

RECONSTRUCTION OF CHEST WALL DEFECTS

An Essay

Submitted for partial fulfillment of the Master Degree in General Surgery

By

Waleed Mahdy Mohamed
M.B., B.Ch.

Supervised by

Prof. Dr. Khaled Gawdat

*Professor of General Surgery
Faculty of Medicine, Ain Shams University*

Prof. Dr. Mohamed Ateya

*Assistant Professor of Cardiothoracic Surgery
Faculty of Medicine, Ain Shams University*

Dr. Mohamed Bahaa Eldin

*Lecturer of General Surgery
Faculty of Medicine, Ain Shams University*

**FACULTY OF MEDICINE
AIN SHAMS UNIVERSITY
2007**



ABSTRACT

The primary function of the chest wall is to produce respiratory movements responsible for ventilation of the lungs, it also affords protection of thoracic viscera. Such requirements need a uniquely functional apparatus.

Many etiological factors may affect the sealing and stability of the chest wall. Of these factors are the congenital, traumatic, chest wall tumours and post irradiation necrosis of the chest wall as well as postoperative thoracic wound infections.

Key words (Reconstruction, chest, wall, defects, congenital, traumatic, chest wall tumors, post irradiation, infections)

AKNOWLEDGMENTS

All thanks are due to God

First and foremost, i feel always indebted to God , the kind and Merciful.

I am greatly honoured to express my deepest gratitude to my eminent Prof. Dr. Khaled Gawdat; Professor of General Surgery in Ain Shams University; for his kind guidance and supervision. My deep appreciation is due Dr. Mohamed Ateya; Assistant Professor of Cardiothoracic Surgery in Ain Shams University; who gave me a great deal of his valuable time in close supervision and assistance to finish this work. My sincere thanks are due Dr. Mohammed Bahaa; Lecturer of General Surgery in Ain Shams University; who gave me much support to finish this work and guided me all through.

My special endless gratitude and cardinal apprecication are due Prof. Dr. Mohammed Nasr; Head of Cardiac Surgery department in the National Heart Institute; for his ever-present support and advice, as his efforts in building the confidence of his colleges are invaluable.

My deep thanks are due Dr. Adel Nabih; Consultant Associate Professor of Cardiac Surgery in the National Heart Institute; for his promptness and thorough commitment to his colleges. I'd like to thank deeply Prof. Dr. Sameh El Amin; Consultant Professor of Cardiac Surgery in the National Heart Institute; for his invaluable advices and support.

Finally my everlasting gratitude to my family for everything I have.

Waleed El Mahdy

CONTENTS

	Page
Introduction and aim of the work	1
Development and embryology	4
Anatomy of the chest wall	6
Aetiology and pathology	20
- Congenital disorders of the sternum and chest wall	21
- Chest wall injuries	25
- Tumors of the chest wall	26
- Infections of the chest wall	30
- Radiation damage to the chest wall	33
Reconstruction of congenital chest wall deformities	34
- Pectus excavatum	34
- Pectus carinatum	38
- Sternal fissures	40
- Cantrell's pentalogy	43
- Poland syndrome	44
- Thoracic dystrophy	45
Reconstruction of acquired chest wall deformities	46
- Chest wall resection	46
- The use of muscle and musculocutaneous flaps in reconstruction	53
- The use of perforator flaps in reconstruction	77
- The use of omentum in reconstruction	79
- The use of prosthetic materials in reconstruction	85
Discussion and conclusion	89
Summary	94
References	95

LIST OF FIGURES

Figure	page
1 Superficial muscles of the chest and front of the arm	7
2 Deep muscles of the chest and front of the arm	8
3 Muscles connecting the upper extremity to the vertebral column	11
4 Anterior surface of sternum and costal cartilages	13
5 A central rib of the left side (posterior view)	14
6 First rib (superior view)	15
7 Posterior surface of sternum and costal cartilages	17
8 Operative technique for correction of pectus excavatum	36
9 Operative technique for correction of pectus excavatum (cont.)	36
10 Operative technique for correction of pectus excavatum (cont.)	37
11 Operative technique for correction of pectus carinatum	38
12 Operative technique for correction of pectus carinatum (cont.)	39
13 Minimally Invasive Repair of Pectus Excavatum	40
14 Operative technique for correction of sternal cleft	41
15 Operative technique for correction of sternal cleft (cont.)	42
16 Surgical correction of cantrell's pentalogy	43
17 Surgical correction of Poland's syndrome	44
18 Neurovascular anatomy of pectoralis major myocutaneous flap	57
19 Split pectoralis muscle flap for sternal wound coverage	60
20 Pectoralis muscle islanded flap	61
21 The latissimus dorsi musculocutaneous flap design and vascular supply	65
22 Preparation and transposition of latissimus dorsi muscle flap	67
23 The latissimus dorsi muscular and musculocutaneous flaps arc of rotation	67
24 The V-Y latissimus dorsi design and operative procedure	68
25 Vascular supply of rectus abdominis muscle flap	72
26 Harvesting of rectus abdominis muscle flap	72

Figure	page
27 Rectus Abdominis myocutaneous flap in full thickness chest Wall defects	73
28 Rectus abdominis muscle flap in sternotomy wound coverage	74
29 The serratus anterior muscle flap and its vascular supply	75
30 The serratus anterior muscle flap (cont.)	76
31 The trapezius muscle and musculocutaneous flap	77
32 A schematic diagram of perforator flaps	78
33 Chest wall reconstruction with perforator flaps	79
34 The omentum and its vascular supply	80
35 The arc of rotation of the omentum pedicled flap	81
36 The omental flap design	82
37 Sternal wound reconstruction with omental flap	83
38 MRI of a sternal mass	88
39 Prosthetic bone reconstruction of anterior chest wall	88
40 Planning the reconstruction of anterior and lateral chest wall	91
41 Planning the reconstruction of anterior and lateral chest wall (cont.)	91
42 Planning the reconstruction of posterior chest wall	92

LIST OF AFBREVIATIONS

COPD	Chronic obstructive pulmonary disease
CPR	Cardio-pulmonary resuscitation
CT	Computed tomography
FEV	Forced expiratory volume
FVC	Forced vital capacity
JVP	Jugular venous pressure
MFH	Malignant fibrous histocytoma
MRI	Magnetic resonance imaging
PTFE	Poly-Tetra-Fluro-Ethylene

INTRODUCTION
AND
AIM OF THE WORK

DEVELOPMENT AND EMBRIOLOGY

ANATOMY OF THE CHEST WALL

AETIOLOGY AND PATHOLOGY

RECONSTRUCTION OF CONGENITAL CHEST WALL DEFORMITIES

RECONSTRUCTION OF ACQUIRED CHEST WALL DEFORMITIES

DISCUSSION AND CONCLUSION