VASCULAR SUPPLY OF THE RECTUS ABDOMINIS MYOCUTANEOUS FLAP

THESIS

Submitted in Partial Fulfilment of

the Master Degree in

General Surgery

Presented By

Mohamed Abd-El Haleem Mohamed Ahmed

M.B., B.Ch.

Supervised By

Prof. Dr. M. MAMDOUH NAFEH
Professor and Head of the Plastic and
Reconstructive Surgery

Dr. M. ASHRAF ABD-EL FATTAH
Lecturer of Plastic and
Reconstructive Surgery

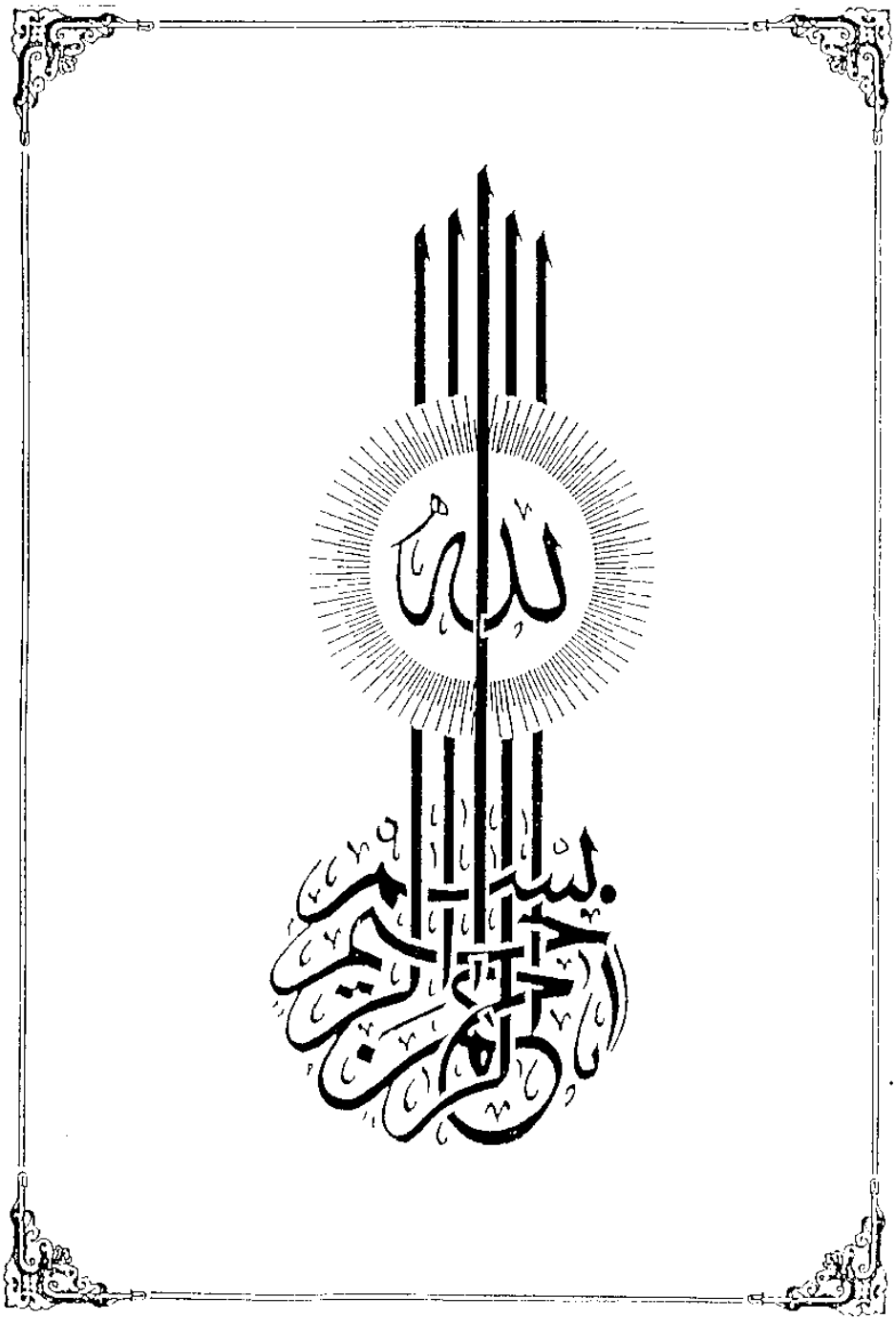
Faculty of Medicine

Ain Shams University

1986

This Work is dedicated

to My Family..



ACKNOWLEDGEMENT

I would like to record my deep gratitude to Prof. Dr. M. Mamdouh Nafeh, Professor and Head of the Plastic and Reconstrcutive Surgery Unit, Ain Shams University, for his kind supervision and encouragement throughout this work.

I wish to express my faithful gratitude to Prof. Dr. Hassan A. Badran, Professor of Plastic and Reconstrcutive Surgery, Ain Shams University, for his moral support and assistance.

I am really grateful to Dr. M. Ashraf Abd-El Fattah, Lecturer of Plastic and Reconstructive Surgery, Ain Shams University, for his guidance, suggestions, and information throughout this work.

My sincere thanks to all members of the Plastic and Reconstructive Surgery Unit, Ain Shams University, for their great help.

I would not forget to offer my warmest thanks to Dr. Ekram E. Seif, Lecturer of Plastic and Reconstructive Surgery, Ain Shams University, for his undeniable help and support.

CONTENTS

* INTRODUCTION 1

* ANATOMY 3

* REVIEW OF LITERATURE 15

* AIM OF WORK 41

* MATERIAL AND METHODS 42

* RESULTS 50

* DISCUSSION 62

* SUMMARY AND CONCLUSION 74

* REFERENCES 76

* ARABIC SUMMARY

1. Introduction.

INTRODUCTION

It is the responsibility of the plastic surgeon to provide the best solution for the wounds and the deformities wherever they may occur. Recently, the muscle and musculo-cutaneous flap has become a safe method to achieve this goal.

The principle of transposition of the muscle and musculo-cutaneous flap has progressed from the initial phase to its present phase of refinement. Fortunately, this phase of refinement in reconstructive surgery is a never ending process, and as such is not complete. A better understanding of the vascular architecture, clinical experience, refinements in muscle selection, flap design and techniques of elevation have offered a wide variety of flaps based on specific arteriovenous lines.

Compound muscle-skin flaps should by derivation termed "musculo-cutaneous" (L. musculus, L. cutis) flaps. The term "myo-cutaneous" (Gr. mys, L. cutis) is used for the sake of brevity.

The use of myo-cutaneous flaps can increase the possibilities for correction in many cases, by bringing new blood supply to avascular area, by furnishing additional

bulk for filling defects, or covering bone grafts, and sometimes by making larger flaps viable. Also the need for delay procedures is decreased and sometimes avoided.

In this study, a review of the vascular anatomy of the rectus abdominis muscle, history of the rectus abdominis myo-cutaneous flap and skin flaps based on the deep epigastric system are offered.

The experimental work includes dissection of fresh cadavers to declare the vascular pedicles of the muscle, injection and tracing the skin territory of each pedicle and demonstrating the anastomosis that could exist between the pedicles.

2. Anatomy :

The Rectus Abdominis Muscle

It is a long strap muscle consisting of vertical fibres, broader above, which extends along the whole length of the front of the abdomen, separated from its fellow by the linea alba. It arises by two tendons, the lateral and larger is attached to the pubic tubercle and may extend beyond the pubic tubercle to the anterior surface of the pubis below it. The medial part is connected with the ligaments covering the front of the symphysis pubis and decussates with the corresponding tendon from the opposite side. The muscle passes upwards to the costal arch, and is attached by three slips of unequal size into the fifth, sixth, seventh costal cartilages. (Warwick & Williams, 1973).

Last (1978) claimed that the bulk of the muscle passes in front of the costal cartilages and is attached to the 5th, 6th, 7th cartilages representing the external oblique layer. Some of the fibres are inserted into the costal margin (i.e., the lower border of the 7th costal cartilage) representing the internal oblique layer (Fig. 1).

The rectus is intersected by three fibrous bands named tendineous intersections, one is usually situated opposite the umblicus, another opposite the free end of the xiphoid process, and a third midway between the xiphoid process and

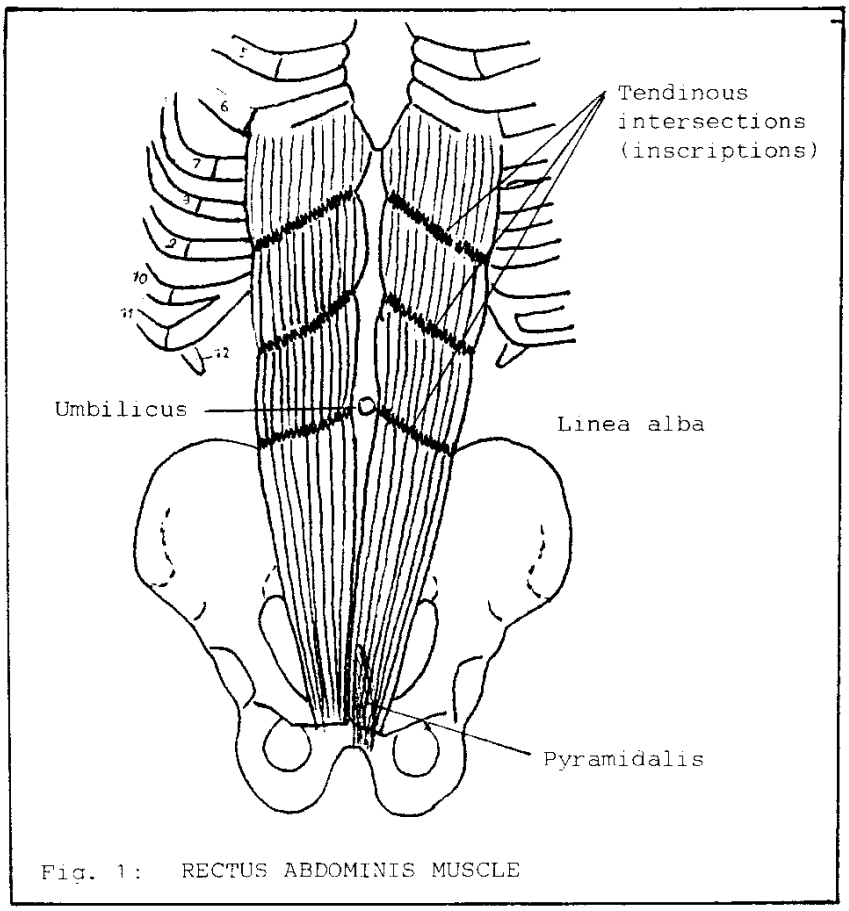


Fig. 1: RECTUS ABDOMINIS MUSCLE

the umblicus. These intersections pass transversely and obliquely across the muscle in a zigzag course, they rarely extend completely through its substance and may pass only halfway across it. They are intimately adherent to the anterior lamina of the rectus sheath. Sometimes one or two incomplete intersections are present below the umblicus. Opinions vary as to whether they represent myosepta delineating the myotomes forming the muscle.

(Warwick and Williams, 1973).

According to Last (1978), the muscle is formed by fusion of mesodermal somites as indicated by its regular segmental innervation. The tendineous intersections represent lines of fusion of myotomes, this explains the fact that such intersections are sometimes found below the umblicus. Jones (1946), said that the tendineous intersections are the representatives in the abdominal wall of costal elements, which in the thoracic wall, take the form of true ribs.

The Rectus Sheath:

The rectus abdominis is enclosed between the apponeuroses of the oblique and transversus forming the so called rectus sheath. At the lateral border of the rectus, the apponeurosis of the internal oblique divides into two, one lamina passing anterior to the rectus to blend with the apponeurosis of the external oblique, the other behind it to

blend with the apponeurosis of the transversus. These join at the medial border of the rectus to reach and help to form the linea alba.

This arrangement exists from the costal margin to a variable level, usually midway between the umblicus and symphysis pubis, where the posterior wall of the sheath ends in a curved margin, named the arcuate line (fold of Douglas). The muscular fibres of the upper part of the transversus abdominis are continued behind the corresponding part of the rectus abdominis to within 2 or 3 cms. of the linea alba, so that the posterior layer of the sheath is here muscular.

Below the level of the arcuate line the apponeurosis of all three muscles pass in front of the rectus, those of the transversus and internal oblique are intimately fused together, but the apponeurosis of the external oblique is bound to them merely by loose connective tissue except in and near the median plane. This part of the rectus is separated from the peritoneum by the transversalis fascia (Warwick and williams, 1973) (Fig. 2).

Anson and McVay (1971), have regarded the major portion of the transversalis fascia as passing in front of the rectus, fused with the apponeurosis of the transversus

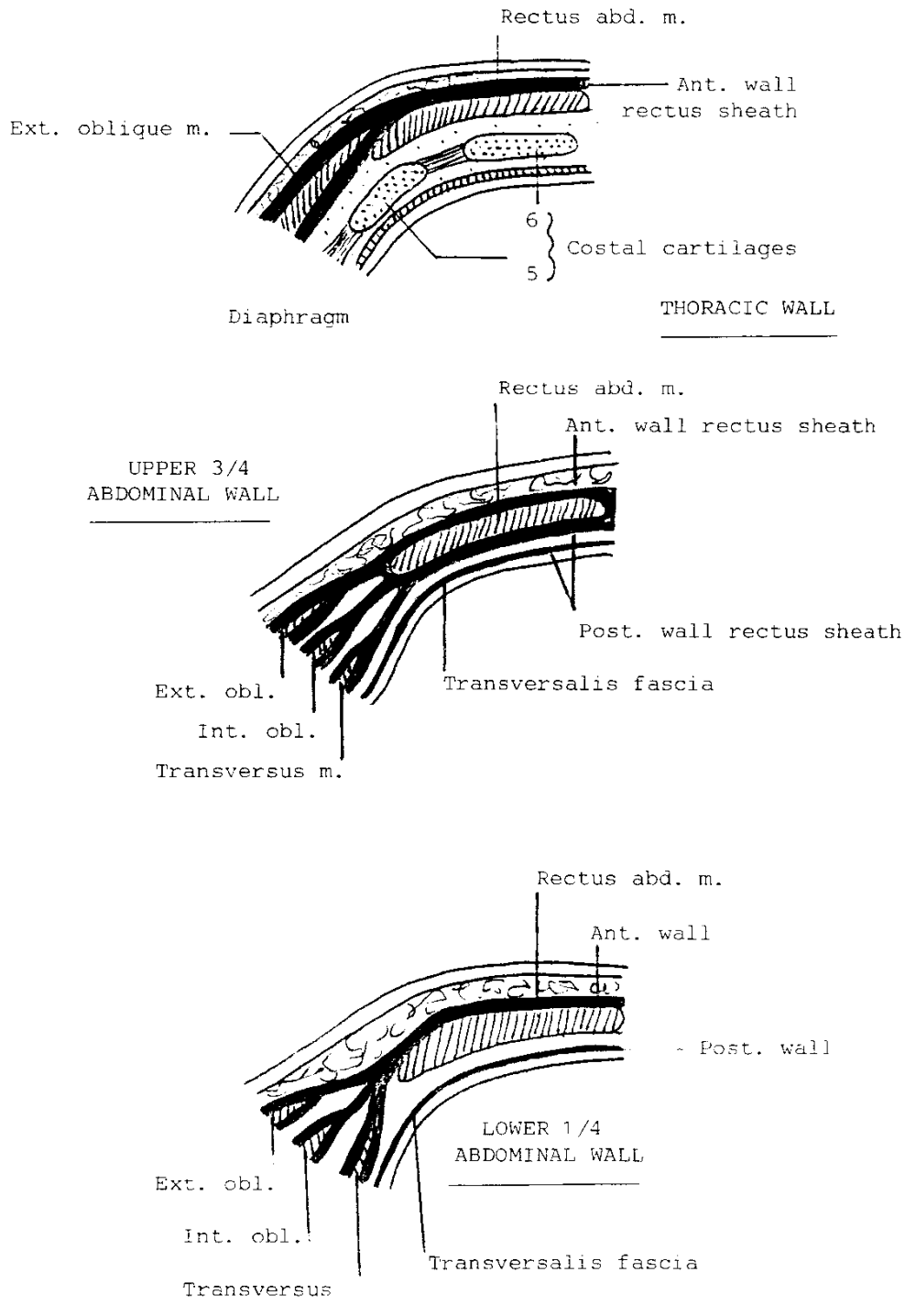


Fig. 2 : RECTUS SHEATH

muscle, so that the rectus therefore rests almost directly upon the extraperitoneal connective tissue.

Since the apponeurosis of the internal oblique and transversus reach only as high as the costal margin, it follows that above that level the muscle rests directly on the cartilages of the ribs, the front of this part of the rectus is overlapped merely by the apponeurosis of the external oblique (Warwick and Williams, 1973).

While the anterior wall of the rectus sheath is only loosely attached to the muscle itself, it is very firmly attached to the tendineous bands, and can be removed here only by sharp dissection, there is no similar attachment to the posterior wall of the sheath (Hallinshead, 1960).

The linea alba lies in the middle line of the anterior abdominal wall. It is strong fibrous structure formed by the fusion of the apponeuroses of all three muscles of the abdominal wall. Above the symphysis, it is very narrow, for here the two recti are in contact with each other behind it. From just below the umblicus to the xiphisternum, it broadens out between the recti. The linea alba is strongly attached below to the symphysis pubis and above to the xiphisternum. (Last, 1978)