



Enhancing Waist Definition Through Oblique Plication and Liposuction in Abdominoplasty

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Abstract

Background and objective: Lipo-Abdominoplasty remains a popular cosmetic surgical procedure globally, with numerous modifications aimed at enhancing aesthetics and minimizing complications. This study aimed to assess the effectiveness of incorporating oblique plication of the abdominal fascia alongside vertical rectus plication to improve waist definition.

Methods: This single-arm interventional study was conducted from December 2021 to February 2023 at the Plastic Surgery Department of the Burn and Plastic Surgery Teaching Hospital on 15 patients undergoing treatment for abdominal contour deformities and seeking to enhance waist definition, Through liposuction, oblique plication of external oblique muscle in addition to rectus plication.

Results: Both patients and surgeons rated the outcomes as good to excellent, a substantial reduction in waist measurements ranging from the minimum reduction of 9 to maximum of 17cm with mean of 13.67%, in term of scar assessment 87% described their scars as light and thin while 13% reported widened scars, regarding complication two cases of seroma (13.3%) with no major complications observed during or after the surgery.

Conclusion: The technique of combining oblique plication of the abdominal fascia with vertical rectus plication appeared to be safe and reproducible, resulting in reduced complications and residual bulging compared to conventional abdominoplasty.

Keywords: Lipo-Abdominoplasty, Oblique plication, Waist Definition, Waist Contouring

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Introduction

Body contouring procedures are expanding around the world due to the increment of the fat populace and bariatric procedures; the abdominal region is the foremost commonly treated zone in plastic surgery strategies. After pregnancies or weight loss, patients desire enhancement and improvement of abdominal area.¹ Abdominoplasty improves body function and appearance by addressing musculofascial laxity, excess skin and fat, and creating a natural-looking umbilicus.² It ranks as the fourth most prevalent cosmetic surgery, with approximately 800,000 individuals undergoing this treatment annually.³ Illouz and Fournier popularized and modified liposuction, with Illouz expanding the technique to the entire body in 1977. Using adapted equipment and blunt cannulas, varying cannula sizes based on aspiration needs.⁴ In October 1996, the first liposuction abdominoplasty (LAA) separated an abdominal flap from deep fascia using liposuction, enhancing perfusion and flap excursion. Recent years have seen a focus on refining abdominoplasty to reduce risks, expedite recovery, enhance body contours, and mitigate complications and tissue necrosis.⁵ Abdominal rectus diastasis occurs when the abdominal muscles separate due to widening of the linea alba, often by pregnancy or significant weight gain, resulting in a noticeable bulge in the abdomen.⁶ Furthermore, in comparison to the general population, patients with rectus diastasis report lower quality of life, lower body satisfaction.⁷ Pitanguy's abdominoplasty technique emphasizing rectus abdominis muscle plication without aponeurosis opening for improved outcomes.⁸ The impact of midline plication for waist definition is minimal. An undesirable and unnatural appearance of the contour may be caused by an enlarged anterior rectus sheath plication, which would distort the abdomen and waist.⁹ Various

techniques, including L-shaped external oblique plication, multidirectional abdominal musculature plication, and muscle flap advancement, aim for consistent waste reduction, with additional plication of the external oblique for extensive liposuction.¹⁰ During a normal abdominoplasty, bilateral Scarpa advancement flaps are used to define the waist.¹¹ Crossbow plication addresses diastasis of the linea alba, focusing on the lower abdomen, containing protrusion mostly around the inguinal ligament and upper pubic region, improving aesthetic abdominal volume.¹² The umbilicus, a natural scar, measures 1.5 to 2 cm in diameter, located at the midline by the superior iliac crests, and encircled by a skin fold, aesthetically pleasing when displaying a superior hood in middle-aged individuals.¹³ Various techniques are employed in abdominoplasty to reposition the umbilicus, often involving suturing the abdominal skin to the navel and securing the umbilical stalk to the rectus sheath.¹⁴ Even though quality of life is improved after abdominal contouring procedures, postoperative complications may compromise the result. According to studies, the complication rates following aesthetic abdominoplasty vary from 32% to 37%.¹⁵ Every complication poses a risk to the patient-surgeon relationship, particularly in aesthetic procedures chosen by healthy patients, emphasizing the importance of close post-operative monitoring to prevent systemic issues like pulmonary thromboembolism.¹⁶ This study aims to investigate how oblique plication of the abdominal fascia influences waist definition and contour irregularities. The goal is to introduce a modern approach to abdominoplasty that integrates established methods, aiming to improve long-term outcomes and patient satisfaction while reducing the risk of post-procedural complications.



Patients and methods

This study is a single-arm interventional trial conducted at the Plastic Surgery Department of the Burn and Plastic Surgery Teaching Hospital from December 2021 to February 2023. Prior to participation, written consent was obtained from all patients, and they were briefed on the operative procedures. The study involved 15 patients, aged between 31 to 52 years, who exhibited laxity in abdominal skin, accumulation of fat, and body mass index (BMI) values ranging from 26 to 35. Patients who had chronic respiratory conditions, smoked, had previous abdominoplasty, regularly used corticosteroids, or had eventration and plans for future pregnancy were not included in the study. The ethical and administrative approval was taken from the Ethics Committee of College of Medicine/ University of Sulaimani, Sulaimani General Directorate. The protocol of this study was registered in 25 January 2023 as reference number 37191182. Patient confidentiality was protected and their personal information was kept out of the collected data file. Written consent was obtained from all patients, and they were briefed on the operative procedures. Preoperative markings are essential for achieving successful outcomes and desired symmetrical results. Markings were performed in an upright position prior to the operation Figure (1). While standing, the lowest natural crease and the outermost point of the inguinal fold were marked. Efforts were made to confine the lateral point, yet occasionally, extended excision was necessary for fatty folds extending to the waistline to achieve an optimal waist curve. A transverse line was drawn above the pubic hair, extending laterally towards the anterior superior iliac spine, and the upper boundary of the pendulous fold was delineated at or slightly above the umbilicus level. Rectus diastasis was diagnosed while the patient was in a

supine position using the straight leg raising test as showed in Figure (2).

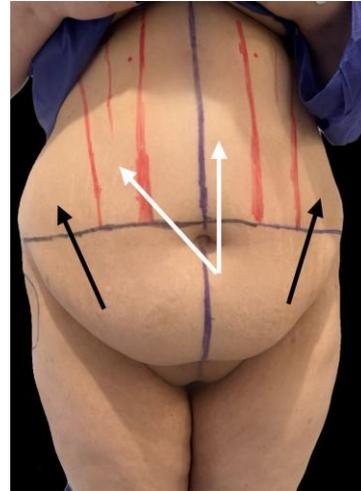


Figure (1): Preoperative marking. White arrows illustrating minimal liposuction areas, Black arrows illustrating areas of extensive liposuction



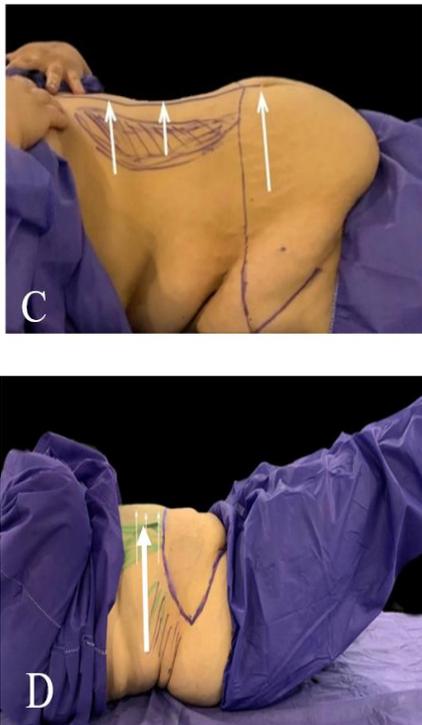


Figure (2): Straight leg raising test. Illustrating Diastasis recti occurs due to increasing intra-abdominal pressure. A, B. Before the test. C, D. After the test

The patients received a preventative dose of intravenous amoxiclav totaling 1 gram. Under general anesthesia and intubation. Infiltration was employed to infuse the wetting solution using a power-assisted liposuction device and a blunt infiltration cannula. The wetting solution consisted of 500 ml of Ringer lactate, along with 0.5 mg of epinephrine and 10 ml of 1% Lidocaine. Adequate tissue turgor was ensured before commencing liposuction. The infiltration of the wetting solution was carried out sequentially, targeting one area at a time, encompassing flanks for all patients, regardless of fat thickness. A waiting period of ten to fifteen minutes allowed the wetting solution to achieve hemostatic efficacy before proceeding further. During the procedure, lipodestruction is initiated using a 4mm basket cannula for approximately 20

minutes, followed by liposuction with a 4mm Mercedes cannula. Further refinement is then carried out using a 3mm cannula for nearly 20 minutes in each targeted area. Following liposuction, the lower abdomen flap is dissected up to the umbilicus, as illustrated in Figure 3 (left), Selective dissection occurs along the midline of the upper abdomen, between the medial edges of the rectus abdominal muscles, with tunnel dissection potentially extending to the xiphoid, then proceeding laterally (1 to 1.5 cm) to the medial border of the rectus abdominis muscle up to allows for adequate fascial plication while preserving perforators. Correction of rectus diastasis involves vertical plication using a continuous 0 loop nylon suture from the xiphoid to the suprapubic region. Subsequently, oblique plication of the external oblique muscle's aponeurosis is performed to enhance waist definition, extending from the center of the illustration outward until reaching the anterosuperior iliac spines, utilizing Polypropylene 0. Image reference is provided in Figure (3). The procedure advances by excising skin and subcutaneous tissue flaps, placing a suction drain, securing the umbilicus using Polyglactin 910 2.0, suturing the Scarpa's fascia with Polyglactin 910 3-0, employing Polyglecaprone 25 3-0. for subdermal sutures, and finally, closing with subcuticular sutures using Polypropylene 3.0, followed by dressing application. The Scientific Committee approved the study protocol on 25 Jan 2023 at the Kurdistan Higher Council for Medical Specialties (KHCMS), Sulaimaniyah, Iraq. The mean percentage of studied parameters was calculated using excel software.



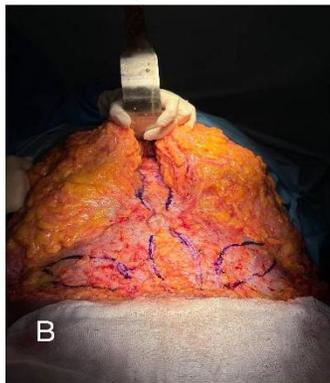


Figure (3): A. Tunnel undermining Abdominal flap. B. Markings for vertical and oblique plication. C. After vertical and oblique plication

Results

From December 2021 to February 2023, surgical procedures were performed on a total of 15 patients, all of whom exhibited abdominal laxity characterized by divaricated recti upon examination. Details

regarding patient demographics are provided in Table (1). At the time of surgery, the patients' ages spanned from 31 to 52 years, with an average of 39.2 ± 6.58 years. Their BMIs ranged from 26 to 35 kg/m^2 , with a mean of $29.36 \pm 3.16 \text{ kg}/\text{m}^2$, and only three out of the 15 cases (20%) had hypertension. No additional concurrent procedures were carried out during the surgeries. The average duration until drain removal was 5 days, regarding complications no instances of wound dehiscence or necrosis reported. However, there were two cases of seroma (13.3%), both of which resolved without further complications.

Table (1): Demographic and basic characteristics of patients

	Age	BMI	Smokin g	HTN	DM
Case 1	39	35	No	No	No
Case 2	41	30.4	No	Yes	No
Case 3	31	27	No	No	No
Case 4	33	24	No	No	No
Case 5	38	27	No	No	No
Case 6	31	30	No	No	No
Case 7	45	29	No	Yes	No
Case 8	40	35	No	No	No
Case 9	33	26	No	No	No
Case 10	52	27.5	No	No	No
Case 11	32	31	No	No	No
Case 12	50	28	No	Yes	No
Case 13	40	33.2	No	No	No
Case 14	39	28.3	No	No	No
Case 15	44	29	No	No	No
Total *	39.2 ± 6.58	29.36 ± 3.16	0 (0.0%)	3 (20.0%)	0 (0.0%)

* mean±SD or No.(%),HTN=Hypertension, DM=Diabetes mellitus





Throughout the follow-up period, notable improvements were observed in body contouring and definition among all patients, evidenced by a substantial reduction in waist measurements ranging from 9 to 17cm, as depicted in Table (2) and Figure (4-7). Scar assessment conducted through patient questioning at the 6-month postoperative mark revealed that 87% described their scars as light and thin, while 13% reported widened scars Figure (8).

Table (2): Changes in waist measurements following surgery

	Pre-op (cm)	Post-op (cm)	Reduction (cm)
Case 1	105	90	15
Case 2	100	87	13
Case 3	83	70	13
Case 4	79	70	9
Case 5	95	82	13
Case 6	95	80	15
Case 7	102	85	17
Case 8	89	75	14
Case 9	85	73	12
Case 10	89	80	9
Case 11	88	78	10
Case 12	97	81	16
Case 13	90	74	16
Case 14	90	74	16
Case 15	92	75	17
Mean ±	91.93±	78.27±	13.67±
SD	7.16	6.03	2.72 *

*Wilcoxon Signed Ranks Test showed a significance difference (P=0.001)



Figure (4): A. Anterior view preoperative. B. Lateral view preoperative. C. Result 6 months after surgery





Figure (5): A. Anterior view preoperative. B. Lateral view preoperative. C. Result 6 months after surgery



Figure (6): A. Anterior view preoperative. B. Result 8 months after surgery



Figure (7): A. Anterior view preoperative. B. Result 4 months after surgery



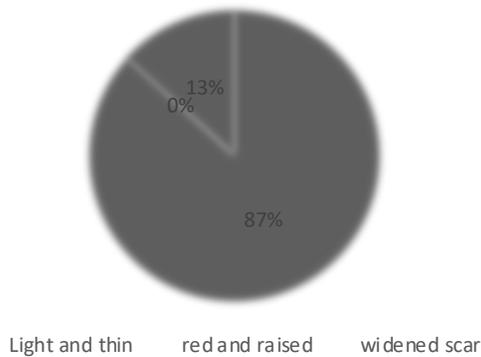


Figure (8): Scar assessment result after 6 months. Scar assessment through patient questioning at the 6-month postoperative, that 87% satisfied with their scars as light and thin, while 13% reported widened scars

Discussion

Preoperatively, precise markings which was illustrated in Figure (1) beginning with a lower transverse line above the pubic hair, extending laterally towards the iliac spine ensuring comprehensive surgical planning for optimal outcomes. First beginning with liposuction which benefits individuals with surplus abdominal skin and localized fat accumulation in the flanks and abdominal region, enhancing the aesthetic waist appearance. Thorough liposuction targets the flanks and lateral costal margins, resulting in a mesh-like undermining effect aiding downward flap movement thus avoiding extensive subcostal dissection.¹⁷ This albeit with restricted dissection, resulted in a safer and more aesthetically pleasing abdomen compared to other methods previously described. The second principle involves selective dissection along the midline of the upper abdomen, specifically between the medial edges of the rectus abdominal muscles. Failure to restrict dissection in this manner can lead to harm to perforating vessels, thereby raising morbidity rates and the likelihood of necrosis in the abdominal flap. Tunnel dissection may extend to the xiphoid if rectus muscle plication is necessary.¹⁸ As a result, this approach

enhances vascularity to the flaps, reducing the risk of flap necrosis, as well as lowering the likelihood of seroma and hematoma formation. The third principle involves oblique plication, initiated by vertically plicating the rectus abdominis muscles from the xiphoid to the pubis. Subsequently, the aponeurosis of the external oblique muscle undergoes oblique plication. Sutures are applied continuously with an inverted knot, utilizing Polypropylene 0 or a comparable suture material. In comparison to the traditional vertical plication method used in patients undergoing lipoabdominoplasty, a residual bulging was noted in the lower abdomen during the postoperative period.¹² This led to a reduction in waist definition and abdominal contour, despite rectus diastasis plication. Therefore, combining oblique plication with rectus plication proves to be a safe procedure that enhances overall results. It contributes to a more youthful contour of the waist and is deemed a superior method for defining the waist compared to conventional abdominoplasty. Despite significant advancements in abdominoplasty surgery, complications are still a significant risk. Seroma formation is the most common of these side effects at a rate of 1 to 57%.¹⁹ According to Matarasso, the rate of serum collection is higher in the combination of liposuction and abdominoplasty than in the individual procedure.²⁰ Fortunately, no major complications such as skin necrosis was encountered because of limited tunneled undermining of abdominal flap in the which preserves the perforators. In our study, we encountered two cases of seroma formation. The decision not to utilize progressive tension sutures due to limited undermining likely contributed to this occurrence. Additionally, the extensive nature of the liposuction may have played a role. We suggest leaving drains in place for a longer duration (up to 10 days) to mitigate this risk. The seromas were managed by weekly





aspiration. The aesthetic attractiveness of the abdomen is closely linked to achieving an appealing waistline. The presence of pendulous or bulky flanks can cause both cosmetic and psychological distress for patients, highlighting the importance of achieving a pleasing waist appearance, a goal requested by all patients. Surgery conducted using this technique was deemed to be highly safe, with no complications observed during the surgical procedure, and any postoperative complications were managed appropriately.

Conclusion

Abdominoplasty is a part of combination body contouring procedures. Combined Abdominoplasty with liposuction should be taking in to account for each patient. Achieving a safe and aesthetically pleasing result over time is the desired goal, this study showed that the technique is vascularly safe as well as reproducible due to the use of limited abdominal flap elevation, selective liposuction, and oblique plication in addition to vertical plication that enhances formation of a smoother waist contour which are of significant importance to achieve a natural and aesthetic result that maintains over.

Conflict of Interest

Authors declare there is no financial conflicts of interest

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