Minor (Smart) Modifications for Increasing the Efficacy of Liposuction

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Abstract

Since the description of the modern liposuction methods, many new devices and equipments have been introduced, together with the development of different technologies. Upon the fat transfer and stem cell treatments becoming widespread, atraumatic and effective liposuction and lipotransfer methods have also become commonly employed. There is a wide range of commercial equipments from conventional syringe-assisted liposuction sets to high-tech devices, all designed for different purposes. When these equipments are not accessible or in case of deficiencies of the current systems, the surgeons may find smart and low-cost solutions using the described technical modifications.

21.1 Introduction

Today, liposuction is among the most commonly performed cosmetic surgical procedures. Various liposuction equipments and techniques have been developed to date since the introduction of the modern lipoplasty methods by Illouz more than 20 years ago [1]. Together with the widespread use of fat transfer and stem cell treatments, atraumatic and effective liposuction methods have become widespread. Current liposuction equipments include various cannulas intended for different purposes, aspiration hoses, syringes, remote control devices, and cables [2].

In addition, many surgeons perform the liposuction surgery together with a second surgeon, using a combination of different techniques. All these factors create a chaotic and cumbersome setting, where many devices are used simultaneously at the operating rooms. Even the potential minor mechanical issues can reduce the efficacy of the liposuction and result in unfavorable outcomes such as violation of sterility and loss of time. Also, different equipments may not always be available at all surgical centers, which can cause a reduction of cost-effectiveness. Thus, many surgeons create smart and simple solutions in response to various problems they encounter in

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their own surgical practice and publish them. In this chapter, various solutions developed related to liposuction will be summarized as presented in literature.

21.2 Modifications in Syringe-Assisted Liposuction

It is not always possible to have access to machine-assisted liposuction devices in the office setting. In such cases, syringe-assisted techniques are preferred due to its ability to ensure fat removal with a higher level of control and less trauma. Also the aspirated fat can be obtained in a sterile manner to be used again as autologous fat grafting [3]. This method was developed by Pierre Fournier in 1985 and is based on adaptation of the liposuction cannula to a syringe, where negative pressure is created via withdrawal of the piston [4].

Despite all advantages, the syringe-assisted liposuction method also bears certain disadvantages. For example, the surgeon should hold the whole system consisting of the cannula, syringe, and the piston lock during the fat aspiration. Also, the syringe volume of 50–60 mL is rapidly achieved, thereby necessitating frequent interruption of the procedure for a change of the syringe [3]. In addition, a stable connection can hardly be ensured by using specific cannula for every different type of syringe. Otherwise, an appropriate negative pressure cannot be obtained due to air leaks. There are commercially available syringes, piston locks, and various connector apparatuses, specifically designed for this purpose. However, similar syringe-assisted liposuction systems can be established by using the standard materials that are available at each hospital in case of nonavailability of them. For example, Fournier [5] created a notch at the back of the protruding side of piston using a lancet and ensured locking of the piston withdrawn by creating a chamber on the syringe so that the protrusion fits in it. Koldas et al. [6] recommended the use of a towel clamp for this process. After the piston is withdrawn, it is fixed by a clamp by pinching, thereby avoiding return of the piston to its former position (Fig. 21.1). Similarly, Narayanan et al. [7] reported that the piston could be fixed by using a hemostat device. Nisi et al. [4] reported that a 10-ml standard syringe piston could be inserted in the 60-ml syringe chamber and used as a piston lock. Kerstein et al. [8] and Ahmed et al. [9] eliminated the locking problem using the same method and smaller syringes in a less costly and simpler way.

Instead of using standard injectors, Kahveci et al. [10] adapted the manual vacuum aspiration (MVA) injector kit normally used for curettage and endometrial biopsy procedures in the daily gynecology practice, together with the Karman cannula to the suction cannula.

Another problem is the potential for the snapper type devices designed as syringe locks, to dislodge, fall on the ground, and become non-sterile. Moss [11] reported that the snapper could be fixed to the piston with a sterile rubber band to avoid a fall in an attempt to overcome this issue (Fig. 21.2).

Other drawbacks of syringe-assisted cannula include potential discordance between the syringe and the cannula connections plus the air leakage problems. This may result from the differences in the junction points of different types of syringes and long-term repeated use of the same cannula. As a result, an effective negative pressure cannot be achieved and the procedure needs to be interrupted frequently. Basaran et al. [12] recom-

Fig. 21.1 The towel clamp is applied to the piston, thereby avoiding return of the piston to its former position (This technique was described by Koldaş et al. [6])

Fig. 21.2 The modification described by Moss: the snapper fixed to the piston with a sterile rubber band [11]

Fig. 21.3 A modification described by Basaran et al. to avoid an air leak between the syringe head and the cannula. Notice the placement of a sterile latex glove at the connection [12]

Fig. 21.4 A Foley catheter is adapted to the feeding injector through cutting of the Foley catheter balloon site. The other tip is connected to the liposuction cannula (This technique was first described in 2007 by Da Silva et al. [3])

mended a quite simple and inexpensive solution to the issue of air leakage between the syringe and the cannula. A tight connection is ensured between the syringe head and the cannula via placement of a piece cut from the sterile latex surgery glove, thereby avoiding the air leakage (Fig. 21.3).

Natividade da Silva et al. [3] described a new liposuction assembly consisting of a 100 mL feeding syringe, standard Foley CH22 catheter, towel clamp, machine-assisted liposuction system, and a cannula. While the Foley catheter is adapted to the feeding syringe through cutting of the Foley catheter balloon site, the other tip is connected to the liposuction cannula. As previously described, the syringe is locked with a towel clamp to ensure persistent negative pressure. Thus, a constant connection is ensured between the cannula and the syringe. Also, the need for the surgeon to hold the injector during the procedure is eliminated. The Foley catheter, thanks to its elastic structure, can comply with different cannula. The requirement for less syringes and thus the lesser interruption of the procedure are also among the advantages of this method (Fig. 21.4). A similar modification was recommended by Gherardini and Rauso [13]. The authors ensure connection between the cannula and the syringe by using a sterile silicon suction connection tube.

21.3 Modifications in the Tumescent Solution Infiltration

Tumescent liposuction has become widely used due to its efficacy and safety in liposhaping proven by a large number of surgeons. Infiltration of high levels of fluid into all surgical sites may be difficult and time consuming particularly in large-volume liposuction cases [14]. Motor infusion pumps have been used for this purpose. However they are not very common, and due to their high cost, they may not be suitable for use in office setting. Modifications have been reported by using various systems such as the wound irrigation system, Jet Lavage system, arthroscopy set, and micromotor irrigation system [14–17]. However these systems may not be readily available everywhere and may be of high cost.

Aydın et al. reported a practical and a low-cost solution for infiltration of high levels of tumescent fluid, which can be applied with the materials, available at all healthcare centers. The infusion bag is connected to the system infusion set by a three-way stopcock. By rotating the handle of three-way stopcock, the syringe can be filled and thus the location of the handle is re-changed and infiltration performed, thereby ensuring infiltration in a controlled manner (Fig. 21.5) [18].

Infusion pumps with mechanical pressure for blood infusion in the hospital setting can also be used for tumescent infiltration. The solution, prepared in a flexible serum bag, is placed in a pressurized infusion pump. Serum hose is transferred to the operation table in a sterile manner and adapted to the infiltration cannula. When the infusion pump is inflated in a way to ensure high pressure, a rapid tumescent solution infiltration is achieved (Fig. 21.6).

Fig. 21.5 This simple system is ensuring high-volume infiltration in a controlled manner and avoiding loss of time due to syringe change (This technique was first described in 2009 by Aydın et al. [18])

21.4 Modifications in the Cannula Port Side

Injury to the skin site at the port entry sites may occur due to repetitive trauma and friction during liposuction. While port sites usually recover without complications, traumatic incisions may also occur with intense scars. In addition, as a result of the long-term exposure of ultrasound-assisted liposuction cannula to the skin, an increase in heat may occur, which may result in burns and even skin necrosis. Certain apparatuses have been developed to be placed at the skin entry of the cannula to avoid direct exposure of the skin to the cannula. However these apparatuses are not always available and may be of high cost. To avoid these complications, Lasso [19]

Fig. 21.6 A modification to ensure rapid tumescent infusion. The blood infusion pump is inflated to increase the pressure

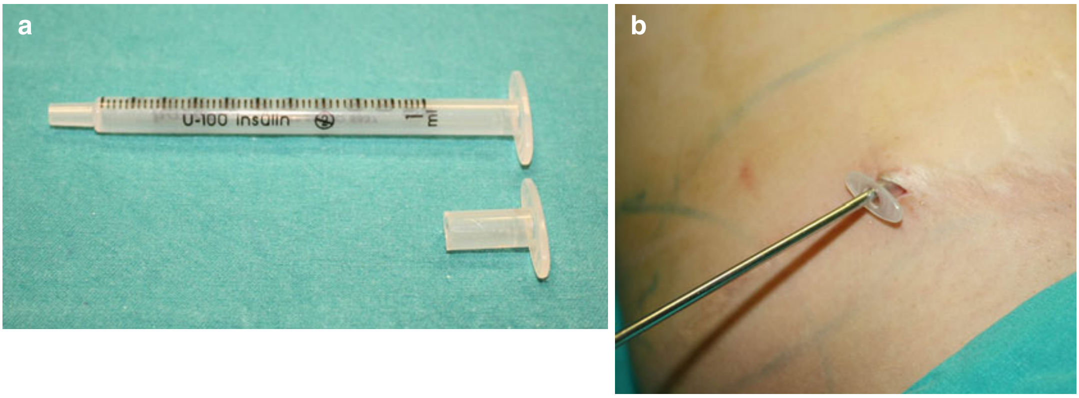

Fig. 21.7 (**a**) Skin protective apparatus, prepared by cutting from a 1 mL injector. (**b**) Protector in place. This technique was first described in 2013 by Bank and Song [20]

used a silicone tube around an ultrasonic liposuction cannula to prevent the contact of the cannula with the skin, and the occurrence of burns was avoided. In the absence of skin protective apparatus, protections similar to these apparatuses may be produced by using syringe pieces. Bank et al. [20] and Khoo et al. [21] demonstrated the benefits of skin protective apparatuses, prepared by cutting from a 1 mL injector (Fig. 21.7). A cannula of thickness up to 4 mm can easily pass through these apparatuses. If needed, this cannula may be fixed to the skin via sutures passed through the holes opened at sites. Man reported the cross-incision technique he developed to avoid injury to the skin by the cannula. Thanks to the incision in the form of a cross sign, the cannula can more easily pass through the incision site and create a smaller surface of contact, thereby ensuring a procedure with better recovery and scar tissue [22].

21.5 Other Technical Modifications

Weber et al. [2] reported that the devices and equipment, cables, and hoses used for liposuction operations could have contact with the non-sterile sites such as the surgeon's leg and easily get contaminated. They reported a suspension system based on keeping the extensions of the devices together using a system hang from the ceiling.

Zhanqiang et al. [23] described a more effective cannula design, which ensured a sharp dissection during liposuction and caused less tissue injury relative to blunt dissection. This paddle-like, U-shaped design, made of stainless steel, is placed in parallel to the tip of the conventional cannula, thereby achieving more effective results in liposuction.

References

1. Illouz YG. Body contouring by lipolysis: a 5-year experience with over 3000 cases. Plast Reconstr Surg. 1983;72(5):591–7.
2. Weber P, Dryden RM, Foster JA. The liposuction apparatus "suspension device": hi-plane liposculpture. Dermatol Surg. 2000;26(6):602–4.
3. Natividade da Silva PE, Ferreira P, Silva A, Malheiro E, Reis J, Amarante J. A new device for syringe-assisted liposuction. Plast Reconstr Surg. 2007;119(2):763–4.
4. Nisi G, Silvestri A, Castello MF, D'Aniello C. A smart and simple idea for blocking the plunger during syringe liposuction. Aesthet Plast Surg. 2006;30(4):500.
5. Fournier PF. A simplified procedure for locking the plunger during syringe-assisted liposculpturing. Plast Reconstr Surg. 1996;98(3):569–70.
6. Koldaş T, Onel D, Ozden BC. The use of a towel clamp as a complementary instrument for manual fat harvest. Ann Plast Surg. 2004;52(6):626–7.
7. Narayanan V, Khanna A. A simple method of locking the plunger during syringe liposuction. Plast Reconstr Surg. 2004;114(7):1973.
8. Kerstein RL, Siddiqui A, Erdmann M. Use of the dual plunger for creating negative pressure in 10 ml syringe

for fat aspiration in Coleman fat transfer procedure. J Plast Reconstr Aesthet Surg. 2011;64(1):e29–30.
9. Ahmed F1, Nehme J, Turner M, Bennett N. Fat harvesting: spare your thumb, don't spoil the fat. Plast Reconstr Surg. 2012;129(6):1023e–5.
10. Kahveci R, Rehimli M, Esmer A, Rehimli S, Kanturk R, Menderes V. A useful technique to obtain adequate negative pressure for liposuction. J Plast Reconstr Aesthet Surg. 2009;62(12):e604–5.
11. Moss R. A simple method of preventing snapper fall-out during syringe liposuction. Plast Reconstr Surg. 2007;119(5):1627–8.
12. Basaran K, Ersin I, Pilanci O. A practical solution for preventing an air leak during syringe-assisted liposuction. Aesthet Plast Surg. 2013;37(2):472–3.
13. Gherardini G, Rauso R. Improving efficacy of liposculpture revisions using a short plastic tube as syringe connector. Dermatol Surg. 2012;38(6):967–8.
14. Horch RE. Modified device for easy infiltration of tumescent solution in liposuction. Aesthet Plast Surg. 2007;31(1):85–7.
15. Galla TJ1, Walgenbach KJ, Bach AD, Voigt M, Stark GB. Infiltration of tumescent anesthetic solution by a modified wound irrigation system. Aesthet Plast Surg. 1999;23(6):386–7.
16. Gündeşlioğlu AO, Akin S, Maral T. A simple hand-made device for easy, quick, and efficient tumescent infiltration in liposuction. Plast Reconstr Surg. 2004;114(1):269–70.
17. Ozyazgan I. Use of available micromotor irrigation system for liposuction tumescent fluid infiltration. Plast Reconstr Surg. 2004;113(1):449.
18. Aydin HU, Yiğit B, Serin DA, Güven E. A simple setup for easy infiltration of large volumes. Aesthet Plast Surg. 2009;33(1):129–30.
19. Lasso JM, Arenas D, Valiente A. A cheap device to perform ultrasound-assisted lipoplasty. Plast Reconstr Surg. 2003;111(7):2483–4.
20. Bank J, Song DH. Inexpensive method of liposuction cannula port-site protection. Aesthet Plast Surg. 2013;37(4):843.
21. Khoo LS, Corona GG, Radwanski H, Fernandes VS, Pitanguy IH. Inexpensive method of liposuction cannula port-site protection. Aesthet Plast Surg. 2014;38(1):256–7.
22. Man D. The cross-incision for lipoplasty: minimizing lipoplasty scars. Plast Reconstr Surg. 2005;116(3):930–1.
23. Zhanqiang L, Yongxue X, Qinjian P, Meiheng W, Hong G. Fat planer: a new needle for liposuction. Plast Reconstr Surg. 2007;120(3):821.