Modified Round Block Technique in Management of Breast Cancer

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Abstract

The modified round block technique represents a significant advancement in breast cancer surgery, offering several advantages over traditional methods. This technique, a variation of the standard breast-conserving surgery (BCS) approach, involves the excision of the tumor with a margin of surrounding healthy tissue, but with a specific focus on minimizing the volume of resected tissue while maintaining oncological safety. Unlike traditional BCS, which might employ more extensive excision to ensure negative margins, the modified round block prioritizes a smaller, more precisely defined resection volume. This is achieved through meticulous intraoperative assessment, often guided by image-based techniques like ultrasound or clip placement for precise tumor localization. The smaller excision volume translates to several potential benefits: reduced surgical morbidity, including less pain, faster recovery times, improved cosmetic outcomes with smaller scars, and potentially less risk of complications such as seroma formation. The success of this technique hinges on achieving adequate surgical margins. Careful pathological examination post-surgery is crucial to ensure complete tumor removal and guide adjuvant therapy as needed. The modified round block technique, therefore, represents a paradigm shift towards a more targeted and minimally invasive approach to breast cancer surgery, aiming to balance oncological safety with improved patient quality of life. Further research comparing this technique to standard BCS in larger, prospective studies is needed to fully establish its long-term efficacy and definitively assess its impact on local recurrence rates and overall survival.

Keywords: Modified Round Block Technique , Breast Cancer

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Introduction

In any patient who presents with a breast lump or other symptoms suspicious of carcinoma, the diagnosis should be made by a combination of clinical assessment, radiological imaging and a tissue sample taken for either cytological or histological analysis, the so-called triple assessment [1]. The positive predictive value of this combination should exceed 99.9% [1].

1- Clinical assessment:

a- Clinical history:

The patient's history should include standard epidemiologic and reproductive information to assess the relative risk factors. Information about lumps, pain, or any changes in the breast should be obtained and correlated with physical findings. Although pain is probably the most frequent breast complaint that brings a patient to a physician's office, it is uncommonly the presenting factor in cancer. Breast cancer, especially in its early stages, is usually painless. Most breast pain is related to hormone stimulation and swelling of breast tissues [1].

b- Clinical examination:

The technique for examination of the breast should include inspection and palpation of the entire breast and draining lymph node.

Inspection:

the following are assessed:

- Asymmetry
- Visible lumps
- Cutaneous oedema (peau'd orange)
- Contour flattened
- Skin tethering as identified by puckering, particularly when the arm raised
- Abnormal fixation
- Retraction and altered axis of the nipples; in advanced cases.

There may be gross ulceration of the skin overlying the lesion.[2].

Palpation:

Care must be taken to ensure the whole breast is examined, transversely from the sternum to the clavicle, posteriorly to latissimus dorsi and inferiorly to the upper rectus sheath. The surgeon performs the examination with the palmer aspects of the fingers avoiding grasping or pinching motion. The breast may be cupped or melded in the examiner's hands to check for retraction [2].

A systematic search for lymphadenopathy then is performed. The position for examination of the axilla is that the shoulder girdle is stabilized by supporting the upper arm and elbow. Using gentle palpation, all three levels of possible axillary lymphadenopathy are assessed. [2].

2- Radiological imaging:

a- Mammography:

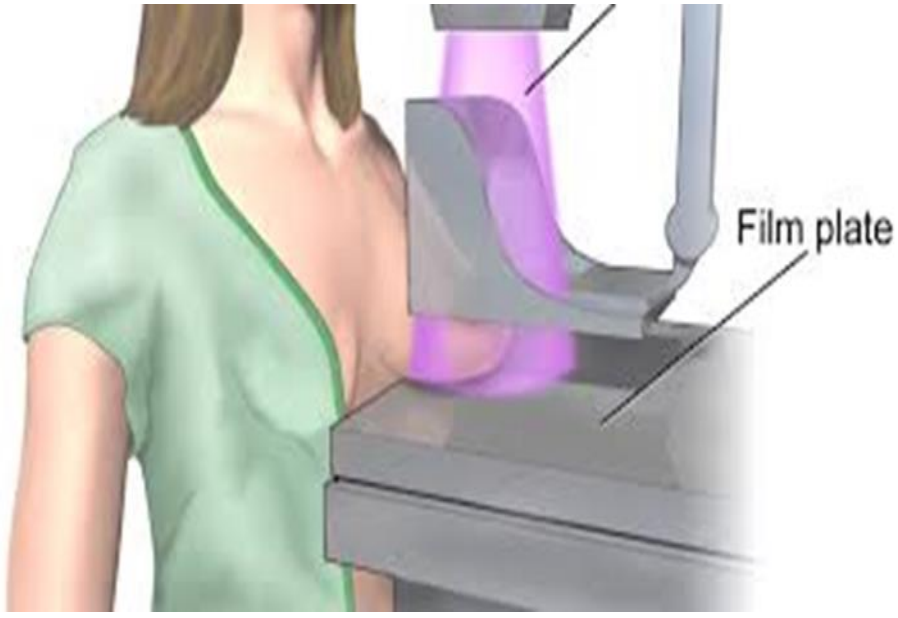

Fig 1: Technique of mammography

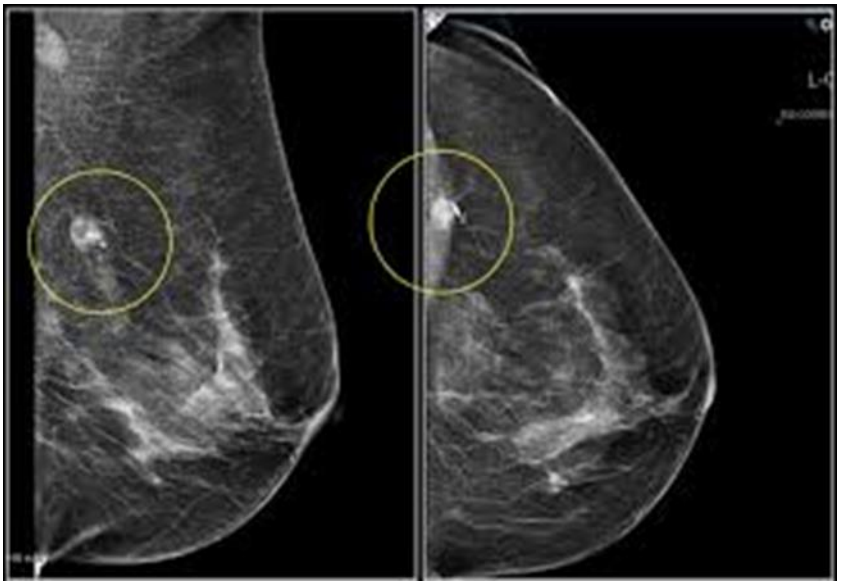

Fig 2: Breast mass on mammography

Mammography remains the investigation of choice for detecting and classifying microcalcification:

a- Benign microcalcification is characterized by diffuse scattering and crescentic '' tea-cupping.''

b- Malignant microcalcification is characterized by isolated clusters, punctuate of varying sizes, and a branching or linear pattern.

Recent advances in mammography include digital mammography, and computer-aided detection (CAD).

Digital mammography uses essentially the same mammographic system as conventional mammography, but it is equipped with digital receptors, instead of film cassettes. The digital detectors convert x-ray photons to digital signals for display on high-resolution monitors. The processes of storage and display of images can be separated and individually optimized, thus allowing alteration of the magnification, brightness, contrast, and orientation of the mammogram [3].

BIRADS classification is widely used classification system. The BIRADS acronym stands for Breast Imaging-Reporting and Data System which is a widely accepted risk assessment and quality assurance tool in mammography, ultrasound or MRI. Part of the initial implementation was to make the reporting of mammograms more standardized and comprehensible to the non-radiologist reading the report. This is not a unique system. There are other systems (e.g. Nottingham classification) in use all over the world [4].

The latest version classifies lesions into six categories:

BIRADS 0

o incomplete, further imaging or information is required, e.g. compression, magnification, special mammographic views, ultrasound

• BIRADS I: negative, symmetrical and no masses, architectural disturbances or suspicious calcifications present

• BIRADS II: benign findings, interpreter may wish to describe a benign-appearing finding

o calcified fibroadenomas

•fat-containing lesions such as: oil cysts and breast lipomas

• BIRADS III: probably benign, short interval follow-up suggested

• BIRADS IV: suspicious abnormality

o there is a mammographic appearance which is suspicious for malignancy

o biopsy should be considered for such a lesion

• BIRADS V: there is a mammographic appearance which is highly suggestive of malignancy, action should be taken

• BIRADS VI: known biopsy proven malignancy

[5].

b- Breast ultrasonography:

Technological advances have expanded the clinical application of Ultrasound beyond its traditional role as an adjunct to mammography. High-resolution ultrasound detects very small lesions, and more reliably differentiates malignant from benign solid masses. However, it also identifies many benign lesions that usually necessitate further investigation. This has been the major limitation of ultrasound in studies that have evaluated its accuracy in screening, the incremental false positive rate being around 5%-7% if ultrasound is used as an adjunct to screening mammography. Ultrasound remains unproven as a screening tool, and its potential role in screening is likely to be limited to women with dense breasts on mammography where it can detect cancers not visible on mammography [6].

c- Magnetic Resonance Imaging (MRI):

Magnetic Resonance Imaging is a particularly useful modality for detailing architectural abnormalities in the breast and can help detect lesions as small as 2-3 mm. In cancers, it is useful in defining the precise size of the tumor and in detecting multifocal disease. This is particularly helpful when deciding whether borderline cases are appropriate for breast-conserving surgery [7].

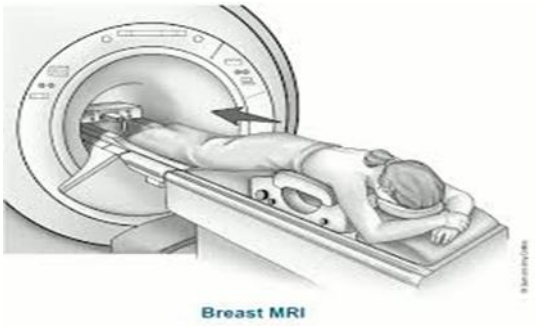

Fig 3: Technique of breast MRI

Fig 4: Examples of Breast MRI

Advantages of MRI compared with conventional imaging techniques to detect breast cancer include the following:

• Improved staging and treatment planning

• Enhanced evaluation of enhanced breast

• Better detection of recurrence

• Improved screening in high-risk patients

d- Positron Emission Tomography (PET):

Positron Emission Tomography is the most sensitive and specific of all the imaging modalities for breast disease, but it is also one of the most expensive and least widely available. Using a wide range of labelled metabolites (e.g. fluorinated glucose), changes in metabolic activity, vascularization, oxygen consumption, and tumor receptor status can be detected. At present, its main use may be for helping detect recurrences in scarred breasts, but it is also useful in multifocal disease and in helping detect axillary involvement [8].

Distant metastases may be detected with PET imaging and could replace the need for other imaging studies, such as bone scanning, chest radiography, and abdominal CT scanning [9].

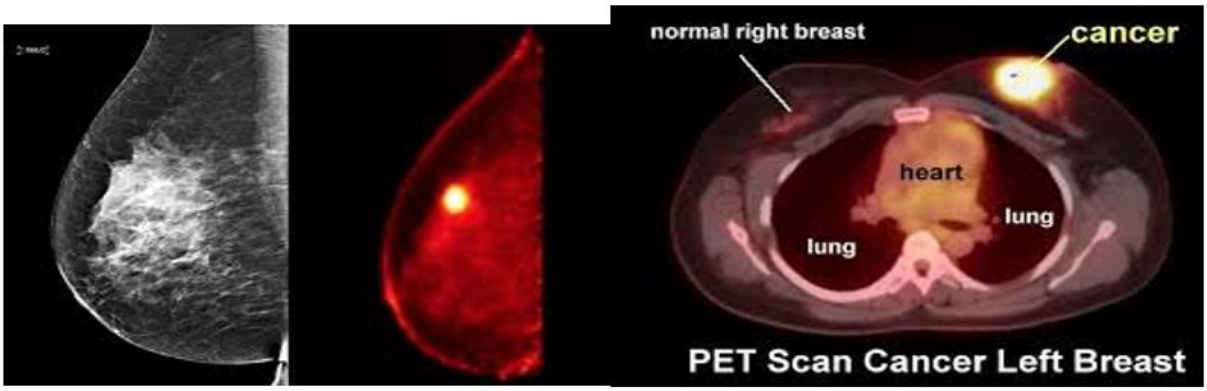

Fig 5: PET and PET CT scan of the breast

Table (1): Indications of breast imaging modalities

Modality	Indications
Mammography	Initial investigation for symptomatic breast in women older than 35 years and for screening; investigation of choice for micro calcification.
Ultrasonography	Initial investigation for palpable lesions in women younger than 35 years.
MRI	Scarred breast, implants, multifocal lesions, and borderline lesions for breast conservation.
Positron emission tomography (PET)	Axilla assessment, scarred breast, and multifocal lesions.

Modality Indications

Mammography Initial investigation for symptomatic breast in women older than 35 years and for screening; investigation of choice for micro calcification.

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Positron emission tomography (PET) Axilla assessment, scarred breast, and multifocal lesions.

e- Ductography:

Ductograms are performed by injecting radiopaque contrast media into one or more of the mammary ducts and performing subsequent mammographic imaging. The primary indication for this technique is discharge from the nipple, particularly when the fluid is bloody. The duct is gently enlarged with a dilator [10].

Fig 6: Ductography

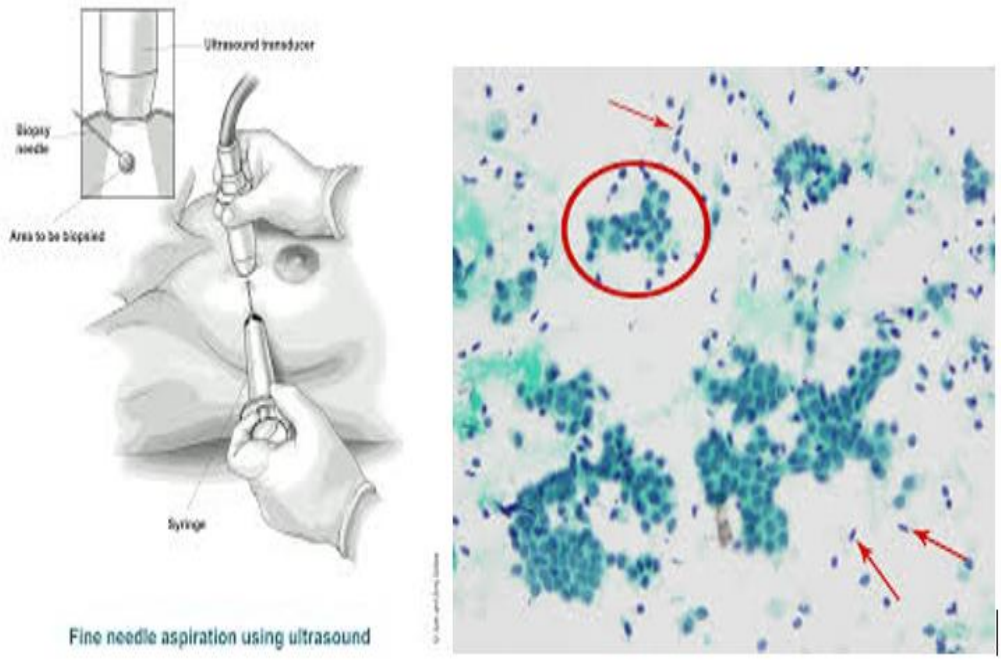
3- Histopathological diagnosis:

I- Palpable masses:

1- Fine-needle aspiration biopsy (FNAB):

Histopathological diagnosis of breast carcinoma is mandatory before conducting surgery. FNAB is applied to confirm the diagnosis of a breast tumor demonstrated by mammography and\or ultrasonography. FNAB is now regarded as the method of choice in the preliminary investigation of breast lesions

Advantages of FNAB include the simplicity of the method, which is well-tolerated by patients, and the high diagnostic rate achieved, especially in small (but not <1cm) and\or hard lesions. Estrogen and progesterone receptors can be determined by immunohistochemistry on malignant FNAB specimen [11].



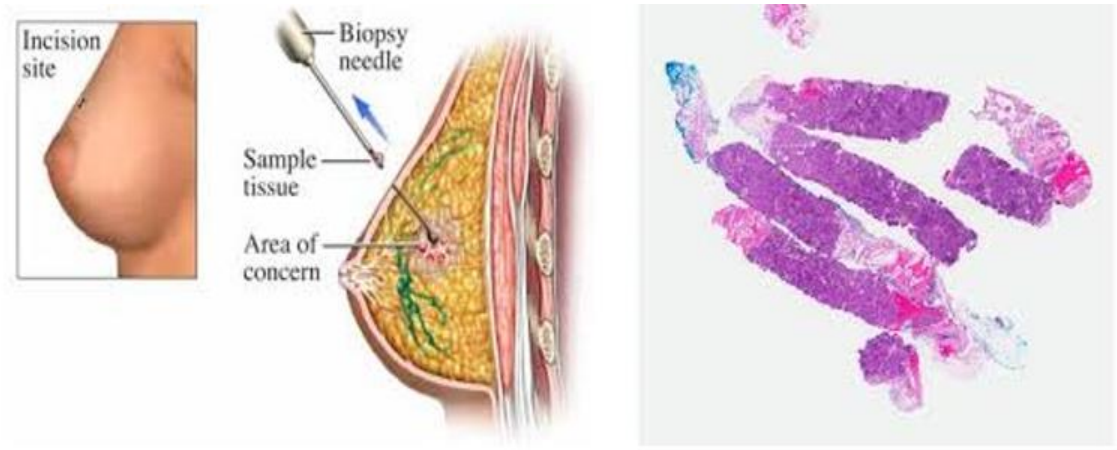


Fig 7: FNAC (technique and cells under microscopy)

2- Core-needle / tru-cut biopsy:

Core-needle biopsy technology has improved and although the false positive and false negative results are comparable to FNAB, core-needle provides more detailed histopathological information than FNA.Core-needle biopsy primary role is to establish tissue diagnosis of locally advanced breast cancer before radiation or chemotherapy. Another application is a benign-appearing mass discovered or seen on mammogram or U/S. Using radiologic guidance, these lesions can undergo biopsy and are proven benign, thereby, avoiding open biopsy [12].

3- Incisional biopsy:

An incisional biopsy of a suspicious breast mass involves the removal of a portion of the lesion which is then submitted for pathologic examination. This type of biopsy is indicated in pathologic examination. This type of biopsy is indicated in patients who have large (4 cm or more) primary breast lesions and who will undergo pre-operative chemotherapy or radiotherapy. The incisional biopsy should excise only the amount of tissue necessary for histologic confirmation of the diagnosis and for hormone- receptor studies [13].

4- Excisional biopsy:

Excisional biopsy is both diagnostic and therapeutic at which a completely removed mass with good margins of normal tissue may mean that further surgery is not required. It is performed in the operation room under local anesthesia with intravenous sedation or under general anesthesia. Incisions should be oriented along Langer's lines for optimal cosmoses (curvilinear, parallel to the areola). All incisions should be planned such that they can be incorporated into a mastectomy incision. If the surgeon suspects intra-operatively that the mass is malignant, a 1-cm margin of normal tissue should be excised around the entire extent of the tumor. The masses should be excised as a single specimen, oriented such as placing a short suture superiorly and long suture laterally, and margins inked. This guides the surgeon to a conservative re-excision if margins are close or positive, improper specimen handling may obscure margin status [14].

Modified Round Block Technique (MRBT)

A periareolar incision (PAI) is often utilized in breast-conserving surgery because of its superior aesthetic outcomes, due to its short scar formation. However, it can be difficult to apply the procedure when a tumor is located distal from the areolar margin or the areola is small in size. Benelli first reported round block technique for mammoplasty in 1990 to restrict the scar to the areola. RBT is now widely used, and can compensate for the disadvantages of PAI. The advantages of RBT include a wider skin incision that enables easy access to tumors with almost the same short scar as that of PAI. However, late-onset widening of the scar and changes in areolar shape are common problems with this technique-modification of RBT to resolve those problems, especially for women with small- to medium-sized breasts. Herein, the new oncoplastic breast-conserving surgery using modified round block technique (MRBT), and present the outcomes.

Surgery was performed in a supine position under general anesthesia. A circumferential periareolar incision was made along the outer wedge of the areola, and deep subcutaneous dissection was carried out via the incision. Unlike RBT, the periareolar skin was neither excised nor de-epithelialized. Subcutaneous dissection was extended not only to the tumor bearing upper quadrant but also to the entire breast including the inferior quadrants, which made it easy to access the distally located tumor without periareolar skin excision. The nipple areola complex (NAC) was then completely detached from the sounding skin flap, and vascularized only by a breast gland beneath the NAC. A wound retractor was then able to widen the periareolar round wound at least 5 cm in diameter even when the areolar size was less than 3 cm in diameter. The attached retractor was pushed up toward the tumor, and the NAC and breast parenchyma were pushed downward. Once the lesion around the tumor was well visualized, partial mastectomy could then easily be performed with a good field of view. When the tumor was non-palpable, intraoperative ultrasound examination could be performed through the wound to precisely detect and resect the tumor. Partial mastectomy defect was repaired by mobilizing and suturing the surrounding breast parenchyma. It was very easy to mobilize the residual breast parenchyma because it had been already widely dissected from the skin flap. However, part of the residual breast parenchyma, which was located below the NAC or the 5th intercostal level, must remain attached to the pectoralis muscle to maintain vertical blood supply to the NAC. After remodeling of the breast was completed, a close suction drain was placed. The wound was straightened to accommodate the former areolar size with non-absorbable purse-string suture, and closed with the NAC with continuous subcuticular absorbable suture [15].

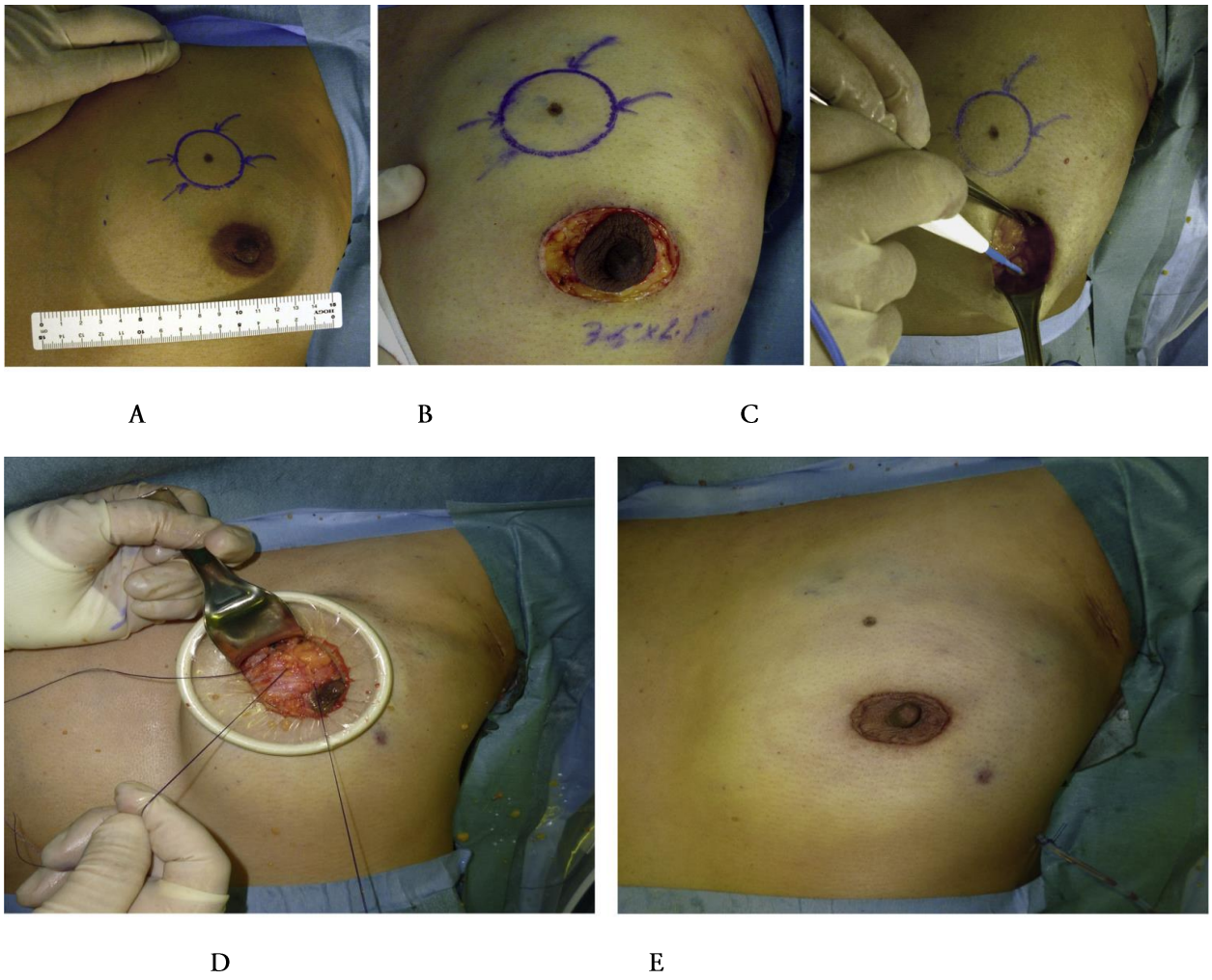


Fig. 8: modified round block technique (A. Partial mastectomy was completed with a good field of view. B. The nipple-areolar complex was situated beneath the lower skin flap during the tumor resection. C. The figure shows the original location of the resected specimen and the nipple-areolar complex. D. Partial mastectomy defect was repaired by mobilizing and suturing the surrounding breast parenchyma. E. The wound was closed with the areola without tension.)

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