is not available in most centres and can take up to thirty minutes.

ROLL is another popular technique which overcomes most of these shortcomings. Most hospitals in Iran have a radioisotope department to provide the material and an ultrasound scan device to guide the injection. With the help of the same gamma probe which is used for sentinel biopsy, the breast lesion can be easily detected and removed. There are some data which indicate less tissue loss after this technique compared to wire guided excision. Confirmation of the lesion removal can be easily made with the same probe.

WGL has been the gold standard for many years but its disadvantages, such as displacement and repositioning of the wire, limited incision site, painful placement of the wire, the need for skilled radiologist, small risk of pneumothorax, and increased risk of needle stick injury to the surgeon and pathologist, have shifted some surgeons toward using the ROLL technique.^{1-3,5,11,13}

Some reports have shown that ROLL reduces the volume and weight of tissue removal, creates better cosmetic outcomes, and reduces the operation time and also the re-operation rate.^{4,9}

Van der Ploeg *et al.* in 2007 reviewed ROLL for non-palpable breast lesions. They found ROLL was more radical than WGL, its localization was more accurate and faster, excision of the lesion was more elegant and simpler, and the cosmetic results were better. They recommended ROLL as the preferred technique in the management of non-palpable lesions.⁴

In 2012, in a large multi-center randomized clinical trial study called "ROLL trial", Postma *et al.* compared the efficacy of ROLL with WGL in breast conserving surgery for non-palpable breast tumors and concluded that ROLL was comparable to WGL in terms of complete tumour excision and re-excision rate. ROLL, however, leads to excision of larger tissue volumes. Therefore, ROLL cannot replace WGL as the standard of care.¹⁴

In a study in Hungary in 2012, Takacs *et al.* compared ROLL and WGL in the treatment of non-palpable masses in two groups of patients (ROLL=321, WGL=69) and reported no significant differences in the operating time, removed specimen volume and pathological tumour size, presence of positive resection margins, and occurrence of postoperative wound infection. They reported a higher rate of clear margin in ROLL but it was not statistically significant. The localization time was significantly reduced in ROLL but there was no difference in the duration of excision. Finally, they recommended ROLL as the preferred technique because of the shorter localization time and simpler technique.⁸

A systematic review in 2013 by Ahmed *et al.* compared the differences of WGL and RGL (radio-guided localization: ROLL & RSL) in the treatment of non-palpable breast cancers and reported that RGL reduced the operation time but with increased as accompanied volume of the excised tissue and therefore could not be recommended as the standard of care.⁵

Based on our search in PubMed and Scopus, we only found one article using ROLL for multicentric lesions in both breasts without previous biopsy. In the report by Paredes *et al.*, ROLL was used in a case of bilateral multifocal breast cancer. They suggested the use of different size radiocolloids to allow proper evaluation of each lesion and to avoid more radical surgery. They used 99m Tc-nanocolloidal and albumin macroaggregates (99mTc-MAA) for suspicious lesions of both breasts to distinguish lesions in the same breast.¹⁵ However, we had no problem with just using TC(99m) since the gamma probe is able to distinct lesions with a sufficient distance.

The ROLL technique is simpler to perform and has more advantages. There are conflicting data in the literature regarding the resected volume. We would recommend this procedure especially in multifocal non-palpable lesions when WGL can be quite challenging. The final result of our case is shown in Fig 4. We suggest an RCT (Randomized Control Trial) study to compare ROLL vs. WGL in non-palpable multifocal breast cancer when mastectomy is not planned.



Figure 4. Final result after surgery

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