Objective Evaluation Of Modified Abdominal Wall Component Separation

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MD Degree in
General surgery

By

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Abstract

This method has gained wide spread acceptance and is considered by many their first choice for difficult closure of midline abdominal wall defects.

Edington et al. described that this innervated muscle complex can be advanced approximately 4 cm at the subxiphoid level, approximately 8 cm at the waist region, and 3 cm in the suprapubic region on each side, allowing the surgeon to reconstruct defects up to 16 cm in width at the waist level. Several modifications have been suggested to enhance the efficacy of abdominal wall component separation technique including: division of the external oblique muscle, separation of external oblique muscle from internal oblique muscle, division of internal oblique muscle, separation of rectus abdominis from posterior rectus sheath, periumbilical perforator preservation, bilateral transverse subcostal incisions ,endoscopically assisted component separation and recently Memphis Modification.

Key word: PDS-MRI- Separation Technique- Anatomy-*Component Separation*

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Dedication

To my father, mother, wife, family and friends

Ahmed Mohamed Talaat
Cairo 2012

بسم الله الرحمن الرحيم

(و قــل ربـي زدني علمـــآ)

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List of abbreviations

Abbreviation	***Meaning***
PDS	Polydixanone suture
CT	Computed topography
SL: WL	suture length: wound length
IAH	intra-abdominal hypertension
IAP	intra-abdominal pressure
APP	abdominal perfusion pressure
MAP	mean arterial pressure
HDU	High dependency unit
ICU	Intensive care unit
TAC	Temporary abdominal closure
PPM	polypropylene mesh
PTFE	polytetrefluroethylene
TRAM	Transverse rectus abdominis muscle
ACS	Abdominal component separation
BMI	Body mass index
EOA	External oblique aponeurosis
IOM	Internal oblique muscle
MRI	Magnetic resonance imaging

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Arabic summary	

CHAPTER (1)

Introduction

Reconstruction of massive abdominal wall defects has long been a difficult clinical problem.[1-3] A landmark development for the autogenous tissue reconstruction of these difficult wounds was the introduction of " ***Separation of Abdominal wall Components***" technique by Ramirez et al. [4,5].

This method has gained wide spread acceptance and is considered by many their first choice for difficult closure of midline abdominal wall defects [6-12].This method uses bilateral, innervated, bipedicle, rectus abdominis-transversus abdominis-internal oblique muscle flap complexes transposed medially to reconstruct the central abdominal wall.[7-9]

Edington et al. described that this innervated muscle complex can be advanced approximately 4 cm at the subxiphoid level, approximately 8 cm at the waist region, and 3 cm in the suprapubic region on *each* side, allowing the surgeon to reconstruct defects up to 16 cm in width at the waist level. [10]

Several modifications have been suggested to enhance the efficacy of abdominal wall component separation technique including: division of the external oblique muscle, separation of external oblique muscle from internal oblique muscle, division of internal oblique muscle and separation of rectus abdominis from posterior rectus sheath. [11-13]

However, there is insufficient evidence to the value of each of these steps in decreasing tension in the midline closure. Moreover there is a lack in long term evaluation of the integrity of the abdominal wall after abdominal wall component separation. [12]

So the aim of this study is to evaluate the efficacy of each step in the abdominal wall component separation technique in facilitating midline abdominal closure and to assess the short mid-term results in the abdominal wall following abdominal wall component separation.

CHAPTER (2)
Anatomy of the anterior Abdominal wall

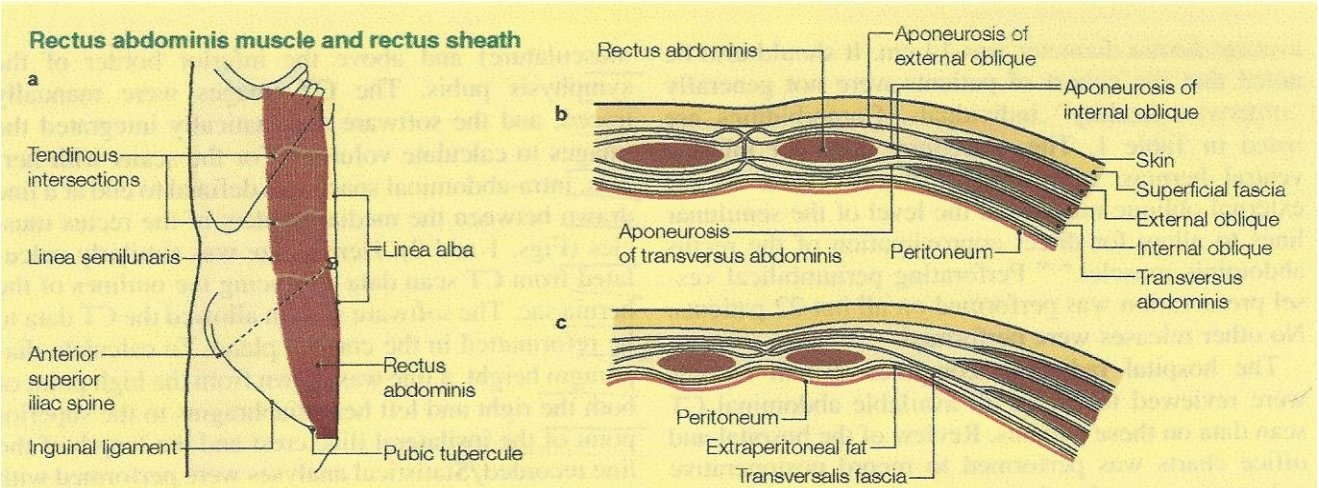
The outline of the anterior abdominal wall is approximately hexagonal. It is bounded superiorly by the arched costal margin (with the xiphisternal junction at the summit of the arch). The lateral boundary on either side is, arbitrarily, the mid-axillary line (between the lateral part of the costal margin and the summit of the iliac crest). Inferiorly, on each side, the anterior abdominal wall is bounded in continuity, by the anterior half of the iliac crest, inguinal ligament, pubic crest and pubic symphysis.

Layers of the anterior abdominal wall

The anterior abdominal wall is a many-layered structure (Figure 1.1). From the surface inwards, the successive layers are:

- skin
- superficial fascia (comprising two layers)
- musculo-aponeurotic layer (which is architecturally complex and composed of several layers)
- transversalis fascia
- properitoneal adipose layer
- parietal peritoneum.

(Grevious MA.2006)



a Right rectus abdominis after removal of the anterior layer of its sheath. **b** and **c** Transverse sections of the anterior abdominal wall showing the interlacing fibres of the aponeuroses of the right and left oblique and transversus abdominis muscles, above **b** and below **c** the arcuate lines

Source: Moore K L. *Clinically Oriented Anatomy*. Baltimore: Williams & Wilkins, 1992.

Figure (2.1) Muscles of the Anterior Abdominal wall

Skin:

The skin covering the anterior abdominal wall is thin compared with that of the back, and is relatively mobile over the underlying layers except at the umbilical region, where it is fixed.

Natural elastic traction lines of the skin (also known as skin tension lines or Kraissl's lines) of the anterior abdominal wall are disposed transversely. Above the level of the umbilicus these tension lines run almost horizontally, while below this level they run with a slight inferomedial obliquity. Incisions made along, or parallel to, these lines tend to heal without much scarring, whereas incisions that cut across these lines tend to result in wide or heaped-up scars.

Beneath the skin, there is the subcutaneous areolar tissue and superficial fascia. Over the lower thorax and epigastrium, the superficial fascia consists of one layer.

This layer is thin and less organized than in the lower abdomen. In the lower abdomen it becomes more definitively bilaminar. Just superior to the inguinal ligament it can be divided into a superficial fatty stratum, termed Camper's fascia, and a deeper, stronger, and more elastic membranous layer called Scarpa's fascia. [13]

The superficial layer is thick, areolar, and contains a variable amount of fat. This layer continues into the perineum, and in females, it continues over the labia majora. The deep layer is more membranous and contains elastic fibers. It is separated from the underlying deep fascia by a loose areolar layer. Inferiorly, it fuses with the deep fascia of the thigh, medial portion of the inguinal ligament, and pubic tubercle along the line of the fold of each groin.[14]

Musculo-aponeurotic layer :(Figure 2.1)

The abdominal wall contains multiple large, musculofascial units which serve several functional purposes.

Laterally, from external to internal, there are two paired external oblique, internal oblique, and transversus abdominis muscles. There are two paired midline muscle groups which include the rectus abdominis muscle and the pyramidalis. All of these muscles contribute to increasing intraabdominal pressure and aid in micturition, defecation, and parturition. [15]

Rectus Abdominis

Rectus abdominis muscle lies on either side of the vertical midline. Each muscle arises by two tendons; a lateral tendon from the pubic crest,

and a medial tendon from the upper and anterior surfaces of the pubic symphysis. The two tendons unite a short distance above the pubis to give rise to a single muscle belly which runs upwards to attach to the anterior surfaces of the 7th, 6th and 5th costal cartilages. The upper part of the muscle usually shows three transverse tendinous intersections; one at the level of the umbilicus, one at the level of the xiphoid tip and one halfway between the two.

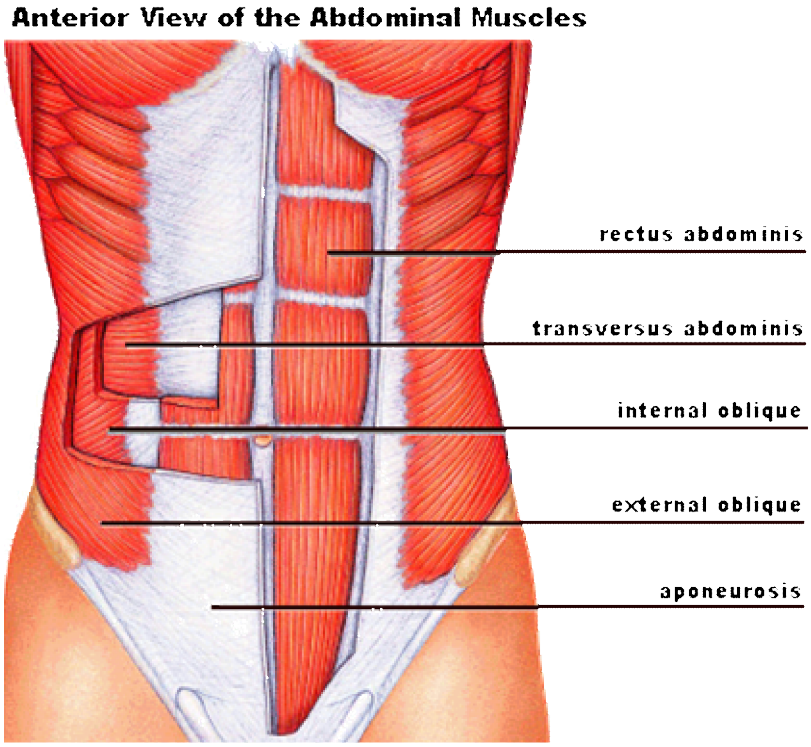


Figure (2.2) anterior view of the anterior abdominal wall

On either side of the rectus abdominis, the musculo-aponeurotic plane is made up of a three-ply (overlapping) arrangement of flat muscular sheets. The outermost of these is the external oblique muscle, the innermost is the transversus abdominis muscle and the intermediate layer is the internal oblique muscle. Of these, only the external oblique has an attachment above the level of the costal margin. Followed anteromedially, each of these muscles becomes aponeurotic. These