INTRODUCTION

Umbilicoplasty, usually known by the more friendly title of belly button revision, is a surgery which is designed to alter the shape of the navel. The surgery may be undertaken for a number of reasons, and it can be bundled in with other cosmetic surgeries or done as an entirely separate procedure.

The navel, or belly button, is formed during pregnancy, and its shape is determined in the days shortly after birth, when the umbilical cord dries up and eventually falls off.

The human umbilicus varies in shape among individuals, and various factors including age, height, and weight affect its shape ***(Sakamoto et al., 2010).***

The umbilicus itself has been described as a depressed scar surrounded by a natural skin fold that measures 1.5 to 2 cm in diameter and lies anatomically within the midline at the level of the superior iliac crests. It is generally flat and vertically oriented in young individuals, and later it develops hooding and deepening of the stalk as fat accumulates along the deep fat pocket that surrounds the umbilicus ***(Craig et al., 2000).***

The umbilicus at the center of the abdominopelvic area is an important anatomical component and landmark in the abdominal wall. It also has a key effect on the esthetic appearance of the abdomen. Its position in the abdominal wall, its shape and depth are important influential factors of beauty

and psychological well- being, which must be preserved or considered when one contemplates an abdominal reconstructive or esthetic procedure ***(Massiha, 1997).***

Abdominoplasty has been one of the most popular aesthetic surgery procedures performed since it deals with one of the areas of the body liable to change, stretch and store fat, as well as being the one area to affect most the entire appearance of the body and trunk. It has no longer become a mere amputation of the flesh but a whole resculpture of the trunk, when abdominal wall plastic procedures began to evolve, the excision involved entailed alterations in the umbilical position in the abdomen up to its complete removal, especially by general surgeons even today ***(Matarasso, 1989).***

There are other indications for umbilicoplasty such as umbilical hernia, which is a frequent clinical condition in childhood and often observed in the daily practice of pediatric surgeons. Small aponeurotic defects usually close spontaneously and do not require surgical treatment, Umbilicoplasty is necessary for giant protruding hernias with excess skin ***(Macedo et al., 2008).***

Nowadays, there are many techniques that used for umbilicoplasty, which considered a key component of abdominoplasty. 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 ***(Lesavoy et al., 2012).***

For umbilical hernia, there are other techniques for example, in large protruding hernia with excess skin M.Macedo et al. used diamond shape incision with dissection of the hernial sac and repair of the aponeurotic defect ***(Macedo et al., 2008).***

Other techniques used in case of umbilical absence, such as using reverse fan-shaped flap, The goal of the reconstruction for umbilical absence is to obtain anatural three-dimensional appearance of the umbilicus with minimal operative scarring ***(Masuda et al., 2003).***

Recovery time from an umbilicoplasty depends on the procedure. For invasive tummy tucks and similar procedures, patients may need several weeks or months to recover and have to be careful about bending and lifting, especially at first. For more superficial surgeries, the patient can often resume normal activity levels very quickly. Plastic surgeons work to keep scarring minimal and can also prescribe treatments like pressure bandages to prevent scar formation when large incisions cannot be avoided ***(Bermant, 2012).***

Unfortunately, each surgery carries some uncertainty and risk, but, when surgery for belly button umbilicoplasty is performed by a qualified plastic surgeon, complications are infrequent and usually minor, risks depend on the problem to be

treated, other medical issues, and surgical techniques, As with any surgery, there can be risks. These include prolonged healing, infection, loss of tissue, excessive bleeding, and adverse reaction to anesthesia. The procedure may also result in noticeable scars, permanent pigment changes, numbness, and asymmetry ***(Bermant, 2012).***

AIM OF THE WORK

To review and discuss the different techniques used for umbilical reconstruction

Chapter One

ANATOMY OF THE UMBILICUS

When considering aesthetic procedures of the abdomen, knowledge of the anatomy of the abdominal wall is essential. A clear understanding of the blood supply and soft tissue layers is critical when planning incisions, determining the amount of tissue to be resected, and deciding whether concomitant liposuction or lipectomy is indicated ***(Nahai, 2005).***

The Esthetic Abdomen: *(Light Reflections and Shadows)*

The abdominal wall is formed by the relationship between the osteomuscular system, the subcutaneous tissue, and the skin. This relationship gives the appearance of an esthetic contour with light reflection produced by prominences and shadows resulting from depressions. In the midline from the xiphoid to the navel a shadow is formed by the depression of the medial sulcus. Lateral to this sulcus, there are two vertical wide strip reflections produced by the prominence of the rectus muscle that join under the umbilicus, forming a mound ***(Psillakis, 1991).***

More lateral and slightly more posterior to these prominences, there are two wide strips of shadows called "semilunar" sulcus, in "lyre" form, produced by the depressions

formed by the insertion of the skin at the fascia of the oblique muscles, which are inserted into the external margins of the rectus muscles and into the inguinal ligaments and pubis. More laterally, the profile of the abdomen is formed by the thoracic cage superiorly, the pelvis inferiorly and the waist in the middle. The *waist* extends 7 to 10 cm between the inferior costal ribs and the iliac crest. The shape of the waist is also dependent on the superior aperture of the pelvis. The larger the pelvis, the more accentuated the waist. The waist can be absent when the pelvis is small, when the distance between the pelvis and the ribs is reduced, or when muscular atony or fat deposits are present ***(Psillakis, 1991).***

In the inferior extremity of the shadow of the median sulcus a more accentuated shadow is formed by the triangular depression of the navel. Spatially, it is situated 1 or 2 cm over a transverse plane `that corresponds to the third or fourth lumbar vertebra ***(Arslan, 2005).***

Topographic anatomy of the anterior abdominal wall *(Fig.1)*

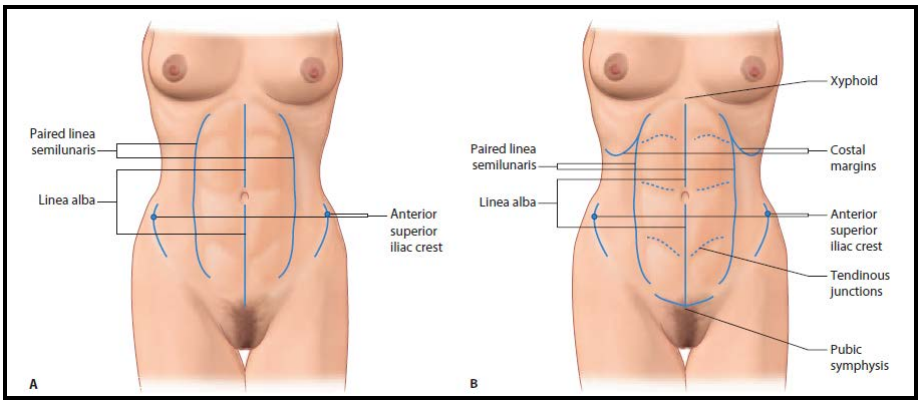

Fig. (1): The soft tissue landmark ***(Hunstad & Repeta, 2009).***

Abdominal beauty doesn't arise from a strictly defined form. There are varied appearances which are considered aesthetically pleasing. Surface landmarks contribute greatly to abdominal aesthetics, but the degree to which they are defined is not necessarily directly related to the level of feminine aesthetic beauty. As with most aesthetic features, proportion plays a significant role. Contour of the abdomen is dependent upon age, genetics, muscle mass, tone, obesity, intra-abdominal pathology, parity, and posture. These factors may significantly alter topography ***(Davis and Talarczyk, 2010)***.

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 ***(Gabella, 1993).***

The anterolateral abdominal wall is bounded superiorly by the costal margins and the xiphoid and below by the iliac crest, inguinal ligaments, pubic crest, and pubic symphysis. Its lateral margins are defined by conventional vertical lines dropped from the costal margins to the most elevated portion of the iliac crests. The linea alba extends in the midline from the xiphoid process to the symphysis pubis. It is divided by the

umbilicus into supra-umbilical and infra-umbilical segments of nearly equal lengths ***(Davis and Talarczyk, 2010).***

The rectus muscles produce elevated bands on each side of the linea alba. Transverse tendinous intersections create palpable depressions in muscular persons. There is usually one at the level of the xiphoid, one at the umbilicus, and one between. It is the combination of the linea alba and the linea transversae which form the abdominal "six-pack" sought by body builders. At the lateral margin of each rectus muscle, there is depression called the linea semilunaris which is directed inferomedially toward the symphisis pubis. Visible grooves make the lower limits of the inguinal ligament**.**

Umbilical position and appearance are important and prominent aesthetic features. The umbilicus represents residual scarring at the point of umbilical cord attachment. Typically, as the scar involutes and the abdominal wall matures, a depression forms. The central recession is a key aesthetic feature. In the inferior extreme of the shadow of the medial sulcus, a more accentuated shadow is formed by the triangular depression of the navel. The umbilicus should be situated in the midline at or slightly above the superior iliac crests. Aesthetic units of the abdomen have been defined for both men and women. There are six units (3 pairs) in men corresponding to the epigastrium, periumbilical, lower abdominal regions. Women have a seventh unit, the dorsal back roll region, which is also a consideration for treatment at the time of abdominal contour surgery. Men

rarely complain of dorsal back rolls ***(Davis and Talarczyk, 2010).***

Under the umbilicus, the abdomen is typically not flat but slightly prominent. The degree of adiposity represents the most striking and variable feature affecting abdominal wall appearance. Both intra-abdominal and extra abdominal fat can act to efface surface landmarks and hip definition to the degree to render them unaesthetic. Modifications of the position and thickness of the tissues will alter the aesthetic appearance of the abdomen due to the changes of the light reflections and shadows ***(Davis and Talarczyk, 2010).***

Gross 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 (fascia lata) and extends into the penis and scrotum and into the perineum as Colle's fascia ***(Arslan, 2005)***

- ***Blood Supply of the anterior abdominal wall (Fig. 2)***

The anterior abdominal wall receives blood supply through branches of the femoral, external iliac, subclavian and intercostal arteries as well as the abdominal aorta ***(Arslan, 2005).***

The abdominal wall receives its blood supply from direct cutaneous vessels and musculocutaneous perforators. The superficial epigastric, superficial circumflex iliac, superficial external pudendal, deep circumflex iliac, superior and inferior epigastric arteries, subcostal and lumbar arteries are the main branches of the blood supply to the anterior abdominal wall (***Hester et al., 1984***).

Superficial inferior epigastric artery originates from the common femoral vessel. It pierces through the Scarpa's fascia just below the inguinal ligament 8-10 cm lateral to the midline. The deep inferior epigastric vessel is a branch of the external iliac artery, which ascends obliquely along the medial margin of the deep inguinal ring piercing the transversalis fascia at a point close to arcuate line ***(Gray & Henry, 1918).***

The deep inferior epigastric artery has two sub-divisions of perforators that course medially and laterally. The lateral branch is usually the dominant branch and contains most of the perforator vessels ***(Taylor, 2003).***

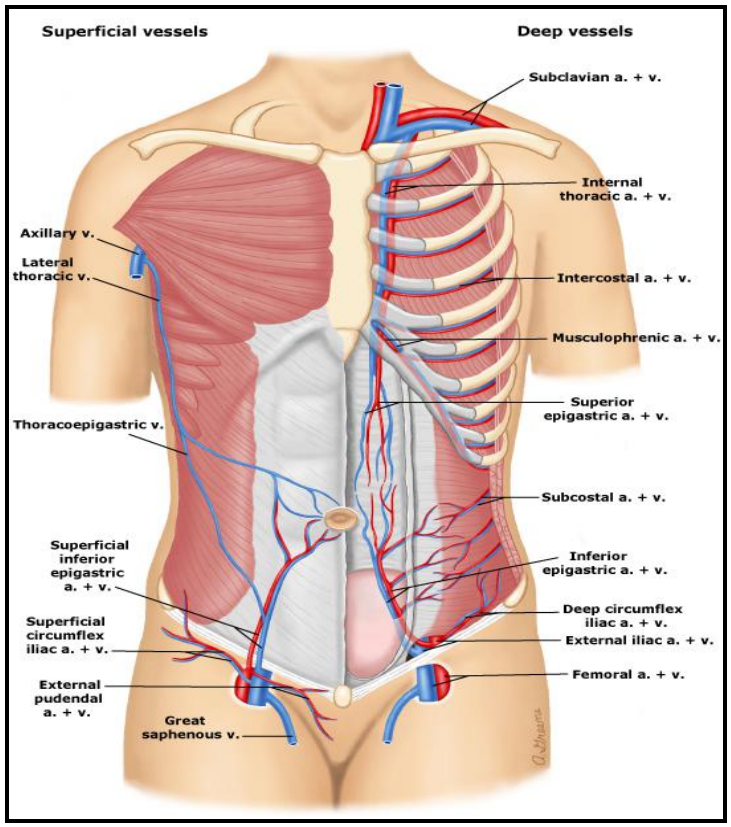

Fig. (2): Vascular supply of the anterior abdominal wall ***(Mahadevan, 2006)***.

Onishi & Maruyama (1986) reviewed that the superior epigastric artery is one of the two terminal branches of the internal thoracic artery, it penetrates the rectus sheath as it passes behind the 7th costal cartilage.

Arslan (2005) highlighted the importance of the anastomosis between the superior and deep inferior epigastric arteries in form of providing important collateral circulation to the lower part of the abdominal wall.

The musculo-cutaneous perforators are the main blood supply to the anterior abdominal wall. These vessels were further categorized into large (direct) or small (indirect) perforators. The indirect perforators terminate in the deep layer of the subcutaneous fat. Conversely, the direct perforators course into the subdermal plexus to supply the superficial sub-cutaneous fat and skin ***(Grevious, 2006)***.

Superficial branches of the femoral artery ascend to supply skin and subcutaneous tissue of the anterior abdominal wall**.** Three branches of the femoral artery supply the lower anterolateral abdominal wall. They are, from above downward, the superficial circumflex iliac, superficial epigastric and the superficial external pudendal. These arteries travel toward the umbilicus in the subcutaneous connective tissue. The superficial epigastric artery anastomoses with the contralateral artery, and all three arteries have anastomoses with the deep arteries ***(Arslan, 2005).***

The superficial circumflex iliac artery arises from the femoral artery near the origin of the superficial epigastric artery. It pierces the deep fascia of the thigh lateral to the saphenous opening and courses laterally toward the anterior superior iliac spine to supply the superficial fascia and skin. The superficial external pudendal artery branches off the femoral artery and runs medially deep to the great saphenous vein. It travels across the spermatic cord (round ligament) to supply the lower anterior wall of the abdomen. The deep

circumflex iliac artery originates from the external iliac artery lateral to the point of origin of the inferior epigastric artery and advances laterally posterior to the inguinal ligament in a sheath formed by the transversalis and iliac fascia ***(Arslan, 2005).***

After the lower two or three posterior intercostal arteries cross the corresponding intercostal space into the costal groove proximal to the costal angle. The posterior intercostal arteries enter the rectus sheath from its lateral border, anastomosing with the superior and inferior epigastric arteries. The subcostal artery courses inferior to the last rib and anterior to the 12th thoracic vertebra. The subcostal artery establishes anastomoses with the lower posterior intercostal, superior epigastric and lumbar arteries. The musculophrenic artery, a terminal branch of the internal thoracic artery, runs inferiorly and laterally posterior to the seventh to ninth costal cartilages and gives rise to the lower two anterior intercostal arteries to the corresponding intercostal spaces. It supplies the pericardium and anterior abdominal muscles, anastomosing with the deep circumflex iliac and the lower two posterior intercostal arteries. The lumbar arteries arise from the abdominal aorta anterior and to the left of the lumbar vertebrae.

The upper three pairs run anterior, while the lowest course runs posterior, to the quadratuslumborum. After they pierce the transverse abdominis, running between this muscle and the internal oblique, the lumbar arteries anastomose with