



Role of MR Mammography in Women with Breast Implants

ESSAY

Submitted for Fulfillment of Master Degree in
Radio-diagnosis

Submitted by:

Muhammed Adel Abd Al-Azim Amin
(M.B.B.CH., Ain Shams University)

Under Supervision Of

Prof. Dr. Maha Mohamed Abd Al-Raof

*Professor of Radio-diagnosis
Faculty of Medicine
Ain Shams University*

Dr. Noha Mohamed Osman

*Assistant Professor of Radio-diagnosis
Faculty of Medicine
Ain Shams University*

**Faculty of Medicine
Ain Shams University**

2019

Abstract

Mammography is rapid and inexpensive, but it is of limited usefulness in detecting implant rupture in women with silicone implants. It is very inaccurate for intracapsular rupture and will reliably detect extruded silicone only in an extracapsular rupture.

Key word:

RODEO

TRAM-

Mammography

ACKNOWLEDGEMENTS

First and foremost, my deepest praises are due to Almighty “ALLAH” who enabled me to finish this piece of work appropriately.

I would like to express my deep thanks and gratitude to **Prof. Dr. Maha Mohamed Abd Al-Raof** for her continuous meticulous supervision apart from his spiritual support that paved the way to the achievement of this work.

I feel deeply indebted to **Dr. Noha Mohamed Osman** for her precious valuable advices, close supervision and remarkable advices removing any obstacle. I shall always be proud to have worked under her guidance.

Finally, I would like to express my infinite gratitude and my deepest appreciation to my family, all staff members and to my colleagues, at Radiology Department, for their support.

***To
My Wife***



REVIEW OF LITERATURE

List of Contents

Contents	Page
List of Figures	6
List of Tables	9
List of Abbreviations	10
Introduction	12
Aim of work	14
Review of Literature	
• Chapter 1: Types of breast implants.	16
• Chapter 2: Magnetic resonance imaging of breast implants and their normal appearance.	35
• Chapter 3: Magnetic resonance manifestations of breast implant complications.	50
Summary & Conclusion	83
References	86
Arabic Summary	94

List of Figures

Figure	Page
Fig. 1: Diagram for skin incisions in prosthesis implantation	20
Fig. 2: Diagram for locations of breast prosthesis	22
Fig. 3: MRI of subpectoral and subglandular silicone implants	22
Fig. 4: MRI of single lumen silicone implant	26
Fig. 5: MRI of single lumen silicone implant with smooth shell	26
Fig. 6: MRI of single lumen adjustable implant with leaflet valve	27
Fig. 7: MRI of single lumen saline implant with retention valve	27
Fig. 8: MRI of double lumen implant	28
Fig. 9: MRI of double lumen implant with self-seal inflatable valve	28
Fig. 10: MRI of reverse double lumen implant with posterior tube valve	29
Fig. 11: MRI of reverse double lumen implant	29
Fig. 12: MRI of reverse adjustable double lumen implant	30
Fig. 13: MRI of gel gel double lumen implant	30
Fig. 14: MRI of triple lumen implant	31
Fig. 15: MRI of cavon implant	31
Fig. 16: MRI of soft pectus implant	32
Fig. 17: MRI of sponge (non adjustable) implant	32
Fig. 18: MRI of textured surface of implants	33
Fig. 19: MRI of normal single lumen implant	42

Fig. 20: Diagram for single lumen implant	43
Fig. 21: MRI of radial folds	44
Fig. 22: MRI of radial folds	45
Fig. 23: MRI of double lumen implants	46:47
Fig. 24: MRI of soya-oil containing Trilucent implants	48
Fig. 25: Diagram for intracapsular and extracapsular rupture	53
Fig. 26: Diagram for the degrees of shell collapse	54
Fig. 27: Diagram for intracapsular rupture	57
Fig. 28: MRI of intracapsular rupture	57
Fig. 29: MRI of intracapsular rupture	58
Fig. 30: MRI of intracapsular rupture	58
Fig. 31: Diagram for uncollapsed intracapsular rupture	59
Fig. 32: MRI of uncollapsed intracapsular rupture	60
Fig. 33: MRI of uncollapsed intracapsular rupture	61
Fig. 34: MRI of leakage/minimally collapsed rupture	61
Fig. 35: MRI of minimally collapsed rupture	62
Fig. 36: MRI of ruptured inner lumen in double lumen implant	63
Fig. 37: Diagram for extracapsular rupture	64
Fig. 38: MRI of extracapsular rupture	65
Fig. 39: MRI of intracapsular and extracapsular rupture	65
Fig. 40: MRI of intracapsular and extracapsular rupture	66
Fig. 41: MRI of migrated extracapsular silicone	66

Fig. 42: MRI of complex radial folds	68
Fig. 43: MRI of migrated breast implant	69
Fig. 44: MRI of capsular contracture and intracapsular rupture	71
Fig. 45: MRI of capsular contracture	72
Fig. 46: MRI of infected implant	74
Fig. 47: MRI of cancer breast	77

List of Tables

Table

Page

Table 1. Sequences and Resulting Signal Intensities of Silicone, Fat, and Water **40**

List of Abbreviations

FDA: *Food and Drug Administration*

TRAM: Transverse rectus abdominis musculocutaneous

MRI: Magnetic Resonance Imaging

Hz: Hertz

T: Tesla

STIR: Short T1 Inversion Recovery

FSE: Fast Spin Echo

RODEO: Rotating Delivery of Excitation off Resonance

IR: *Inversion recovery*

SE: *spin echo*

TE: *echo time*

TI: *inversion time*

TR: *repetition time*

CC: *Craniocaudal*

MLO: *Mediolateral oblique*

FOV: *Field of Vision*



INTRODUCTION

INTRODUCTION

Since the reintroduction of breast implants in breast augmentation has become the most common cosmetic surgical procedure (**Gribelyuk et al., 2012**).

Breast implant associated complications still represent a significant challenge for radiologists and have significant negative impact on patient satisfaction (**Del Pozo et al., 2014**).

Mammography ultrasonography, computed tomography, and magnetic resonance imaging (MRI) have been used to assess the integrity of breast implants. In previous studies, MRI has been shown to be superior compared with other methods (**Cher et al., 2014**).

Magnetic resonance imaging should be considered the method of choice for investigating breast implants, and the standardization of magnetic resonance imaging criteria may improve magnetic resonance imaging accuracy (**Rietjens et al., 2014**).

Non-contrast MRI, using multiple planes and employing sequences designed to evaluate the internal structure of the implant and to assess implant complications. Although mammography remains the standard of care for breast cancer detection, contrast enhanced MRI may assist in depicting cancer in augmented breast: the use of intravenous contrast and ability to image posterior tissues are particularly valuable in women where

mammography is compromised by the presence of implants (**Lieberman and Berg 2005**).

Clinical information is usually helpful and is occasionally crucial .The normal appearance of certain types of implants can be confusing, and can simulate the appearance of rupture; knowledge of implant type can minimize the likelihood of diagnostic error (**McNamara and Middleton 2011**).

In evidence of intracapsular rupture Mammography is typically normal, and the rupture is identified only on three-dimensional imaging, such as MRI (**De Paredes 2007**).

Regular magnetic resonance imaging has been recommended for the purpose of screening for implant rupture (**McCarthy et al., 2008**).

AIM OF WORK

The purpose of this study is to discuss the appearances, complications of different breast implants, and underlying breast cancer using MR Mammography.

CHAPTER 1

TYPES OF BREAST IMPLANTS