THE ROLE OF CONTRAST ENHANCED SPECTRAL MAMMOGRAPHY IN THE FOLLOW-UP OF PATIENTS WHO HAD UNDERWENT BREAST SURGERY.

Thesis

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Abstract

In this This study was prospectively carried on 38 female patients presenting with history of previous breast surgery on either breast sides, who require follow up. It included 38 post-operative patients with 52 breast lesions. Each lesion was assigned an independent BIRADS score for each modality. The results were studied and correlated.One of these is contrast-enhanced spectral mammography (CESM) that improves the sensitivity for breast cancer detection without decreasing specificity as it provides higher contrast and better lesion delineation than mammography alone.CESM is an imaging technique combining digital mammography with intravenous injection of iodinated contrast media to detect hypervascularized lesions. Addition of iodinated contrast agent to Mammography facilitates the visualization of breast lesions.

Keywords: CESM-MRI- BIRADS- BRCA

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- ACR: American College of Radiology
- ACRIN: American College of Radiology Imaging Network
- AGO: Arbeitgeinschaft Gynakologische Oncologie
- AJCC: American Joint Cancer Committee
- Al: aluminum
- BIRADS: breast imaging reporting and database system
- BCT: breast conservative therapy
- BRCA: breast cancer
- CC: cranio-caudal
- CEDM: contrast enhanced digital mammography
- CESM: contrast enhanced spectral mammography
- CT: computed tomography
- Cu: copper
- DCE-MRI: dynamic contrast enhanced magnetic resonance imaging
- DCIS: ductal carcinoma in situ
- DE: dual energy
- ER: estrogen receptor
- ESMO: American Society of Oncology
- FNAC: fine needle aspiration cytology
- FSPGR: fast spoiled gradient-recalled acquisition
- G: grade
- Gd: gadolinium
- GE: General Electric
- HER2: human epidermal growth factor receptor 2

- IBR: immediate breast reconstruction
- IDC: invasive ductal carcinoma
- ILC: invasive lobular carcinoma
- keV: kilo electron volt
- kV: kilo volt
- LCIS: lobular carcinoma in situ
- LR: local recurrence
- M: distant metastasis
- MG: mammography
- MIP: maximum intensity projections
- MLO: medio-lateral oblique
- Mo: molybdenum
- MRI: magnetic resonance imaging
- MRM: modified radical mastectomy
- N: regional lymph node
- NAC: nipple-areola complex
- NMLE: non mass like enhancement
- NSM: nipple sparing mastectomy
- PR: progesterone receptor
- Rh: rhodium
- ROLL: radio occult lesion localization
- RT(PCR): reverse transcription polymerase chain reaction
- SI: signal intensity
- SLN: sentinel lymph node
- sn: sentinel node
- SSM: skin sparing mastectomy

➢ STIR: short tau inversion recovery
➢ T: primary tumor
➢ T1 mic: micro-invasion
➢ Tis: Carcinoma in situ
➢ TRAM: transverse rectus abdominus muscle
➢ US: ultrasound
➢ WI: weighted image
➢ WL: wire localization

Introduction

The introduction of full-field digital mammography has sparked the development of other techniques that are less expensive than magnetic resonance imaging (MRI) and more widely available. One of these is contrast-enhanced spectral mammography (CESM) that improves the sensitivity for breast cancer detection without decreasing specificity as it provides higher contrast and better lesion delineation than mammography (MG) alone ***(Dromain et al., 2012).***

Preliminary results with CESM examination suggest that, similar to breast MRI, CESM should be of particular interest for the assessment of the extent of disease that allow a better evaluation of lesion size and detection of more multifocal breast cancers than mammography alone or combined with ultrasonography (US) ***(Fallenberg et al., 2014).***

Many factors influence the individual woman's requirements for follow-up care after breast surgery. Recommendations to individuals should be based on the absolute benefits and potential risks of follow-up care, and the individual's needs. These factors should be discussed with the woman. With the current treatment protocols the local recurrence rate is 1% – 2% per annum after breast conserving treatment and radiotherapy and 1% after mastectomy ***(Ewan 2001).***

The usual treatments for local recurrence are more effective if used in the earliest phases. Local recurrences are more commonly diagnosed during routine follow-up at a time when the patient is

asymptomatic. The percentage of patients with a recurrence being asymptomatic at time of detection varied between 9% ***(Donnelly et al., 2001)*** and 52% ***(Perrone et al., 2004).***

New contralateral primaries are usually diagnosed as part of the regular mammographic screening while patients are asymptomatic. The outcomes are based on tumor characteristics and are independent of the original cancer ***(Rutherford et al., 2010).***

As CESM seems to be a promising tool for increasing the sensitivity of MG, with a performance comparable to that of MRI, it might be expected to improve size estimation and staging. Investigational clinical results on CESM have been published during the last few years, suggesting that the technique may be a useful adjunct to MG with lesion contrast uptake information ***(Dromain et al., 2006).***

Also, CESM could be useful in follow-up of cases after surgery and monitoring lesion size after chemotherapy ***(Elsaid and Raafat 2012).***

Therefore, CESM as an adjunct to MG with or without US is expected to improve diagnostic accuracy compared to MG with or without US. Addition of iodinated contrast agent to MG facilitates the visualization of breast lesions ***(Dromain et al., 2012).***

To our knowledge, there is a paucity in literature in this field and such an approach has not yet been attempted in clinical application. Thus, we will discuss the application of CESM in the follow up of patients who had undergone breast surgery in reference to the literature describing the MRI features in the field. Enhancing breast mass

lesions were therefore assessed in reference to American College of Radiology (ACR) 2013 Breast Imaging Reporting and Data Base System (BIRADS) MRI Lexicon as no standardized BIRADS Lexicon to CESM is still established ***(Morris et al., 2013).***

Aim of the work

The aim of this work is to evaluate the diagnostic accuracy of Contrast Enhanced Spectral Mammography as an adjunct to sono-mammography versus sono-mammography alone in the assessment of patients following breast surgery.