Umbilicoplasty and ideal insertion of umbilicus in abdominoplasty

A thesis for partial fulfillment of master degree in general surgery submitted by

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To My Family

Aim of the work

This study was conducted to 20 female patients undergoing abdominoplasty, in trial to optimize the ideal technique for either umbilical repositioning using the Ramirez technique or reconstruction using the "Key-hole pattern" Technique which we developed, to obtain an aesthetically appealing umbilicus avoiding the complications encountered in other techniques such as visible scars or scar contracture.

Abstract

Umbilicus is a key feature in the aesthetics of the abdominal wall that should be preserved in operations commonly performed to manage problems arising in this region. The aesthetically-pleasing umbilicus tends to be small and vertically-oriented in nature, with superior hooding and shadow, inferior retraction and slope, and positioning at the topmost level of the iliac crest. In this work we are trying to optimize an ideal technique either for umbilical repositioning or for umbilicoplasty.

We choosed the O.Ramirez(V-umbilicoplasty) for umbilical repositioning, and the Key-hole technique for neo-umbilicoplasty. Both featured techniques aimed to restore the umbilicus to an aesthetic and youthful appearance with minimal scarring.

Key words: umbilical repositioning- umbilical reconstruction – umbilicoplasty**.**

Ch.1

Review of literature

INTRODUCTION

At the beginning of the story of body form and image which dates back to the beginning of time are humans who have always tried to change their bodies to achieve their own goals of beauty, and to understand today's patient who seeks body change, we must understand the humans of history, the attitudes they had towards their bodies and the way in which they tried to change them.

Abdominoplasty is one of the most commonly performed aesthetic procedures, which encompasses not only aesthetic features but also structural reconstruction of the abdominal wall. Aesthetic enhancements include improvement in abdominal wall contour, reconstruction of a natural appearing umbilicus and optimal placement of the resulting abdominal scar. The reconstructive component includes recreation of the original fascial and muscular anatomy as well as the restoration of any other anatomical deformations, which may be present. ***(Hunstad JP, Repta 2009)***

The position, shape, size, and depth of the umbilicus influence the overall aesthetics of the abdomen. Hence, umbilicoplasty is a common adjunct to aesthetic and reconstructive surgery of the abdominal wall. Delineation of the position and shape of the “beautiful” umbilicus can aid in the planning of abdominoplasty and lipoabdominoplasty. ***(Shu Jin Lee, Saurabh Garg.2014)***

In this study, subjects in the age range from 20 to 55 years were studied as regards the measurements of the position of the umbilicus on the anterior abdominal wall to achieve the standard position and shape of the umbilicus in the Egyptian population and set a model ‘ideal’ or standard. Then abdominoplasty were done and the results of the umbilical restitution or reconstruction were described and evaluated.

ANATOMICAL CONSIDERATIONS

Embryological development of anterior abdominal Wall and umbilicus:

The abdominal wall begins to develop in the earliest stages of embryonic differentiation from the lateral plate of the intraembryonic mesoderm. At this stage, the embryo consists of three principal layers: an outer protective layer termed *ectoderm,* an inner nutritive layer termed *endoderm*, and the *mesoderm.* The intraembryonic mesoderm becomes segmented into mesodermal somites or myotomes from which proliferating cells grow into the developing abdominal wall or somatopleure. The developing mesoderm of the future anterolateral abdominal wall splits into three layers that ultimately give rise to the transversus abdominis and the internal and external oblique muscles.

At this early stage, the lining of the coelomic cavity communicates broadly with the lining outside the body cavity. As the embryo enlarges and the abdominal wall components grow toward one another, the ventral open area, bounded by the edge of the amnion, becomes smaller. This results in the development of the umbilical cord as a tubular structure containing the yolk stalk (omphalomesenteric duct), allantois, and the fetal blood vessels, which pass to and from the placenta.

By the end of the third month of gestation the body walls have closed, except at the umbilical ring. Because the alimentary tract increases in length more rapidly than the coelomic cavity increases in volume, much of the developing gut protrudes through the umbilical ring to lie within the umbilical cord.

As the coelomic cavity enlarges enough to accommodate the intestine, the latter returns to the developing peritoneal cavity such that only the omphalomesenteric duct, the allantois, and the fetal blood vessels pass through the shrinking umbilical ring. At birth, blood no longer courses through the umbilical vessels and the omphalomesenteric duct has been reduced to a fibrous cord and no longer communicates with the intestine. After division of the umbilical cord, the umbilical ring heals rapidly by scarring. ***(Robinson JN.2000)***

Embryological anatomy of the umbilicus:

The normal umbilicus consists of a sulcus that extends slightly superiorly as it approaches the abdominal wall fascia, a central mamelon, and a surrounding navel ring at its entrance that is hooded superiorly. By studying thirteen autopsies specimens it was concluded that the umbilicus is formed as a result of contraction of four fibrous cords. These consist of the obliterated left umbilical vein, which runs superiorly in the round ligament of the liver; the obliterated urachus centrally, which runs inferiorly; and the two obliterated umbilical arteries, which run laterally to their corresponding internal iliac artery. The resultant vector of these four cord contractors is usually directed inward and upward, resulting in the characteristic skin overhang superiorly with a shelving of the lower margin. ***(Craig SB.2000)***

Thus an anatomic umbilical reconstruction should have (1) a normal slant superiorly, (2) a superior hood, (3) a normal shape (i.e. cylindrical with a wide attachment to the abdominal wall fascia and a central mamelon), and (4) no external scars, especially nonlying circumferentially in the navel ring, which could result in stenosis. ***(Lee MJ, Mustoe TA.2002)***

The anatomy of the umbilical ring and fascia may be appreciated from the drawing presenting the relations of the ring to the linea alba, round ligament, urachus, and fascia (fig.1.1)

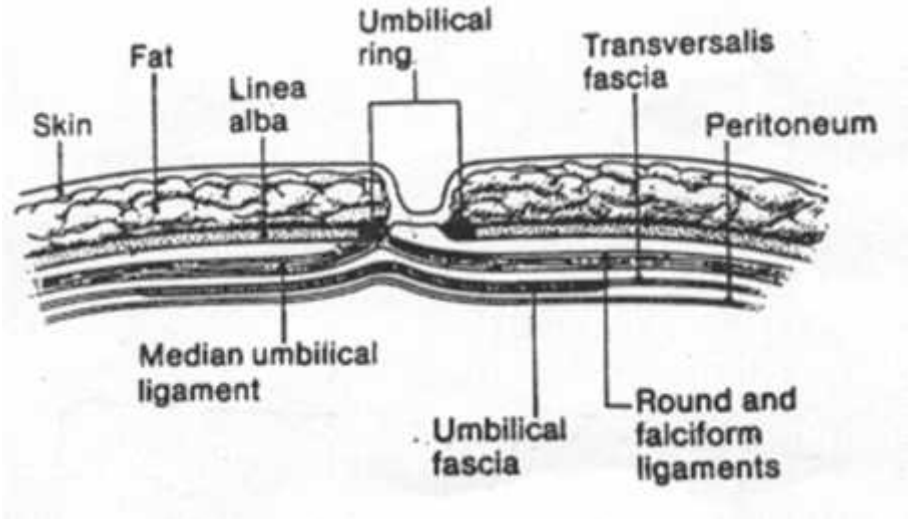

Fig (1.1)

Variations of the umbilical ring and umbilical fascia, shown by a sagittal section through umbilicus. Note the relation of the ring to the linea alba, round ligament of urachus, umbilical and transversalis fasciae, and the absence of fat over the ring ***(Skandalakis, 2000)***

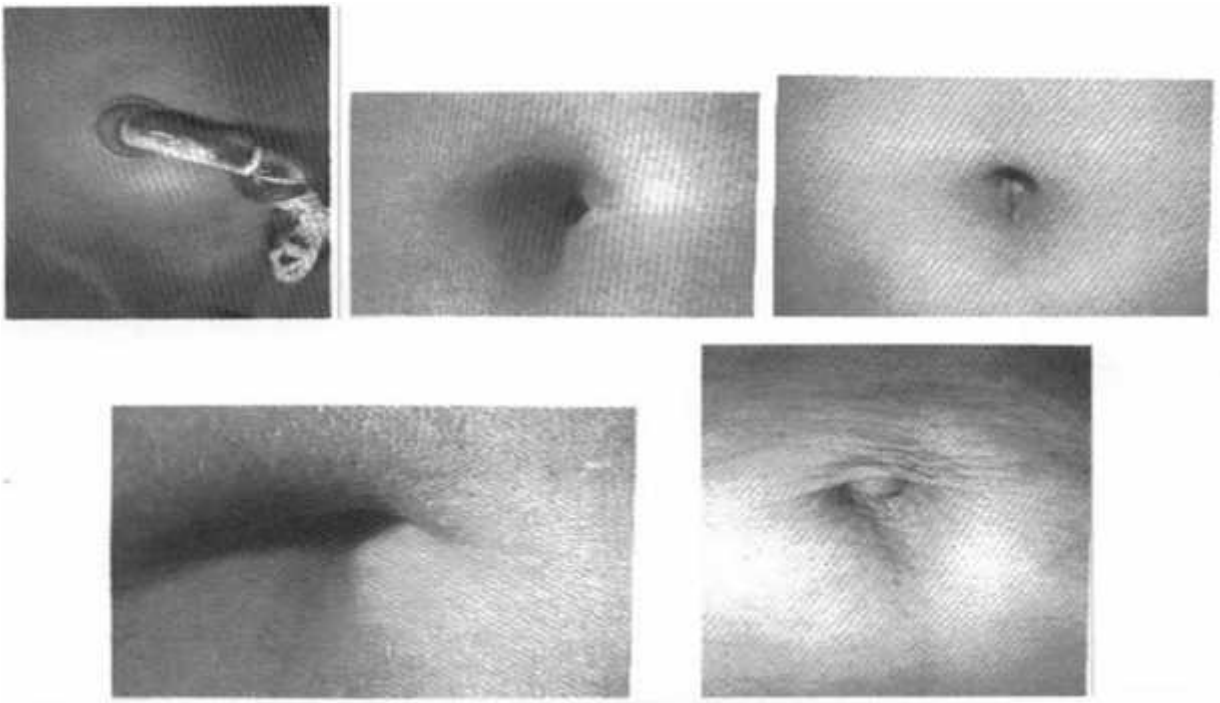

Fig. (1.2)
Variations of the umbilicus with age.***(Skandalakis, 2000)***

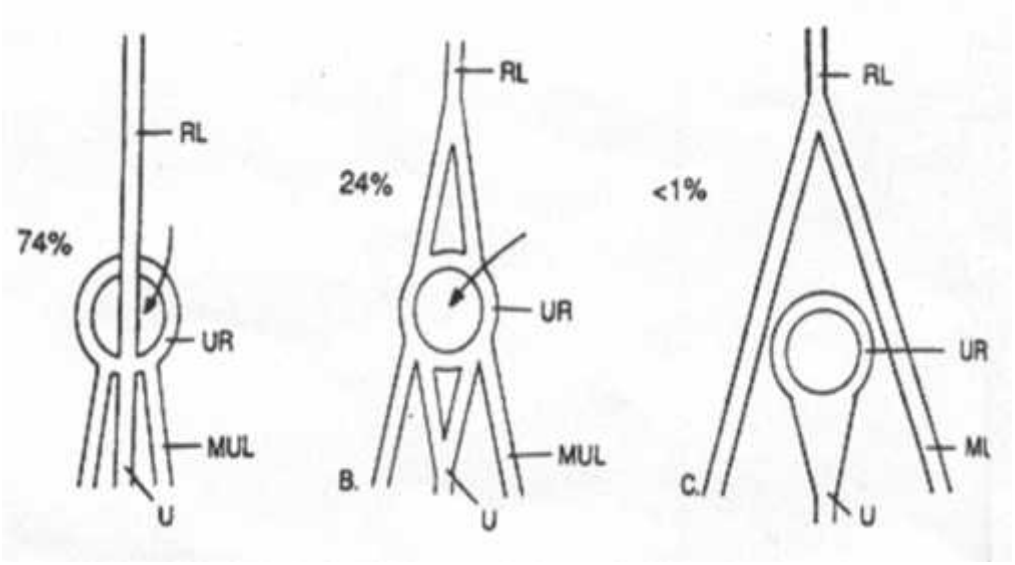

Fig (1.3)
Variations in the dispositions of the umbilical ligaments, as seen from the posterior (peritoneal) surface of the body wall. Arrows indicate: A) Usual relations (74%) of the umbilical ring (UR), the round ligament (RL), the urachus (U), and the medial umbilical ligaments (MUL). The RL crosses the UR to insert on its inferior margin. B) Less common configuration (24%). The RL splits and is attached to the superior margin of the UR. C) Rare configuration (less than 1%). The RL branches before reaching the UR. Each branch continues with the MUL without attaching to the UR ***(Skandalakis, 2000)***

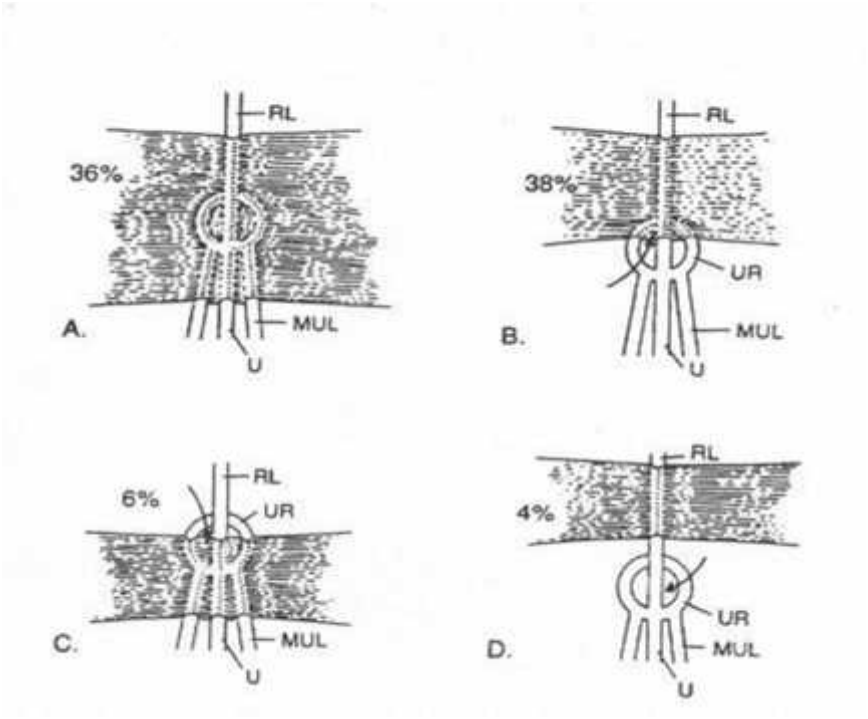

Fig. (1.4)
Variations of the umbilical fascia in relation to several anatomic entities **(Skandalakis,2000)**

At birth, the umbilical artery becomes arteritic and its stump sloughs off postpartum at the level of the new inadequate blood supply. The central vascular supply to, and the venous return from, the umbilical stalk is quite rich. Defatting the stalk surgically carries little risk. If, however, a ring of abdominal skin remains as part of the abdominal stalk, it may not share in the rich central blood supply, thus allowing a peripheral slough. For this reason, the retention of the thin layer of fat on the stalk to contain the subdermal plexus seems safer. ***(Akbas H.2003)***

Topographical Anatomy of the Abdominal Wall

Definition and surface anatomy:

The abdomen is the region of the trunk below the diaphragm and actually it constitutes its main part. Consequently, its shape and size can alter under different conditions, such as varying degrees of distention of the contained hollow organs-and the phases of respiration. (***Joseph and Remus.2009)***

Abdomen is the part of the trunk between the thorax and the pelvis. It is bounded superiorly by the xiphoid process and costal margins, posteriorly by the vertebral column, and inferiorly by the upper parts of the pelvic bones (Fig. 1.5). ***(Moore et al. 2006)***

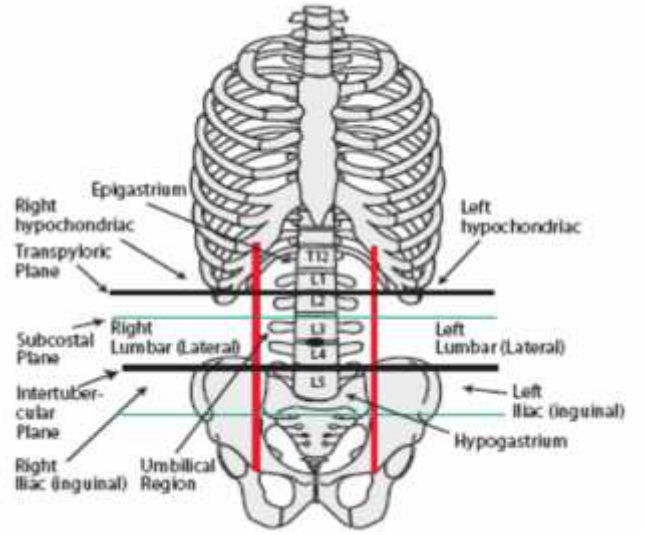

Fig (1.5) Regions of the anterior abdominal wall. (Moore et al. 2006)

Bony Landmarks:

1. Xiphoid process lies at the upper part of the abdomen in midline connected to the body of sternum.
2. Costal margin: it is the lower border of the thoracic cage, formed of costal cartilages of 6th, 7th, 8th, 9th, and tenth ribs. It can be traced from the xiphoid downwards and laterally to end at its lower border in the flanks.
3. Costal angle: it is the angle between the two limbs of costal margin.
4. Symphysis pubis: lies in the lowest part of the abdomen in the midline, formed of fusion of both pubic bones. The pubic tubercle can be felt on either side one inch lateral to the symphysis pubis.
5. Anterior superior iliac spine: It is the first bandy prominence to be felt while you are following the inguinal ligament laterally. It is the anterior end of the iliac crest.
6. The iliac crest: this bony part can be felt all subcutaneous, extending form the anterior superior iliac spine to the sacrum.

7. Iliac tubercle: a small tubercle 5 cm posterior to the anterior superior iliac spine on the outer lip of the iliac crest. ***(Joseph and Remus 2009***)

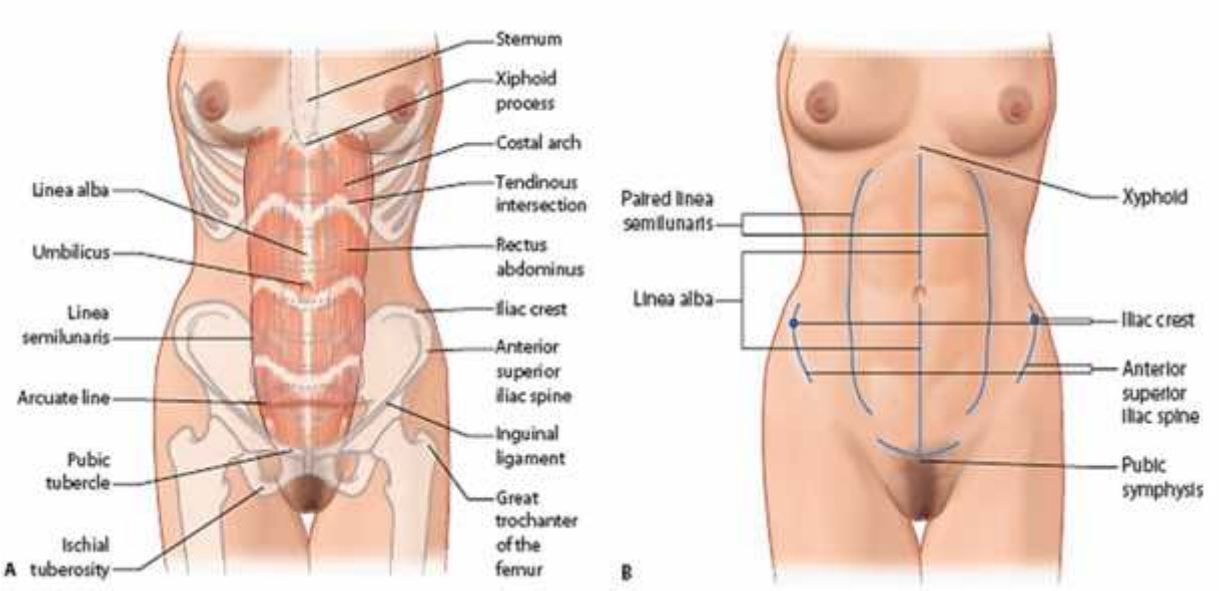

Fig. (1.6) Topographically a handful of bony and soft tissue landmarks can be identified. The bony landmarks include the xiphoid, pubic symphysis, the anterior superior iliac spine, and the iliac crest. ***(Joseph and Remus 2009)***

Topographic anatomy of umbilicus

Anatomists and general surgeons describe the umbilicus as being an inconstant landmark, lying in the healthy adult at the junction of L3 and L4 vertebrae. It is lower in the infant and in the pendulous abdomen. The normal position of the umbilicus has been described as occupying the midline, level with the iliac crests and approximately 2.5 cm. above maximum waist suppression. ***(Pfulg M.2005)***

Psillakis had defined the waist as extending 7-10 cm between the inferior costal ribs and the iliac crests. ***(Sevin A.2006)***

A review of the literature reveals that the transumbilical plane is noted in many anatomical texts as being at the level of the fibrocartilage between the third and fourth lumbar vertebrae. ***(Ramirez OM.2000)***

However, this method of locating it may not be of much help in a clinical situation. Baroudi (Baroudi, 1974) and Pitanguy (Pitanguy, 1967) use the level of the umbilical pedicle as the surface transumbilical plane. However, massive (and often successive) weight changes may affect the tone and even the amount of abdominal musculature; this, in turn, can affect the base of the pedicle. Equally important, a long pedicle can introduce errors of its own, even when the stalk is plicated.

The length of the umbilical stalk varies according to the size of the panniculus and should be considered during reimplantation. A more exact location is given by Vernon who positions the umbilicus two to four cm below the waistline – though this is also an inexact measurement intraoperatively (Vernon, 1957). Hinderer gives a method for locating it – 3 cm above the level of the anterior iliac crest. ***(Lee, 2002)***

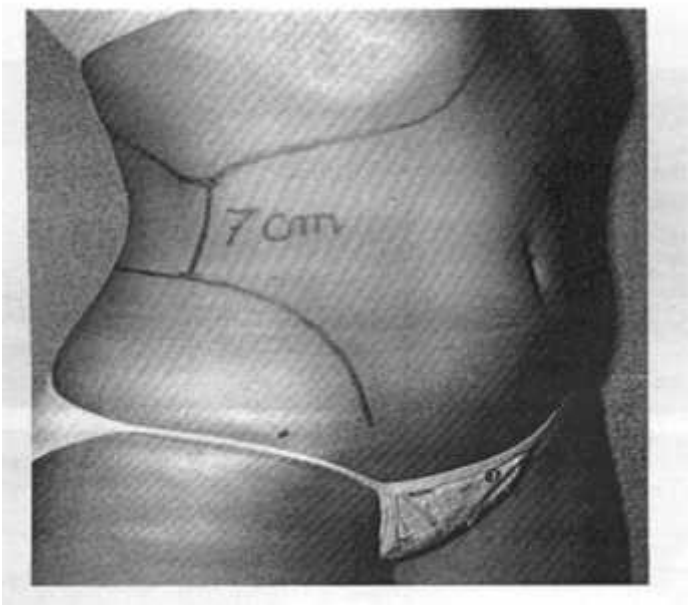

Fig. (1.7)
The height of the waist measures 7-10 cm, and it is limited by the bony skeleton. ***(Psillakis 1991)***

SURGICAL ANATOMY

The abdominal wall is formed of skin, two layers of superficial fascia, three layers of muscle and their aponeuroses, and a layer of fascia - the fascia transversalis - all overlying the peritoneum. There is no deep fascia in the abdominal wall (if there were, we would presumably be unable to take a deep breath or enjoy a large meal!) The superficial fatty layer of superficial fascia (Scarpa's fascia) is continuous with the superficial fat of the rest of the body, but the deep fibrous layer (Camper's fascia) blends with the deep fascia of the upper thigh (fascialata) and extends into the penis and scrotum and into the perineum as Colle's fascia.***(Costa LF,2004)***