

■ Review

An Overview of Abdominoplasty

Abdominoplasti: Güncel Konseptler

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Abstract

The number of tummy tuck surgeries has recently increased significantly, largely due to the rise in bariatric surgery procedures. This surgical procedure is undertaken for both functional and aesthetic reasons. Several surgical techniques may be employed in the performance of an abdominoplasty. Most techniques are based on the excision of the skin in the lower abdomen and the stretching of the skin in the upper abdomen to cover the resulting defect. It is not feasible to utilize a singular technique for each patient. A meticulous assessment of the patient is imperative in determining the optimal technique. The advent of liposuction has provided a valuable adjunct to surgical intervention. This article outlines the evolution of abdominoplasty and the role of liposuction techniques in its development. Furthermore, the outcomes of the surgical method for reducing abdominal flap thickness by tangential excision of the abdominal flap before the advent of liposuction techniques are presented. Abdominal contouring procedures offer patients not only an enhancement in their appearance but also an improvement in their quality of life. Despite the numerous options, it is crucial to select a body contouring procedure that is safe and effective by evaluating the needs and expectations of each patient.

Keywords: Abdominoplasty, liposuction, bariatric surgery

Öz

Karın germe ameliyatları bariatrik cerrahi girişimlerinin artması nedeni ile son dönemde yeniden sık yapılan ameliyatlar arasına girmiştir. Bu cerrahi, estetik olduğu kadar fonksiyonel amaçlar güdülerek de yapılmaktadır. Abdominoplasti yapmak için kullanılan farklı cerrahi teknikler vardır. Çoğu teknik, karının alt kısmındaki derinin eksizyonuna ve ortaya çıkan defekti örtmek için karının üst kısmındaki derinin gerilmesine dayanır. Her hastaya tek tekniğin uygulanması mümkün değildir. Teknik seçiminde hastanın özenli değerlendirilmesi esastır. Liposuction tekniklerinin gelişimi cerrahi girişime çok büyük bir destek olmuştur. Bu yazıda abdominoplastinin bugüne kadar olan gelişimi, liposuction tekniklerinden bahsedilmiştir. Ayrıca, liposuction tekniklerinin gelişiminden önce abdominal flebin tanjansiyel eksizyonu ile abdominal flep kalınlığını azaltmaya yönelik cerrahi yaklaşımın sonuçları paylaşılmıştır. Karın şekillendirme prosedürleri hastalara sadece imajlarında bir düzelme sağlamaz aynı zamanda yaşam kalitelerinde bir iyileşmede sağlar. Birçok seçeneğe rağmen, her hastanın ihtiyacı ve talepleri değerlendirilerek hem güvenli hem de etkili bir vücut şekillendirme prosedürü seçmek esastır.

Anahtar Kelimeler: Abdominoplasti, liposuction, bariatrik cerrahi

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The abdominal Anatomy

The anterior abdominal wall is a complex structure of skin, subcutaneous adipose tissue, fascia, and muscles. In addition to surrounding the important organs, it is involved in functions such as standing, walking, bending, lifting, urination, defecation, labor, vomiting, coughing, and respiration [1]. The shape of the anterior abdominal wall may be impaired due to rapid weight loss, recurrent pregnancies, previous surgeries, hernias, obesity, and laxity of the anterior abdominal wall muscles [2]. Generally, cases showing deformities of the anterior abdominal wall can be classified into three groups according to their severity; mild (loose skin, few striae, mild fat accumulation, non-severe diastasis recti), moderate (toned, sagging skin, diastasis recti, striae, very prominent fat accumulation) and severe (very large amount of fat accumulation, enlargement and sagging of the abdominal skin, skin folds above the pubis or in the form of overflowing apron) [3].

The definition of Abdominoplasty

Abdominoplasties are functional and aesthetic surgeries aimed at correcting deformities of the skin, subcutaneous adipose tissue, muscles, and fascia. Over the past century, there have been many surgeons who have defined different abdominoplasty techniques to achieve better shaping and to hide the remaining scar [4]. Abdominoplasty techniques date back to 1870 [5]. Technical aspects of abdominoplasty have evolved significantly over the last two decades [6]. Many innovations were introduced by Lockwood, who emphasized the treatment of lateral lower abdominal skin laxity using a high lateral tension approach, lifting the flap in a specific area to preserve cutaneous perforating blood vessels, and a low scar position [7]. Preservation of the rectus abdominis muscle perforators increase the vascularity to the fat layer and skin of the abdominoplasty flap, allowing additional liposuction to be safely applied to this flap. In a full abdominoplasty, the length of the lower transverse incision extends laterally over a variable distance [8]. The span of the incision depends largely on the degree of skin folds or overhanging skin and the amount of vertical excess skin in the upper and lower abdomen. This usually extends beyond the anterior superior iliac process (ASIS) and may extend laterally to the posterior axillary line in extended abdominoplasty procedures [9]. Short scar procedures or 'mini' abdominoplasties are less common and can be performed when no excess skin in the upper abdomen and limited skin resection is needed in the lower abdomen. Excess adipose tissue can be removed tangentially

from the abdominal flap to prevent umbilicus malposition, seen in abdominoplasty and affects the aesthetic appearance, and step-shaped skin residue caused by inappropriate flap thickness at the inguinal suture line.

The Brief History of Abdominoplasty

The first examples of abdominoplasty operations were on hernia and consisted of removing excess skin in large and sagging abdomens. Here, the excess skin was removed as a full layer without lifting the abdominal skin as a flap. Demars and Marx (1890) published cases of fat removal from the anterior abdominal wall in France. Kelly (1899) was the first physician to use the term 'abdominal lipectomy' in the history of medicine by publishing a study he conducted in the USA. Guadet and Morestin (1905) published a series of cases of transverse repair of large umbilical hernias and removal of excess skin and fat tissue. Desjardins (1911) used vertical elliptical excision and H. Morestin (1911) published his series of 5 cases with transverse incision, the largest series up to that time. Weindhold (1909) published a series of midline excisions in Germany. Jolly (1911) described the inferior transverse elliptical incision; Schepelman (1918) described vertical midline excisions. Thorek (1939) published the technique called plastic adipolipectomy. Thorek first took the navel as a graft and adapted it to its new location. Later, he left the navel in the abdominal wall and at the end of the operation, he removed and sutured it in a new place prepared in a flap on the anterior abdominal wall. Somalo (1946) used the term 'abdominal dermoliplectomy' for the first time, which is still accepted as terminology today [10].

The Today of Abdominoplasty

Today, the difference in the application of abdominoplasty is due to the type of cut chosen. Korre (1952) categorized the cuts used in abdominoplasty [5, 11]. According to this:

1-Vertical: It runs between the processus xiphoideus and pubis and is recommended in cases of horizontal abdominal skin excess and looseness of the anterior abdominal wall structures in the same direction. This type of cut was used by Babcock, Pick, Ksuter, Spira.

2-Transverse: Nowadays, inferiorly located ones are often preferred. This type of cut was used by Somalo, Spadofora, Pitanguy, Gonzalez-Ullua, Molbeck, Regnault.

3-Combined: These are a mixture of transverse and vertical cut shapes. Today, this technique is used in patients with excess vertical and transverse skin after bariatric surgery.

Today's abdominoplasty operations aim to remove excess skin and fat tissue, to correct the anterior abdominal wall

muscles and fasciae and laxity, and to leave the smallest and most acceptable scar possible [12]. Various studies have been carried out on methods suitable for these purposes.

There is a concern among plastic surgeons that fat excision from the inner face of a raised abdominal flap or liposuction of this flap will disrupt skin circulation and cause additional wound-related complications. This has led to permanent central fullness and excess fat. Surgical removal of adipose tissue has been performed by many surgeons before and has been recommended in many scientific meetings [13, 14].

A surgical technique to reduce abdominal flap thickness

Taner et al. evaluated the results of 15 abdominoplasty operations performed in the 2nd Plastic and Reconstructive Surgery Clinic of Ankara Numune Hospital between 1983 and 1989. In the cases included in the study, thick abdominal flaps were thinned by tangential removal of excess adipose tissue. In these cases, standard abdominoplasty incision and flap elevation were performed. After excision of the part under the umbilicus, the adipose tissue under the superficial fascia was removed tangentially from the remaining abdominal flap with a dermatome knife. Following hemostasis, the umbilicus was adapted to its new location and the subcutaneous skin was sutured in three layers after drain placement. In the patients included in the study, tangential adipose tissue was removed from the right half of the abdominal flap in combination with classical abdominoplasty, and no surgical procedure was performed on the left half to reduce the thickness of the abdominal flap in the first session. Postoperative necrosis, irregularity, ecchymosis, hyperpigmentation, edema, thrombophlebitis, pulmonary embolism, umbilical malposition, asymmetry, and excess residual adipose tissue were not observed. In our case in which tangential excision was performed on the right half, umbilical malposition, asymmetry on the anterior abdominal wall, and a prominent left-sided step deformity on the inguinal incision line were observed (17). While similar studies have continued until today, their results have been reported in various publications. For example, Samra et al (2010) studied on the authors conducted a chart review of 161 patients who had undergone either lipoabdominoplasty or traditional abdominoplasty between 2004 and 2009. They reported that Lipoabdominoplasty was not associated with a statistically significant increase in perfusion-related complication rates compared with classical abdominoplasty, even though it involves potential trauma to the vascularity of the elevated abdominoplasty flap. This holds

even in patients who are at increased risk for perfusion-related complications secondary to a history of active smoking or a previous supraumbilical scar [15].

Vieira et al (2018) studied in Eleven thousand one hundred ninety-one patients having abdominoplasty with truncal liposuction and having abdominoplasty alone. Overall complication rates were 10.5 percent and 13.0 percent, respectively. Combined liposuction and abdominoplasty were independently associated with a reduced risk of overall complications and seroma. They reported that abdominoplasty with truncal liposuction is safe, with fewer complications than abdominoplasty alone [16].

Discussion and Future Direction

Patients who apply for abdominoplasty are usually middle-aged and elderly people, who have given birth to many children, whose skin quality has deteriorated, whose abdominal skin is sagging, often overhanging the pubis, who have excessive fat accumulation in the abdominal region, and who are obese or tend to obesity. In these patients, deformities of the superficial fat layer are common [17].

If the thick abdominal skin flap is not thinned in tummy tuck surgeries, the potential for obesity will remain hidden due to the deep fat layer that will remain especially below the navel for the person's future life. These cells may hypertrophy by storing fat again. If calorie intake continues, new fat cells will be formed in this layer from cells called adipocytes. These cells are resistant to both diet and exercise.

The weight gained in this way cannot be lost later. The total fat storage capacity of the remaining cells will decrease due to the number of cells removed by previous surgery. If the person does not abandon the preoperative eating habits, it will be easier for the response to be hyperplasia at the cellular level than in the preoperative period. Again, in case of weight gain, since the symmetry of the deep fat layer, which is normally symmetrically distributed around the navel in the preoperative period, will be disrupted after surgery, fat storage will show an asymmetrical distribution in case of obesity. The accumulation of features will be below the new belly.

In cases where the abdominal flap is not thinned, the possibility of step deformity because of inappropriate flap thickness on the inguinal suture line is very high. Many different procedures are performed to thin the thick flap. Surgical removal of adipose tissue, previously performed by many surgeons, is still used today. This technique was proposed by Pontes, Riberio, Busker, Galli and Requault, but no specific study is available

[17]. As shown in the study of Taner et al., tangential removal of adipose tissue technically did not cause problems such as necrosis and irregularity in the abdominal flap [18].

Nowadays, liposuction is frequently used for thinning of abdominal flaps. Illouz described a 'suction abdominoplasty' technique in 1992. This technique has been useful for those with abundant loose fat in the supraumbilical region [19].

Liposuction combined with abdominoplasty has proven safe and effective, but how much fat can be safely removed without increasing complication rates? An article published in 2009 summarized the lipoabdominoplasty procedure and the low complication rates seen with this technique [15]. Many authors have published their own experiences demonstrating safe and superior results using lipoabdominoplasty compared to abdominoplasty or liposuction alone. These publications show that liposuction performed simultaneously with abdominoplasty has the same or less morbidity than abdominoplasty alone when performed in safe areas [20-23].

Despite all this, the combination of liposuction with abdominoplasty, termed lipoabdominoplasty, remains a controversial topic due to reports of thrombotic or fat embolism complications and the possibility of liposuction-induced necrosis of the vascular supply of the abdominal wall flap. Using Huger's description of the three vascular territories of the abdominal wall, an attempt has been made to define what changes in technique are necessary to make lipoabdominoplasty a safe and effective procedure [15, 24].

Matarasso identified four areas that can be safely treated with liposuction when performing abdominoplasty, recommended limited and careful liposuction when combined with abdominoplasty, and stated that patients with vertical scars, large abdominal flap lifts, and smokers have the highest risk of flap necrosis in the combined procedure [25]. Heller et al. described liposuction of the entire abdomen, including the epigastric and mesogastric regions, followed by abdominoplasty and reported that complication rates did not increase in patients undergoing the combined procedure [26]. The development of vacuum-assisted liposuction (SAL)/ultrasound-assisted liposuction (UAL) has changed the approach to body contouring surgery. Almost all plastic surgeons use SAL/UAL as an adjunct to excisional abdominoplasty [27, 28]. There are also liposuction techniques called VASER, which are combined with abdominoplasty and provide muscle definition. The surgical use of ultrasound or LASER is emphasized to enhance skin tightening during liposuction and enable the

creation of varying degrees of muscle-like appearance [27]. These 'super-thin' flaps are possible using a specially designed liposuction cannula. In this way, the surgeon can proceed in a highly superficial manner, removing fat and preserving the subdermal plexus [27]. Both technologies facilitate fat removal and potentially reduce bleeding and cause less swelling and bruising. On the other hand, there is a higher incidence of thermal injury, dyschromia and seroma compared with normal SAL, as well as a longer procedure time [29].

Good results can be obtained with conventional lipoabdominoplasty, but liposuction results in a fatty thick abdominal flap compared to abdominoplasty. Thinner flaps with good blood supply can be obtained with liposuction, if they are applied to safe areas. Tangential fat excision from the abdominal flap presented by Taner et al. has been replaced by liposuction applications today. In these device-dependent applications, access to the device may not always be possible. It should be kept in mind that tangential fat excision can be performed safely in cases where a thick abdominal flap is encountered, and liposuction devices cannot be accessed or in the face of a situation that may cause a spike effect on the suture line.

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