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Third Generation Ultrasound-Assisted Liposuction "Vaser": Safety and Efficacy

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ABSTRACT

Background: Liposuction is a very commonly performed procedure in aesthetic surgery practice. Several tools and technologies had been introduced to increase the safety and efficacy of this procedure, the most recent of which is "Vaser-assisted liposuction".

Patients and Methods: This study was conducted on 50 patients (33 females and 17 males) presenting with localized lipodystrophy.

Results: No major complication was recorded. One patient was reoperated upon for drainage of an infected seroma. Most of the patients reported their high satisfaction with the result of their surgeries.

Conclusion: Vaser-assisted liposuction proved to be a safe and effective tool of body contouring. Proper training of the operating surgeons together with accurate selection of patients will maximize the results.

Key Words: *Liposuction – Vaser – Body contouring.*

INTRODUCTION

Since its introduction by Ilouz, Liposuction is considered the commonest performed procedure in the aesthetic surgery practice all over the world **[1]**. It is also considered the highest procedure to benefit from advances in medical technology.

Several techniques have been described for performing liposuction. The commonest and most popular is suction-assisted lipoplasty. Other modalities include laser-assisted liposuction, ultrasound-assisted liposuction and power-assisted liposuction.

In the late 1980s and early 1990s, the first generation ultrasound-assisted lipoplasty was developed by SMEI company in Italy. In the mid-1990s, two second generation ultrasound-assisted lipoplasty devices were introducted **[2]**. In 2001, Sound surgical Technologies introduced a third-generation device: "Vaser: Vibration amplification of sound energy at resonance" (Fig. 1). It was designed to improve safety by reducing the power delivered to the tissues while maintaining efficacy **[5]**.

Vaser assisted liposuction utilizes ultrasonic energy as a method for fat emulsification while preserving most of the connective tissue matrix thus making liposuction easier, together with targeting the improvement of skin recoil following the procedure **[6]**. (Fig. 2).

Fig. (1): The Vaser device.

Fig. (2): Vaser integrated system.

PATIENTS AND METHODS

This prospective study was conducted in the period between April 2014 to May 2015. It involved 50 patients presenting with localized lipodystrophy (33 females, 17 males), aging between 21-49 years old with average age of 36 years old.

Exclusion criteria were: Patients with BMI higher than 33, active smokers who refused to cease smoking in the perioperative period, patients with uncontrolled medical conditions and patients presenting with skin laxity than can not be corrected solely with liposuction and required surgical lifting.

Preoperative assessment:

Routine laboratory investigations were ordered in the form of complete blood picture, coagulation profile, fasting blood glucose, liver and kidney function tests. Patients were instructed to stop aspirin, NSAIDs & oral contraceptive pills for 2 weeks preoperatively.

Physical examination included: Quality and tone of the skin, hernias, previous scars, asymmetries, dimpling or cellulite and areas of excessive fatty deposits. Standard photographs were taken for further analysis and planning.

Makings:

Preoperative markings were done while the patient was standing in front of a mirror to allow the patient to participate actively in the process. The site of access incisions were also discussed with the patient to reach the most hidden sites while allowing the best access to the desired region.

Anaesthesia and positioning:

The procedure was done under local anaesthesia if the desired volume to be aspirated is less than 1000ml. If more, general anaesthesia was the way of choice. Both epidural and spinal anaesthesia were avoided because of their potential for vasodilatation and hypotension with the risk of fluid overload due to aggressive fluid resuscitation.

All patients were operated upon in the supine position. Measures to prevent hypothermia were strictly followed in the form of warming of all fluids, minimizing exposed areas and increasing room temperature.

Procedure:

The procedure-consisted of 3 phases: (a) infiltration of tumescent fluid, (b) Emulsification, (c) Aspiration of emulsified fat.

a- *Infiltration:*

Infiltration of the target areas was done using tumescence solution formed of bags of 1L of normal saline, 1mg epinephrine, 25ml of Lidocaine 2% (and 5ml of 8.4% sodium bicarbonate in case of local anaesthesia). This solution was infiltrated in the region in the subcutaneous fatty layer in both planes: superficial and deep, until the region became firm and turgid. 25-30 minutes were allowed to pass before starting emulsification to allow complete diffusion of the treatment fluid to all compartments within the subcutaneous tissue.

b- *Emulsification:*

Special ports were inserted through the access incisions to protect the skin (Fig. 4). Before the probe was inserted, a wet towel or dressing, folded twice, was placed around the port to avoid inadvertent thermal injury to the skin. Before use, the solid titanium probes were gently screwed to the handpiece and tightened. A protective cover was placed over the hilt of the probe near the handpiece.

The solid titanium probes are either one to three grooved. Their diameter ranges from 2.2 to 4.5mm. A probe with one groove delivers its energy from the tip rather than the sides and is used for more aggressive removal of fibrous fat. A three-grooved probe delivers most of the energy from the side rather than the tip. This is safer with homogenous distribution of the energy (Fig. 3).

Fig. (3): The Vaser instrument system.

Fig. (4): Skin ports.

After adjustment of the power and the mode of the device, the selected probe is introduced throughout the access port. The movement of the probe should be continuous, to-and-fro with no torquing, taking care not to tether the dermis by coming superficial at one point. Once there is no resistance in deep layer or the time elapsed (1min per 100ml of infiltrated fluid in the target regions), the probe is brought more superficially if skin tightening is required.

c- *Aspiration:*

Following emulsification, skin ports were removed followed by insertion of proper sized liposuction cannula for aspiration of emulsified fat. The end point was reached based on careful inspection and the pinch test.

At the end of liposuction, a single 5-0 absorbable suture was used to close the access incisions to allow further fluid to come out.

Patients were instructed to wear compression garments all the time in the first 3 weeks followed by 12 hours a day for the successive 3 weeks. Small volume patients were allowed to return to work after 3 days while large volume patients after 5-7 days (if no concomitant surgery was performed).

Follow-up visits were scheduled after one week, 3 weeks, 45 days, 3 months and six months. Patients were examined for complications in addition to aesthetic outcome. Standard postoperative photographs were taken. In the last visit, the patients used to fill a questionnaire about their satisfaction from the procedure: 1 → poorly satisfied, 2 → fairly satisfied, 3 → very satisfied, 4 → excellent result.

RESULTS

Results are shown in Tables (1-6) & Figs. (1-8).

Table (1): Patient demographics

Item	Value
No. of patients	50
Male	17/50
Female	33/50
BMI, Kg/m^2	30
Smoker	20/50
Diabetes Mellitus	10/50

Table (2): Operative data.

Item	Value
Type of anaesthesia:	
• Local with IV sedation	15/50
• General	35/50
Liposuction volume, liters	3.2 L
Type of procedure:	
• Liposuction done	32/50
• Liposuction & abdominoplasty	10/50
• Liposuction & breast augmentation	3/50
• Liposuction & brachioplasty	2/50
• Liposuction & thigh lift	3/50
Redo liposuction	10/50

Table (3): Sites that were contoured.

Item	Value
Abdomen	44/50
Trochanters	38/50
Inner thighs	36/50
Back	24/50
Arms	15/50
Male Breast	10/30

Table (4): Complications.

Item	Value
Seroma requiring drainage	2/50
Hematoma requiring evacuation	–
Surgical site infection (SSI):	
• Superficial	4/50
• Deep	1/50
External burns	–
Skin necrosis	–
Deep venous thrombosis	–
Postoperative blood transfusion	–
Return to the OR	1/50

Table (5): Postoperative sequalae.

Item	Value
Contour irregularities	2/50
Asymmetry	5/50
Duration of oedema	21±4 days
Ecchymosis	15/50

Table (6): Patient satisfaction.

Item	Value
Poorly satisfied	2
Fairly satisfied	8
Very satisfied	22
Excellent result	18

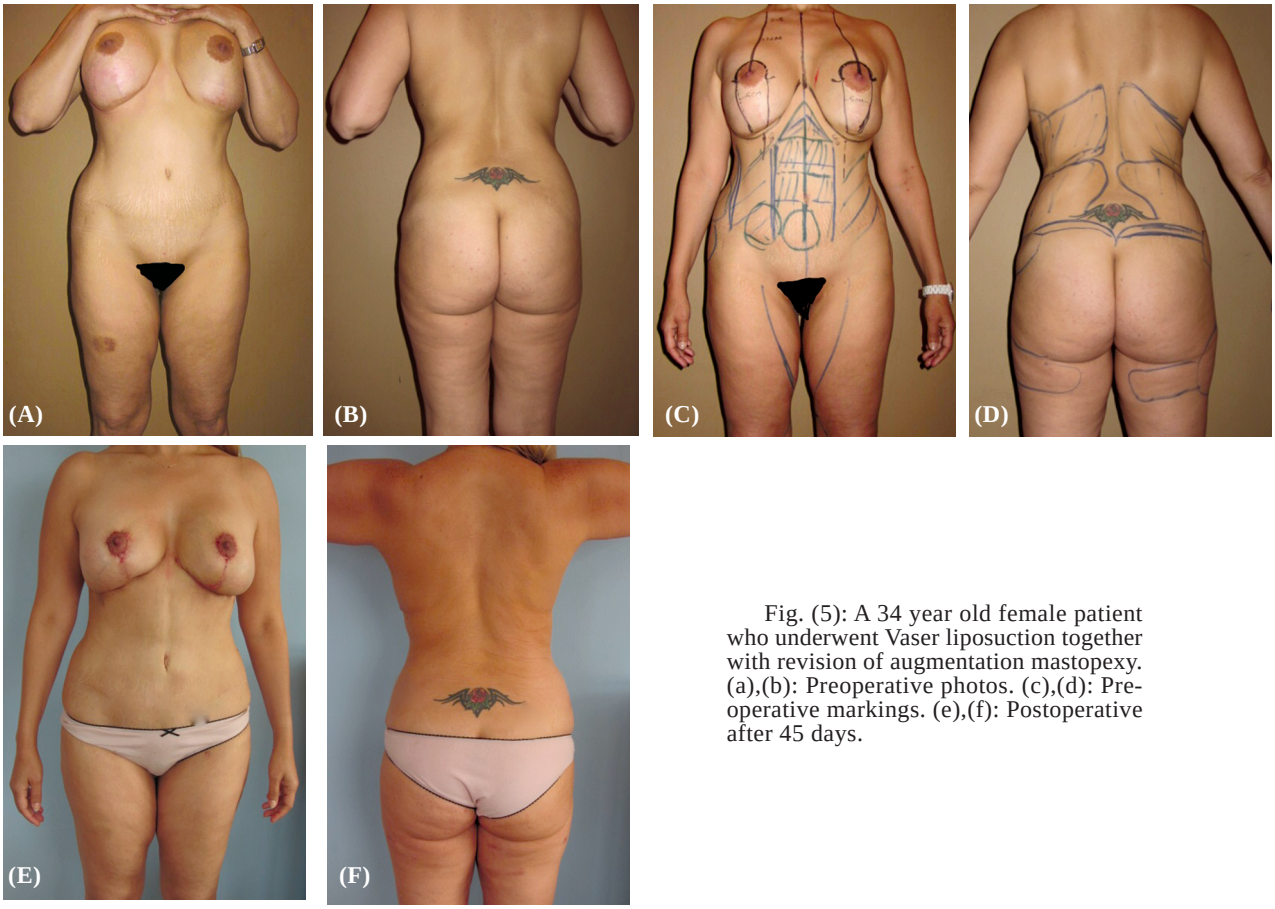

Fig. (5): A 34 year old female patient who underwent Vaser liposuction together with revision of augmentation mastopexy. (a),(b): Preoperative photos. (c),(d): Preoperative markings. (e),(f): Postoperative after 45 days.

Fig. (6): A 38 year old female patient who underwent vaser liposuction. (a),(b): Preoperative photos. (c),(d): Preoperative markings. (e),(f): Postoperative after one week.

Fig. (7): A 42 year old female patient who underwent abdominoplasty together with vaser liposuction of the flanks, trochanters & inner thighs. (a),(b),(c): Preoperative. (d),(e),(f): Postoperative after 2 months.

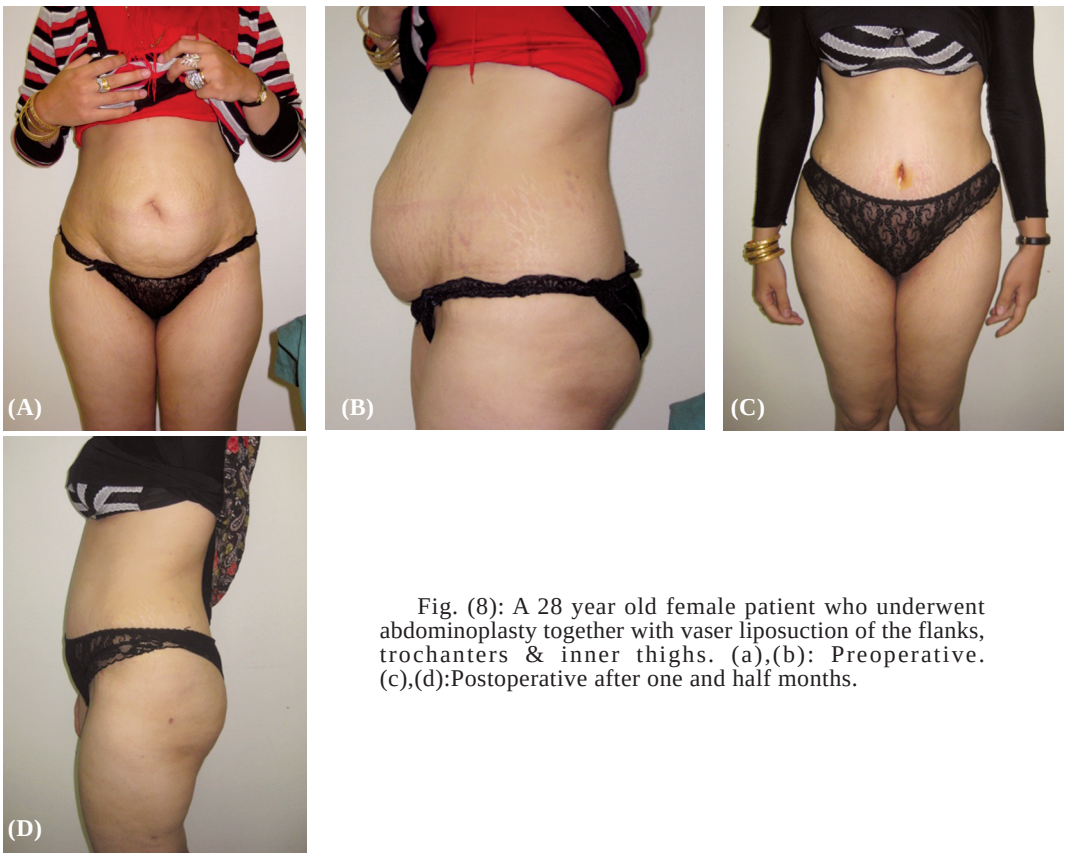

Fig. (8): A 28 year old female patient who underwent abdominoplasty together with vaser liposuction of the flanks, trochanters & inner thighs. (a),(b): Preoperative. (c),(d):Postoperative after one and half months.

DISCUSSION

Liposuction is considered one of the milestones in body contouring surgeries. Throughout the last years; several technical tips in addition to advances in medical technology had contributed a lot to the evolution of the technique. The main aim was always to maximize the results but not on the expense of patients' safety **[9]**.

In the late 1980s, Zocchi followed by Scuderi developed the first generation of ultrasound assisted liposuction devices which delivered continuous ultrasound through blunt, solid, thick probes (4-6mm in diameter). Second generation machines delivered energy through hollow ultrasonic cannulae for simultaneous fat fragmentation and aspiration. The problem with both generation was the high rate of complications mainly attributed to the excessive exposure of the treated tissues to ultrasound energy **[3,4]**.

The Vaser device was developed to overcome the limitations of the previous two generations together with making benefit from the use of ultrasonic energy **[8]**. One of the advantages of this device is that it works with two modes: (a) The continuous mode, (b) The Vaser mode. The Vaser mode works with pulsed delivery of ultrasonic energy, thus reducing the applied power while maintaining efficiency and increasing safety. The design of probes with multiple rings allows better distribution of the ultrasonic energy with increased fragmentation efficiency **[7]**.

In this study, the authors used "the Vaser" mode in all the cases either in the deep or the superficial planes even in tough fibrous areas with no need to shift to the more aggressive "continuous" mode. The probe of choice was the 3 ringed probe except in the secondary cases and male breasts where the single grooved probe was the probe of choice. In our experience in this study, adjusting the power at 70-80% in the deep planes was sufficient. While in the superficial planes it was reduced to 20-30%.

The treatment endpoint; according to the manufacturer; was one minute per 100ml of tumescent fluid infiltrated in the region. However we found that the resistance is lost and the fat was completely emulsified before reaching the expected calculated time.

Skin protection is of paramount importance. Proper use of the access ports together with the towel placed behind the probe offered skin protection externally. Internal protection was achieved by avoiding tethering of the dermis by the probe, continuous strokes to-and-fro without stop, never to pinch the skin around the working probe, and proper infiltration of the superficial planes before introduction of the probe.

In this study, we concluded that one of the main advantages of Vaser liposuction is facilitating secondary liposuction with extensive hard fibrous areas. Also this technology proved great efficacy in tough fibrous areas mainly the male breast and the back. Vaser liposuction in these particular situations and areas were very smooth and bloodless compared to traditional suction assisted lipoplasty.

Theoritically, more time is added to the procedure because an additional step is added "fat emulsification". However, the increase in time was not remarkable because of the facilitation and decrease of the time of the third step which is fat aspiration because less effort and time were required to aspirate the emulsified fat. Blood loss was comparable to conventional liposuction with no advantage for Vaser liposuction in primary cases. Another drawback that was evident in this study is the longer oedema experienced in the postoperative period compared to conventional liposuction. The explanation is not clear.

One patient was readmitted 10 days after the procedure with infected seroma that required surgical evacuation. This raised the concern that all emulsified fat should be aspirated properly. Also any remaining fluid should be massaged out before closure of the access incisions.

An important question is: Who is the proper candidate for Vaser assisted liposuction?. Throughout our limited experience in this study we found the answer is healthy patients, BMI less 30, with good skin tone only complaining of localized lipodystrophy but not skin laxity.

The second question is: Is Vaser technology a proper treatment modality for patients with skin laxity? The answer is: "No". Vaser assisted liposuction can not shift the patient from being a candidate for surgical lifting procedure to a candidate for liposuction. We found Vaser lipsosuction useful in borderline cases which lie in the gray zone between liposuction and surgical lifting. It can give hand for prevention of skin redundancy after liposuction in this particular group of patients.

Needless to say the importance of adequate training before using this device, same as with any recent energy delivering devices to avoid complications that may arise from inadequate training and experience of the operator.

Finally, more research work is required to study the histological changes in the skin following Vaser treatment. This may clarify the role of Vaser in skin tightening which is an important question that need to be answered.

Conclusion:

Throughout this study, Vaser assisted liposuction proved to be a safe and efficient modality of body contouring provided that it is performed in the indicated patient ,by a well trained operator on this type of technology. Although our initial results are encouraging, further work is a necessity to finalize thoughts and establish the practice.

REFERENCES

1- Zocchi M.: New perspective in lipoplasty: The ultrasonic-assisted lipectomy (UAL). Presented at the Annual Congress ofthe French Society ofAesthetic Surgery, Paris, France, May 1988.

2- Flynn T.C., Coleman W.P. III, Field L.M., Klein J.A. and Hanke W.: History of liposuction. Dermatol. Surg., 26: 515-52, 2000.

3- Rohrich R.J., Beran S.J. and Kenkel J.M.: Ultrasound Assisted Liposuction. St. Louis, Quality Medical Publishing, 1998.

4- Tebbetts J.B.: Minimizing complications of ultrasound-assisted lipoplasty: An initial experience with no related complications. Plast. Reconstr. Surg., 102 (5): 1690-1697, 1998.

5- Jewell M.L.,. Fodor P.B., Souza Pinto E.B., Al Shammari M.A.: Clinical application ofVASER-assisted lipoplasty: A pilot clinical study. Aesth. Surg. J., 22: 131-146, 2002.

6- De Souza Pinto E.B.: Lipomioplasty with VASER: A new approach to body contouring. Innov Plast. Aesthet. Surg., 433-42, 2008.

7- Garcia O. and Nathan M.: Comparative analysis of blood loss in suction-assisted lipoplasty and 3rd–generationinternal ultrasound-assisted lipoplasty. Aesthetic Surg. J., 28: 430-5, 2008.

8- De Souza Pinto E.B., Abdala P.C., Maciel C.M., dos Dantos Fde P. and de Souza R.P.: Liposuction and vaser. Clin. Plast. Surg., 33 (1): 107-15, 2006.

9- Nagy M.W. and Vanek P.F.: A multicenter prospective randomized single-blind, controlled clinical trial comparing vaser assisted lipoplasty and suction assisted lipoplasty. Plast. Reconstr. Surg., 129 (4): 681e-689e, 2012.