

The Role of Oncoplastic Surgical Techniques in Management of Breast Cancer

Essay

*Submitted for Partial Fulfillment of the Master Degree
in General Surgery*

By

Doaa Ahmed Hasan Moussa

(M.B.,B.CH)

Faculty of Medicine, Ain Shams University

Supervisors

Prof. Dr. Hossam El-Din Hasan El-Azzazi

Professor of General Surgery

Faculty of Medicine, Ain Shams University

Prof. Dr. Ayman Abo El-Makarem Shaker

Professor of Plastic Surgery

Faculty of Medicine, Ain Shams University

Dr. Haitham Mostafa El-Maleh

Lecturer of General Surgery

Faculty of Medicine, Ain Shams University

*Faculty of Medicine
Ain Shams University*

2014

Acknowledgment

*First, thanks are all directed to **ALLAH** for blessing this work until it has reached its end, as a part of generous help throughout my life.*

*I would like to express my deepest gratitude to **Prof. Dr. Hossam El-Din Hasan El-Azzazi, M.D.** Professor of General Surgery, Faculty of Medicine, Ain Shams University, for his great support & continuous encouragement throughout the whole work,*

*I am truly grateful to **Prof. Dr. Ayman Abo El-Makarem Shaker, M.D.** Professor of Plastic Surgery, Faculty of Medicine, Ain Shams University, for his great support, supervision & continuous encouragement throughout the whole work,*

*I am deeply grateful to **Dr. Haitham Mostafa El-Maleh, M.D.** Lecturer of General Surgery, Faculty of Medicine, Ain Shams University, for his close supervision, help, valuable suggestions & continuous encouragement throughout the whole work,*

Last, but not least, I cannot fully express by any words my deep gratitude to my dear parents, my beloved sisters and brother. Without their help and without their support, this work wouldn't, come to light.

Doaa Ahmed Hasan Moussa

List of Contents

Title	Page No.
List of Tables	i
List of Figures	ii
List of Abbreviations	vii
Introduction	1
Aim of the Work	6
Anatomy of the Breast	7
Pathology of Breast Cancer	32
Management of Breast Cancer	56
Oncoplastic Breast Surgical Techniques	91
Discussion	166
Summary	179
References	185
Arabic summary	

List of Tables

Table No.	Title	Page No.
Table (1):	Lists muscles of the chest wall that comprise the anatomic boundaries of the axilla.....	12
Table (2):	Lists the boundaries and composition of the axilla.....	17
Table (3):	A description of the major nodal groups	23
Table (4):	Protocol sheet for anthropometric assessment of breast.....	31
Table (5):	Breast Cancer Risk Factors	33
Table (6):	Classification of Primary Breast Cancer	35
Table (7):	Manchester classification of breast cancer of four stages	50
Table (8):	Columbia Staging System for breast cancer is clinically based system	51
Table (9):	The TNM classification system.....	53
Table (10):	Stage groupings for patients with breast cancer according to the TNM Classification.....	54
Table (11):	Histopathological tumor grade is recommended by the W.H.O.....	55
Table (12):	Indications for surgical biopsy after core biopsy	66
Table (13):	Various factors affecting cosmesis.	91
Table (14):	The Most important indications (A) and contraindications (B) in oncoplastic breast surgery	94
Table (15):	Indications for volume replacement with LD muscle.....	145
Table (16):	Designing the oncoplastic procedures based on tumor location, breast size, and breast shape	151
Table (17):	Nipple Reconstruction Options	161

List of Figures

Fig. No.	Title	Page No.
Figure (1):	The milk lines	9
Figure (2):	Stages in breast development. Pre-and post-pubertal development and structure of the female breast	10
Figure (3):	The adult female breast	10
Figure (4):	Muscles related to breast anatomy.....	12
Figure (5):	Anterior view of Latissimus dorsi muscle and blood supply	16
Figure (6):	Rectus abdominis muscle & its blood supply	16
Figure (7):	Anatomy of the axilla	18
Figure (8):	Arterial supply of the breast.....	20
Figure (9):	Lymphatic drainage of the breast.....	22
Figure (10):	The axillary lymph nodes.....	23
Figure (11):	The axillary lymph nodes are divided into three levels by pectoralis minor muscle	25
Figure (12):	The breast is divided into 4 quadrants, showing the axillary tail	34
Figure (13):	Ductal carcinoma in situ	36
Figure (14):	DCIS, papillary type.....	37
Figure (15):	DCIS, Cribriform type	38
Figure (16):	DCIS, Comedotype	38
Figure (17):	DCIS, solid type.....	39
Figure (18):	Lobular carcinoma in situ (LCIS)	40
Figure (19):	Invasive Ductal Carcinoma.....	42
Figure (20):	Tubular Carcinoma	42
Figure (21):	Mucinous breast carcinoma by light microscope.....	44
Figure (22):	Medullary Carcinoma of the breast. Well circumscribed soft breast lump.....	45
Figure (23):	Medullary Carcinoma.....	45
Figure (24):	Papillary Carcinoma.....	46

List of Figures (cont...)

Fig. No.	Title	Page No.
Figure (25):	Metaplastic Carcinoma with immunohistochemical stain for cytokeratin is strongly positive (brownish deposits in the cytoplasm) to support an epithelial neoplasm	47
Figure (26):	Invasive Lobular Carcinoma.....	48
Figure (27):	Paget's disease of the nipple	49
Figure (28):	Triple assessment of breast symptoms	56
Figure (29):	Craniocaudal and mediolateral view	58
Figure (30):	Ultrasound view of a breast cyst. Ultrasound image of breast cancer	59
Figure (31):	MRI Breast MRI showing gadolinium enhancement of a breast cancer.....	60
Figure (32):	Ductogram	62
Figure (33):	F.N.A.C of palpable breast mass	64
Figure (34):	High speed core cut biopsy instrument	65
Figure (35):	Modified Radical Mastectomy.....	70
Figure (36):	BCT	74
Figure (37):	A: Lumpectomy, B: Axillary dissection, C: Final result	75
Figure (38):	Lumpectomy (wide excision).Resection outlines within Healthy margins identified by two fingers.....	77
Figure (39):	Quadrantectomy	80
Figure (40):	Skin-sparing mastectomy.....	82
Figure (41):	Skin-sparing total mastectomy with immediate latissimus dorsi reconstruction with an implant on the right and immediate nipple-areola reconstruction and left augmentation mastopexy	85
Figure (42):	Sentinel lymph node.....	90
Figure (43):	Sentinel lymph node biobsy	90

List of Figures (cont...)

Fig. No.	Title	Page No.
Figure (44):	Algorithm for timing of Breast Reconstruction	102
Figure (45):	Algorithm for immediate conservative breast surgery reconstruction based on the type of breast and extent of defect.....	105
Figure (46):	Superior pedicle reduction	107
Figure (47):	Surgical procedure (a) Preoperative skin markings for Superior pedicle reduction mammoplasty	107
Figure (48):	Breast tissue flaps are dissected medially and laterally.....	108
Figure (49):	The dissection of the breast flaps continues cranially	108
Figure (50):	The inferior quadrant is removed.....	109
Figure (51):	The skin is temporarily closed using skin staples	109
Figure (52):	Immediate postoperative result.....	110
Figure (53):	Inferior pedicle reduction	111
Figure (54):	Special situations for oncoplastic reconstruction with inferior pedicle mammoplasty	112
Figure (55):	Preoperative skin markings with the cancer in the upper central quadrant of the right breast.....	113
Figure (56):	Outer and inner incision lines marked with arrows.....	116
Figure (57):	Shows a patient with a central breast cancer involving the nipple	119
Figure (58):	Removal of s shaped quadrant of the breast with tumor located in upper breast quadrant	124
Figure (59):	Grisotti technique.....	130

List of Figures (cont...)

Fig. No.	Title	Page No.
Figure (60):	Preoperative skin markings for removal of the tumor (circumareolar incision) and dermoglandular flap, with the new areola lying adjacent to the native structure.	131
Figure (61):	Shows an algorithm of partial breast reconstruction with oncoplastic techniques in small- to moderate-sized breasts.....	135
Figure (62):	A 43-year-old woman with invasive ductal carcinoma in left lower outer breast	137
Figure (63):	A 51-year-old woman with invasive ductal carcinoma in left upper outer breast	139
Figure (64):	A 60-year-old woman with invasive ductal carcinoma in right upper outer breast	141
Figure (65):	A 39-year-old woman with invasive ductal carcinoma in right upper outer breast.....	143
Figure (66):	A 59-year-old woman with invasive ductal carcinoma in left central breast. (A) Preoperative view	144
Figure (67):	A 39-year-old woman with ductal carcinoma <i>in situ</i> in right upper outer breast.....	147
Figure (68):	Pedicle TRAM flap technique. A muscle-sparing flap is harvested preserving medial and lateral rectus muscle. Circulation is based on superior epigastric vessels. Flap is tunneled to mastectomy defect. The fascia is closed with a running nonabsorbable suture. Inset is completed at mastectomy defect.....	149

List of Figures (cont...)

Fig. No.	Title	Page No.
Figure (69):	Choice of flaps according to breast defect location	156
Figure (70):	Nipple reconstruction - skate flap	164
Figure (71):	Nipple reconstruction - star flap.....	165
Figure (72):	Treatment Algorithm for partial mastectomy defect	178

List of Abbreviations

Abb.	Meaning
AICAP	Anterior Intercostal Artery Perforator.
AP	Anteroposterior.
ALND	Axillary Lymph Node Dissection.
ANS	Axillary Lymph Nodes Sampling.
ALNs	Axillary Lymph Nodes.
BCT	Breast Conserving Therapy.
BI-RADS	Breast Imaging Reporting and Data System.
BCS	Breast-Conserving Surgery.
C.I.S	Carcinoma In Situ.
CT	Computed Tomography.
DCIS	Ductual Carcinoma In Situ.
ER	Estrogen Receptor.
EIC	Extensive Intra-ductal Component.
FNAC	Fine Needle Aspiration Cytology.
FNA	Fine Needle Aspiration.
HRT	Hormone Replacement Therapy.
HER-2	Human Epithelial Receptor-2.
ICAP	Intercostal Artery Perforator.
IDC	Invasive Duct Carcinoma.
ILC	Invasive Lobular Carcinoma.
LICAP	Lateral Intercostal Artery Perforator.
LD	Latissimus Dorsi.
LCIS	Lobular Carcinoma In Situ.
MRI	Magnetic Resonance Imaging.

MC	Medullary Carcinoma.
MRM	Modified Radical Mastectomy.
NCI	National Cancer Institute.
NAC	Nipple Areola Complex.
NSM	Nipple Sparing Mastectomy.
NOS	Not Otherwise Specified.
OBS	Oncoplastic Breast Surgery.
OPS	Oncoplastic Surgery.
PET	Positron-Emission Tomography.
RT	Radiation Therapy.
RCTs	Randomized Control Trials.
SLNB	Sentinel Lymph Node Biopsy.
SAAP	Serratus Anterior Artery Perforator Flap.
SSM	Skin Sparing Mastectomy.
SEAP	Superior Epigastric Artery Perforator Flap.
SSN	Supra-Sternal Notch.
AJCC	The American Joint Committee on Cancer.
TDAP	Thoracodorsal Artery Perforator.
TM	Total Mastectomy.
TRAM	Transverse Rectus Abdominis Myocutaneous.
TNM	Tumour, Lymph Nodes, Metastasis.
US	Ultrasound.
U.K.	United Kingdom.
U.S.A	United States of America.
WHO	World Health Organization

INTRODUCTION

Oncoplastic Breast surgery is probably one of the most interesting and challenging new development over the past twenty years (*Skillman et al., 2003*).

Breast conserving treatment for breast cancer combines lumpectomy, axillary nodes treatment and radiotherapy of the breast. Conservative surgery and radiotherapy is now the standard treatment for unifocal, non inflammatory tumors, less than 3 cm in diameter or T1-T2 breast tumors. There is general agreement that successful breast conservation requires complete tumor excision with a "tumor-free" or "negative" margin of resection (*Amato et al., 2012*).

Oncoplastic breast surgery may be defined as breast cancer surgery focused on optimizing both oncologic and esthetic outcomes, irrespective of the type(s) of surgery performed (*Clough et al., 2010*).

The aims of Oncoplastic surgery are wide local excision of the cancer coupled with partial reconstruction of the defect to achieve a cosmetically acceptable result. Avoidance of mastectomy and consequent reduction of psychological morbidity are the principal goals in the development of various oncoplastic techniques (*Dobson, 2003*).

Increasing use of mammographic screening and neoadjuvant chemotherapy has rendered 70–80% of breast cancer patients as potential candidates for breast conserving surgery (BCS). Nonetheless, BCS remains highly underutilized, with nearly 50% of women either selecting or being advised to undergo mastectomy (*Locker et al., 2004*).

The use of plastic surgical techniques not only ensures good cosmetic outcome, but also allows the cancer surgeon to remove the tumour with greater volume of surrounding tissue, thus extending the boundaries of breast conserving surgery (*McGlothlin, 2005*).

Oncoplastic surgery should be differentiated from breast reconstructive surgery after mastectomy. Whereas it is possible for a Breast surgeon to perform a mastectomy and then allow the Plastic surgeon to carry out the definite reconstruction, this is not feasible in oncoplastic breast conservative surgery, as it requires knowledge both of oncological and plastic surgery combined in one person for a good oncological and cosmetic outcome (*Clarke et al., 2005*).

Randomized controlled trials (RCTs) over the past two decades have now established that mastectomy and breast conserving surgery are equivalent in terms of survival. Provided local recurrence rates after breast conservation surgery are kept at about 1 % per annum (*Fisher et al., 2002*).

The criteria for breast conserving surgery are relative. The size of the tumour relative to the breast volume is the deciding factor in determining the suitability of breast conserving surgery. It may even be suitable for women with large breasts in whom the tumour is up to 5 cm or even multifocal tumours confined to the same quadrant and when large operable tumours have been down-staged by neoadjuvant chemotherapy (*Petit et al., 2004*).

Good cosmetic outcome can be obtained if deeper glandular tissue is approximated to obliterate glandular defect. After excision of the lesion, the breast tissue must be mobilized at the level of the pectoral fascia and the subcutaneous plane to allow tension free approximation of tissues (*Petit et al., 2004*).

Large deficits of glandular tissue can be compensated for by using techniques such as local transposition of glandular tissue or myocutaneous flaps and symmetry can often be improved by a contralateral reduction mammoplasty (*Garusi et al., 1997*).

Oncoplastic surgery involves both simultaneous volume displacement and volume replacement techniques. However, volume displacement is more common in the context of breast conserving surgery, which is done at the same sitting rather than as delayed procedure (*Petit et al., 2004*).

The commonly used volume displacement procedures are:

- Superior pedicle breast reduction for cancers in the lower part of the breast.
- Inferior pedicle breast reduction for cancers above the nipple or in the lower medial or lateral quadrants.
- Grisotti advancement rotation flap for small tumours in the central quadrant of the breast (retro areolar region).
- Round block technique for cancers in the upper and inner quadrant of the breast or in the 12 o/c position.
- Local glandular flaps: Glandular rotation for tumours in the lower inner quadrant and 6 o/c position.
- Thoraco-epigastric flap for tumours in the lower inner quadrants.
- Lateral mammoplasty for tumours in the upper outer quadrants (but not in the 12 o/c position in which case a Round block is preferable).
- Horizontal mammoplasty for tumors above the level of the nipple but at least 18–20 cm below the clavicle.

(Nannelli et al., 2004)

More extensive resections in the outer or inferior part of the breast can be reconstructed using a mini latissimusdorsi (LD) flap. Partial breast reconstruction with a small prosthesis