بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

“Dynamic Contrast-Enhanced Breast MRI for Evaluating Residual Tumor Size after Neo-adjuvant Chemotherapy”

Thesis

Submitted for Partial Fulfillment of the Master Degree in ***Radiodiagnosis***

Presented by

Mahmoud Mohamed Anas Abdul Salam
M.B.B.Ch, Ain Shams University

Under Supervision of

Prof. Dr. Sherine Kadry Amin
Professor of Radiodiagnosis
Faculty of Medicine – Ain Shams University

Dr. Ahmed Mohamed Samy El Shimy
Lecturer of Radiodiagnosis
Faculty of Medicine – Ain Shams University

Faculty of Medicine - Ain Shams University
2020

سورة البقرة الآية: ٣٢

Acknowledgments

First and foremost, I feel always indebted to ***Allah*** *the Most Beneficent and Merciful.*

My deepest gratitude for my supervisor, ***Prof. Dr. Sherine Kadry Amin,*** *Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University, for her valuable guidance and expert supervision, in addition to her great deal of support.*

I must express my deepest thanks to ***Dr. Ahmed Mohamed Samy****, Lecturer of Radiodiagnosis, Faculty of Medicine, Ain Shams University, for guiding me throughout this work and for granting me much of his time.*

I would like to express my hearty thanks to all my family for their support till this work was completed.

Mahmoud Anas

List of Contents

List of Tables

List of Figures

List of Figures cont...

List of Abbreviations

Abb.	Full term
AJCC	*American Joint Committee on Cancer*
BCS	*Breast Conserving Surgery*
BIRADS	*Breast Imaging-Reporting And Data System*
CAD	*Computer Aided Diagnosis*
DCE	*Dynamic Contrast Enhanced*
DCIS	*Ductal Carcinoma Insitu*
ICC	*Interclass Correlation Coefficient*
IDS	*Invasive Ductal Carcinoma*
ILC	*Invasive Lobular Carcinoma*
MRI	*Magnetic Resonance Imaging*
MRM	*Modified Radical Mastectomy*
NAC	*Neo-adjuvant Chemotherapy*
NCI	*National Cancer Institute*
NME	*Non-mass Enhancement*
NPV	*Negative Predictive Value*
pCR	*Pathologic Complete Response*
PPV	*Positive Predictive Value*
SD	*Standard Deviation*
SEER	*Surveillance, Epidemiology, and End Results*
TDLU	*Terminal Ductal- Lobular Unit*
WLE	*Wide Local Excision*

Abstract

Purpose: to investigate the accuracy of dynamic contrast material–enhanced (DCE) breast MRI for determining residual tumor size after neoadjuvant chemotherapy (NAC) and detect the value of measuring residual size in delayed phase compared to early phase.

Methods: The study included twenty female patients who are newly diagnosed breast cancers after completion of NAC referred from surgical oncologists to radiodiagnosis departments of Ain Shams University and Nasser institute hospitals. Each patient was subjected to full history, reviewing medical sheet and dynamic contrast enhanced MRI using 1.5 T unit (GE). Protocol consisted of a sagittal T2-weighted fat-suppressed fast spin-echo sequence and an axial T1-weighted fat-suppressed fast spoiled gradient-echo sequence with one pre-contrast and five post contrast dynamic series at 90, 180 240, 300, 360 seconds after beginning the intravenous administration of gadobutrol. Residual tumor size at early and late phase MRI was compared to postoperative histopathology.

Results: DCE-MRI after NAC underestimation rate was found to be about 50 % Vs 15 % overestimation rate. 51 % NPV Vs 93 %PPV was reported. Delayed phase better correlated with postsurgical histopathological size than early phase.

Conclusion: DCE-MRI has lower accuracy when performed after NAC. It tends to underestimate residual tumor size. Delayed phase is more accurate than early phase in evaluating residual tumor size.

Keywords: Dynamic Contrast-Enhanced, Breast MRI, Neo-adjuvant Chemotherapy

INTRODUCTION

Breast cancer is the most commonly occurring cancer in women and one of the most important causes of death. 1.67 million new cases of breast cancer were identified worldwide, accounting for 25% of all cancers. The incidence and mortality rates of breast cancer is rising. Patient survival rates depend on both early diagnosis and improved treatment modalities including surgery, radiotherapy and chemotherapy ***(Momenimovahed and Salehiniya, 2019).***

Neoadjuvant chemotherapy (NAC) has a well-established role in the management of breast cancer. It increases rates of breast-conserving therapy compared with post-operative chemotherapy and may minimize the need for aggressive nodal surgery with axillary lymph node dissection ***(Pilewskie and Morrow, 2017).***

The underestimation of residual tumor sizes after NAC can result in positive resection margins and the necessity of re-excisions or even conversions to mastectomies, with the increased risk of subsequent in-breast tumor recurrences, so the accurate assessment of residual tumor size after NAC is crucial for planning the necessary surgical extent, as well as for monitoring the response to NAC ***(Hyton, 2018).***

The immediate goal of MRI after NAC is to provide information on the extent of residual disease in the breast to

enable surgeons to obtain adequate surgical margins at initial surgery and avoid re-excision, yet MRI accuracy when performed after NAC is lower ***(Mann et al., 2019).***

At preoperative MRI in patients with breast cancer who do not undergo NAC, tumor size is assessed in the early phase to maximize the contrast of the tumor to the background parenchyma. However, the rate of enhancement of residual cancer after NAC might be delayed because of the antiangiogenic effects of chemotherapy ***(Santamaria et al., 2017).***

So, ***Kim et al. (2018)*** suggested that the lesion size at delayed-phase MRI more accurately reflected the residual tumor size and thus, the current standard practice of assessing size in the early phase may not be adequate following NAC, and the delayed phase should be considered in determining the extent of surgery.

AIM OF THE WORK

To investigate the accuracy of dynamic contrast material–enhanced (DCE) breast MRI for determining residual tumor size after neoadjuvant chemotherapy (NAC) and detect the value of measuring residual size in delayed phase compared to early phase.