Transversus Abdominis Muscle Release (TAR) for Posterior Component Separation during Major Abdominal Wall Reconstructions

Thesis

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By

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List of Abbreviations

Abb.	Full term
AWR	Abdominal Wall Reconstruction
ACS	Anterior Component Separation
ABVS	Automated Breast Volume Scanner
BMI	Body Mass Index
CDC	Centers For Disease Control And Prevention
CST	Components Separation Techniques
CT	Computed Tomography
DIEA	Deep Inferior Epigastric Artery
DHA	Docohexanoic Acid
DASH	Dynamic Abdominal Sonography For Hernia
ERAS	Early Recovery After Surgery
EPA	Eicospentanoic
EOM	External Oblique Muscle
ICU	Intensive Care Unit
IOM	Internal Oblique Muscle
LOS	Length Of Hospital Stay
MRI	Magnetic Resonance Imaging
MICSIB	Minimally Invasive Component Separation With Inlay Bioprosthetic Mesh
NPO	Nothing Per Os
PCS	Posterior Component Separation
RA	Rectus Abdominis
RNA	Ribo Nucleic Acid

List of Abbreviations (Cont...)

Abb.	Full term
SEA	Superficial Epigastric Artery
SSI	Surgical Site Infection
SSO	Surgical Site Occurrence
TAM	Transversus Abdominis Muscle
TAP	Transversus Abdominis Plane
TAR	Transversus Abdominis Release
US	Ultrasound
VHWG	Ventral Hernia Working Group

INTRODUCTION

The component separation technique (CST) was introduced for abdominal wall reconstruction to treat large, complex hernias ***(Bittner et al., 2014).***

The options for closing large and complex abdominal wall defects, including primary repair, mesh, and distant muscle flaps, have yielded suboptimal results. Albanese and Ramirez first developed the CST to address this issue. CST is based on the concept of re-establishing a functional abdominal wall with autologous tissue repair ***(Heller et al., 2012).***

In the meantime numerous different CSTs have been described. In the "classic" CST a distinction is made between the open anterior and posterior approach. In recent years a special type of posterior CST, transversus abdominis release (TAR) was introduced. Furthermore, endoscopic variants of the anterior and posterior CST have been developed. The most recent innovations are the laparoscopic and robot-assisted TAR ***(Scheuerlein et al., 2018).***

The posterior component separation involves dividing the relatively fixed external oblique aponeurosis and muscle, elevating the rectus abdominis muscle from its posterior rectus sheath, and then mobilizing the myofascial flap consisting of the rectus, internal oblique, and transversus abdominis medially ***(Clarke, 2010).***

The TAR procedure starts cephalad (top-down dissection) at the costal margin, the posterior rectus sheath is longitudinally incised medial to the segmental intercostal nerves, 1.5–2 cm medial to the lateral border of the rectus compartment with The linea semilunaris which describes the medial end points of the Transversus Abdominis Muscle (TAM) fibers is exposed after incision of the posterior rectus sheath. In the upper third to the upper half of the abdominal wall, the linea semilunaris runs medial to the lateral border of the rectus muscle compartment the medial end points of the TAM are encountered dorsal to the posterior rectus sheath and, after complete division of the TAM fibers at the level of the incision of the posterior rectus sheath, the fascia trasversalis (FT) is exposed. The TAM is bluntly detached from the FT which is located ventral to the peritoneum allowing a wide retromuscular mesh extending from the costal margin to a level beyond the arcuate line below ***(Novitsky et al., 2012).***

Aim of the Work

The feasibility, safety and efficacy of Transversus Abdominis release in Treatment of ventral hernia with large defects.

Chapter 1

ANATOMY OF THE ANTERIOR ABDOMINAL WALL

Introduction

The modern field of abdominal wall surgery relies on a thorough understanding of all components of the abdominal wall as well as their function and physiology. Advancements in technology have provided surgeons with a wide variety of mesh prosthetics along with new tools to assist in hernia repair. As a result, improvements in recurrence rates and patient outcomes have been well documented ***(Breuing et al., 2010; Timmermans et al., 2014).***

However, our development in the understanding of the abdominal wall anatomy and physiology itself that has enabled doing of more complex procedures including myofascial and musculocutaneous advancement flaps via component separation and muscle release. Such advancements have allowed surgeons the technical ability to employ prosthetics in new technices and allow for closure of abdominal wall defects that were in the past considered impossible ***(Krpata et al., 2012; Novitsky et al., 2012).***

Boundaries

The anterior abdominal wall is a hexagonal area bounded by the xiphoid process superiorly, superolateral edges by the costal margins. Inferiorly it extends along the iliac crests and narrows to the superior edge of the pubic bone of the pelvis in the midline. The inferolateral margins are defined by the inguinal ligaments bilaterally. Lateral extension occurs posteriorly to the erector spinae and quadratus lumborum muscles adjacent to the lumbar spine as these muscles contribute to the thoracolumbar fascia along with transversus abdominis ***(Macintosh et al., 1987).***

Components

The abdominal wall can be divided into midline and anterolateral groups of muscles comprising four main paired muscle groups and a variably present paired fifth muscle group. The muscular groups are covered by subcutaneous fat and skin along with superficial neurovascular components which overlay the fascia. The rectus abdominis and the pyramidalis muscles comprise the mid-line group, although the presence of the pyramidalis muscle is not consistent among the population ***(Van Landuyt et al., 2003; Lovering and Anderson, 2008)***.

The bilateral anterolateral groups are composed of the external oblique muscles (EOMs), internal oblique muscles (IOMs), and transversus abdominis muscles (TAMs) **(Fig. 1).** In addition to the muscular groups and their associated neurovascular