

LIPOSUCTION AND ITS TREATMENT***Karthick S.**

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Article Received on
19 March 2022,

Revised on 08 April 2022,
Accepted on 29 April 2022

DOI: 10.20959/wjpr20225-24003

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ABSTARCT

In view of the fact it's introduced by Dr Yves-aerard illouz represented the illouz method which demonstrated a suction assisted lipoplasty has evolved tremendously developed into most popular procedure in aesthetic plastic surgery. Lipoplasty is an most effective procedure done to treat localized adipose deposits in patients not suffering from generalized obesity. For both men and women these accumulation of subcutaneous fat often occurred. A cannula connected to a suction tube allows for small incisions to be strategically placed and removes the large volumes of fat. It helps to improve the harmonious balance of a patient's physique and improve the body contour. Now a days liposuction having a improved technology that is suction assisted

lipectomy, laser and radio frequency, ultrasound assisted lipectomy, power assisted lipectomy.

KEYWORDS: Liposuction, hematoma, intravenous sedation, sutures, tumescent liposuction, cool sculpting.

INTRODUCTION

In 1970's, it was experimented by A and G. Fischer.^[1] Illouz and Fournier, two Parisian surgeons, modified and improved the Fischer's technique. In 1977, Illouz developed an equipment for performing liposuction and extended technique to the whole body. First he introduced the blunt cannulas of smaller diameter helps to reduce the section of nerves, lymphatic vessels and blood vessels. He used three different size of blunt-tipped cannulas depending on the area to be aspirated.^[2] Liposuction is continuously done by plastic surgeons concerned with removing of adipose fat deposit in various area of the body. Liposuction

method helps to improve our physique and outer appearance. Lipoplasty is not a weight loss procedure, it is a surgical manner.^[3]

Liposuction for fat removal shows similar to phacoemulsification of the ocular lens for cataracts diseases in eyes.^[4]

Indication of fat (low density lipoprotein) deposits in the gluteo-crural areas, hips and the abdomen.^[5] An increase in fat content are called as hyperplastic or hypertrophic. Increases in total fat cell number is hyperplastic obesity.^[6]

By increasing of age, subcutaneous fatty layer is decreases and increases the intra-abdominal fat content women have a gynaecoid pattern of fat deposition over the Laternal part of thigh hips, buttock and truncal region. Men shows an android pattern of fat deposition over truncal and abdominal region.^[7]

Abdominal obesity may cause cardiovascular disease^[8] and Alzheimer's diseases.^[9] Suction lipectomy is used for the treatment of removal of fat and collection of fat less than 1500ml of fat material. When over a 1500ml is removed having the anaesthetic requirements, fluid replacement and treatment blood loss is an important procedures.^[10]

TYPES OF LIPOSUCTION TECHNIQUES

1. TUMESCENT LIPOSUCTION

'Tumescent' means swollen and firms.^[11] These are the techniques involved subcutaneous infiltration of large amount crystalloid fluid called as Klein's solution^[12] these contain lignocaine and epinephrine in low concentration followed by suction assisted aspiration of fat by using a small aspiration cannula called microcannula.

Tumescent liposuction having the use of any additional anaesthesia either intravenous or gaseous inhalation with the patient totally under local anaesthesia.^[13]

PROCEDURE OF MICROCANNULAR TUMESCENT LIPOSUCTION

a) Introduction of local anaesthesia by using tumescent anaesthesia.^{[14][15]}

- 1) To make 4-8mm small incisions called adits.
- 2) To introduce more amount of Klein's solution(1-4L) into the fat. Klein's solution contain lignocaine, epinephrine and large amounts of saline. The saline help to balloons the fat

tissues, epinephrine helps to vasoconstriction to prevent the loss of blood, and lignocaine act as a local anaesthesia.

Two types of micro cannula

- 1) Finesse micro cannula – minimize the skin injury and very safe.
 - 2) Capistrano micro cannula – maximize the amount of fat are extract.
- b) Aspiration of fat by micro cannula liposuction.^{[16][17]}
- 1) Sucking the fat by micro cannula having 1.5-3mm in diameter.
 - 2) Leave the incision wounds of cannula helps to drain out fluids completely over two days.

LARGE VOLUME LIPOSUCTION

- 1) Total fat removed during the procedure or a total volume of fat during procedure(fat plus wetting solution)
- 2) Removal of more than 5 litres of total volume from the patients.
- 3) Large volume liposuction (LVL) is aspirate 5000ml.^[18]
- 4) Mega volume liposuction (MVL) is aspirate 8000ml.^[19]
- 5) Giganto volume liposuction (GVL) is aspirate 12000ml.^[20]



Fig 1: Large volume liposuction.

POWER ASSISTED LIPOSUCTION CANNULA

Fat is removed through the cannula (hallow tube) and aspirator (suction device).^[21] Fat assisted liposuction having a vibrating tipped cannula is used to breakdown the fat cells and loosens the stubborn fat deposits for easier removal with surrounding damage.



Fig 2: Power assisted liposuction.

AMOUNT OF FLUID INJECTION

a) DRY LIPOSUCTION

This method don't use any type of fluids for injection before the fat is removed. This one having risk of bruising and bleeding.

b) WET LIPOSUCTION

Small amount of fluid is injected into the area in which fat to be removed.^[22] It contain lidocaine act as a local anaesthetic, adrenaline to contract blood vessels to prevent the blood loss and salt solution help to make isotonic.^[23]

c) SUPER WET LIPOSUCTION

- 1) Super wet liposuction procedure mainly performed on female patient.^[24] The infusate volume is passed through the treated area and some amount of fat is removed.
- 2) This technique is used only for high volume liposuction by many plastic surgeons, it helps to maintain homeostasis and potential fluid.^[25] IV sedation as well as local anaesthetic or general anaesthetic is required.
- 3) Super wet liposuction is similar to wet liposuction, how much anaesthesia is put in the saline solution injected to breakdown the fat cells.

ULTRASOUND- ASSISTED LIPOSUCTION (UAL)

Ultrasonic liposuction, a specialized cannula is used to transmits ultra sound vibrations to the fatty area.^[26] This vibration bursts the wall of the fat calls, emulsifying the fat, a liquefying process it helps to suction out easier.^[27] This method having less blood loss. This method have slightly risk of seromas forming (packets of fluids) which, removed by using the needle. After ultra sound assisted liposuction to perform the suction-assisted liposuction is necessary

to remove the liquefying fat from the body.^[28] Now, pulse energy delivery is used to remove fat without any drawbacks.



Fig 3: Ultra Sound Assisted Liposuction.

TWIN CANNULA ASSISTED LIPOSUCTION (TCAL or TCL)

This liposuction uses a tube within-a-tube specialized cannula pair, it helps to aspirates fat.^[29] The inner cannula does not procedure any impact to the patient tissue or the surgeon's joints with each and every toward stroke. The inner cannula reciprocates to the outer cannula to stimulate the surgeon's stroke of up to 5cm and vibrating 1-2 mm helps to remove more fat.^[30]

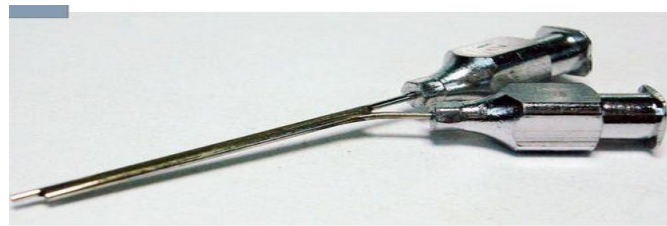


Fig 4: Twin cannula liposuction.

EXTERNAL ULTRA SOUND ASSISTED LIPOSUCTION (EVAL)

External ultra sound -assisted liposuction, where the ultra sound energy is applied from outside of the body, through the skin.^[31] It is developed, because VAL have some more drawbacks like skin necrosis (death) and seromas, pockets of yellowish fluids from the body.^[32] EVAL helps to avoid such complication by applying the ultrasound applied

externally. Advantages of EVAL is decreased blood loss, treat large areas, better access through scare tissues.^[33]



Fig 5: External ultra sound assisted liposuction.

WATER ASSISTED LIPOSUCTION (WAL)

Water-assisted liposuction using a thin fan-shaped water beam, it helps to loosens the structure of the fat tissues and it can be easily removed by cannula.^[34]

In this suction, water is continuously added and the fat is aspirated immediately through the same cannula .WAL requires less solution for infiltration and produce less edema from the tumescent fluid.^[35]



Fig 6: Water assisted liposuction.

LASER LIPOSUCTION, LASER LIPOLYSIS OR LIPOSCULPTURE

Laser liposuction was developed for cosmetic surgeons, target specific body parts.^[36] In laser lipolysis cannula is not used to remove fatty deposits beneath the skin, the laser helps to melt the fat of the target area, the fat get liquefied and drained out from the body using tiny incision and suction away.^[37]

The heat used in the laser liposuction procedure, tissues are contracting naturally, the skin is tighten and to smoother also. The laser liposuction target only the fat cells, protect the muscles and nervous tissues liposuction use specific wave length frequencies for better results.^[38]



Fig 7: Laser liposuction.

SMART LIPO-LASER LIPOSUCTION

Smart lipo system have lot of benefits of a high quality laser lipolysis system.^[39] Smart lipo is used in conjunction with cellulite treatments and used with local anaesthetic. The smart lipo MPX have combine multiple laser wave lengths for improved results. Smart lipo triplex that combine three wave length include 1064nm, 1320nm and 1440nm.^[40] This helps to powerful absorption of fatty tissues.

COOL LIPO-LASER LIPOSUCTION

Cool lipo is done by cool touch, inc is designed for smaller areas of treatment in chin, face and neck areas. It is fat freezing method. This type of liposuction includes, fat deposits in the stubborn and resistant to diet type of weight loss or traditional liposuction.^[41]

Cool lipo laser is particularly designed to protect the tissues other than fat .cool lipo laser liposuctions having a wavelength of 1320nm and also it have a more benefit of laser lipo, the skins are tightening and collagen renewal liposuction uses a short pulse helps to remove more fat and protect the cells and organs. It is using a more power for fat disruption. It is performed by using a local anaesthetics. Cool lipo laser liposuction having less risk and produce a excellent out comes.^[42]

LIPO LITE -LASER LIPOSUCTION

Lipo lite laser is very successfully in body sculpting and contouring like other laser liposuction. Lipo lite - laser liposuction technique uses the 1064nm wavelength to melt the fat and remove it from beneath the skin. In this instrumentation, tiny cannula and fibre optic laser is used for minimal invasiveness during the treatment lipo lite -laser having two pulse, one is short pulses of low energy and another one is longer pulses of higher energy.

It helps to treat the fibrous area and tissue having resistant to laser lipo suction, it destroy fat cell membrane for maximum results. It have been done between 30 to 60 minutes.^[43]

LIPO THERME AND LIPO CONTROL -LASER LIPOSUCTION

Lipo therme by osyris medical, using a wave length of 980 nm to target and emulsify fatty substance deposit under the skin. It target the smallest and most stubborn pockets of fats. Lipo control are controlled by seeing on screen image of the patient treatable area under the skin.

The surgeon moves the cannula beneath the skin having the laser and cannula lipo therme and lipo control help to achieve the desired results.^[44]

Lipo laser treatment helps to burn the free fatty acids with in the body. Device utilize more than one wavelength during treatment.



Fig 8: Osyris lipo therme liposuction.

LIPOSUCTION TREATMENT

A) LYMPHEDEMA

DEFINITION: swelling in an arm or leg due to accumulation of protein rich fluids in lymphatic system. Lymphedema is due to complication of cancer treatment or parasitic infections, it also cause due to genetic disorder.^[45]

METHODS

- 1) Modified liposuction with skin excision(m Lipo).
- 2) Standard liposuction without skin excision(sLipo).^[46]

SURGICAL TECHNIQUE

- 1) Power assisted liposuction, which facilitates the liposuction, especially in the treatment of leg, which is more acceptable treatment. Initially the “dry technique” was used. Later, the technique help to minimize blood loss, a tourniquet was utilized in combination with tumescence, which involves infiltration of 1 to 2 L of saline containing low-dose adrenaline and lignocaine act as a local anaesthetic.
- 2) Through ~15 to 20, 3-mm-long incisions are used, liposuction is performed using 15- and 25-cm-long cannulas having diameters of 3 and 4 mm, respectively. When the arm distal to the tourniquet helps to treated, a sterilized made-to-measure compression sleeve is applied to the arm to stem bleeding(loss of blood) and reduce postoperative edema.
- 3) Sterilized Easy-Slide facilitates putting on the garment and later it is used for this procedure. A sterilized, standard interim glove (Cicatrex interim, Thuasne), in which the tips of the fingers helps to improve the grippness is put on the hand. The tourniquet is removed, and the most important part of the upper arm is treated using the tumescent technique.
- 4) The proximal part of the sleeve helps to compress the proximal part of the upper arm. The incisions are left open to drain the fluid through the sleeve. The arm is lightly wrapped with a large absorbent compress covering the whole arm (60 × 60 cm helps to remove the accumulated fluids. The arm is kept at heart level on a large pillow. Operating time is 2hours to operating the surgical procedure.^{[47][48]}



Fig 9: Lymphedema treatment.

B) DIABETICS

DEFINITION: A chronic diseases cause abnormally high levels of the sugar glucose in blood (hyperglycaemia) as well as the urine.^[49]

CAUSES: Type 2 diabetes, related to obesity. Pancreas not able to produce insulin it regulate the blood glucose level. Insulin are not able to enter into the cells or signal are not send to the pancreas to production of insulin.

TREATMENT

- 1) Liposuction has been considered as a good option for type 2 diabetics, patient who are not in over weight. According to American society of plastic surgeons statement, the candidate for liposuction is a healthy person with localized areas of fat.
- 2) Liposuction was used for removing the fat deposits from localized area of thin people, who are 20-25 pounds above their ideal weight.
- 3) Giese removed average weight of 12 pounds of subcutaneous fat from 14 healthy peoples, over weight premenopausal women, and who had some insulin resistance as a result of high insulin level in blood.^[50]
- 4) Liposuction helps to changing the metabolism of insulin level.

B) LIPOMA

DEFINITION: lipoma is a lump of fat grows in body's soft tissues tumours arising from adipose tissue. It is classified under a tumour but it is harmless.^[51]

METHODS: tumescent liposuction.

SURGICAL TECHNIQUE

- 1) Surgery is conducted by using local anaesthesia slowly or in combination of intravenous sedation. Before the surgical operation, broad spectrum antibiotic is given in intra venous or intra muscular as a single shot.
- 2) Liposuction is used manually created vacuum with 60ml Toomey syringe of klein solution by means of tumescent super wet technique.
- 3) Margins are marked in lipoma area and incision place is chosen, 2-5 cm away from margin. Cannula having 5mm blunt infiltration is used.
- 4) Fat lump is removed by using cannula and remaining hard tissues from the cavity are removed by long forceps.
- 5) Incision is sutured and compressive of skin is done. After discharge wearing a compressive garments or bandage for 3 weeks.^{[52][53]}
- 6) Tiny incision helps to remove up to 100 lipoma in one session and gets the fast recovery.
- 7) Combination of liposuction is used when the lipoma is large in size up to 25cm using 2-3 cm of incision.

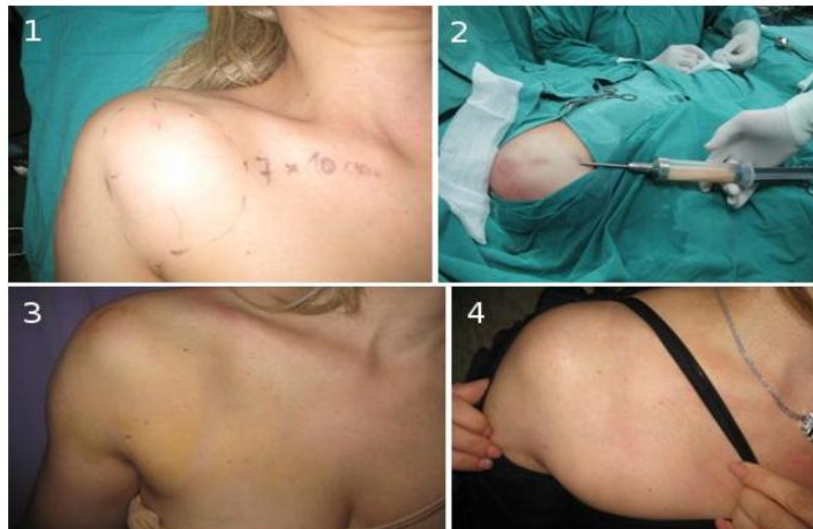


Fig 10: Liposuction assisted with lipoma.

GYNAECOMASTIA

DEFINITION: Gynaecomastia is an increase the amount of breast gland tissue in male. It often happen when they going through the hormonal changes of puberty that is increase in female hormone or reduce male hormone. It is abnormal noncancerous enlargement of breast in male.^[54]

METHODS: cross chest liposuction.

SURGICAL TECHNIQUE

- 1) Liposuction in gynaecomastia is using one or two small incision on each side of chest.
- 2) Marking the upright posture and general anaesthesia is applied. The breast area is infiltrated with 200-250ml of tumescent fluid (1L Ringer lactate with 20 ml Of lignocaine, 20ml of sodium bicarbonate).
- 3) The incision having 7mm stab at a skin areola junction. A 3 mm diameter liposuction having the cannula of Mercedes Benz tip is inserted and liposuction procedure is completed in the ipsilateral breast.
- 4) At the end of liposuction procedure, the sub-areolar part of each breasts remains unaddressed. A 4-mm-diameter liposuction cannula is inserted through the same incisions of the chest and liposuction of the sub-areolar regions of the opposite breasts is also performed after creating one tunnel across the chest for removal of glandular element present in chest.
- 5) A suction drain is inserted through the incision and brought out through the same incision, the drains were removed when the drain volume was not exceeded to <30ml.^{[55][56]}

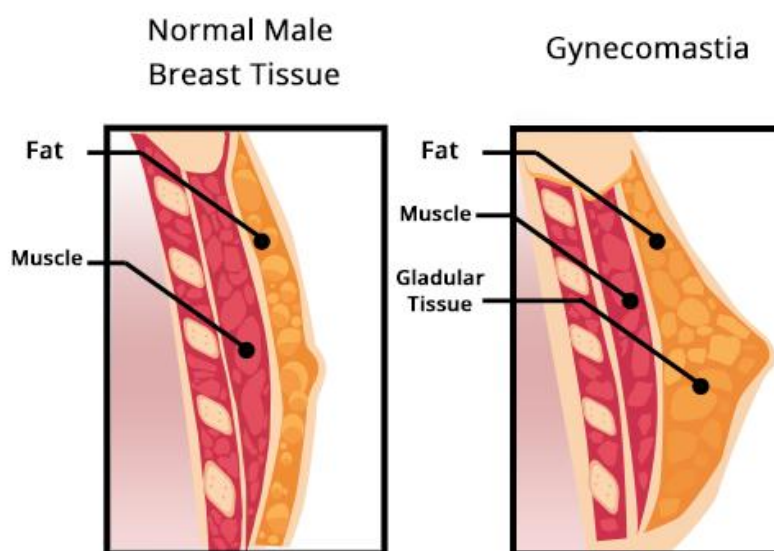


Fig 11:Gynecomastia disorder.

PRECAUTION PROCEDURE FOR LIPOSUCTION

- 1) Before liposuction surgical treatment, anticoagulants are not be taken before 2 weeks of the surgery.

- 2) If general anaesthetic or sedative drugs are used, the surgery will be in morning only and fasting from the mid night is required.
- 3) If local anaesthetic is used, no need to fasting. Smoking should be avoided for two months before of surgery, nicotine cause loss of tissue.^[57]

PROCESS FOR LIPOSUCTION

- 1) Candidate and the surgeons should be discuss with each other, exactly which area will be treated.^[58]
- 2) Before surgery, antibiotics will be given to the patient.
- 3) Marked the area of patient in standing position and take the photos of area to be treated.
- 4) In the surgical room, sterile solution such as betadine is applied to the area.
- 5) Incision are small in size and IV fluid line should be connected to the patient because fluid loss will happen.
- 6) Monitoring device should be connected to the patient for monitor the blood pressure, heart rate, blood oxygen level.

PROCEDURE FOR LIPOSUCTION

STEP: 1 ADMINISTERING ANAESTHESIA

In liposuction only local anaesthesia is used. i.e lidocaine is diluted and injected into the subcutaneous fat of the patient in the affected area. It became easy to remove and firm the fat. It helps to reduce the blood loss in the patient. Patients who are allergic to lidocaine are not suitable for liposuction treatment. General anaesthesia is used only when the patient have substantial amount of fat deposited in multiple area. For long action lidocaine along with sedation are used in combination.

STEP: 2 PLACING INCISIONS

After the administration of anaesthesia small inconspicuous incision are made at the targeted area by surgeon. Incision made are very small in size ranging from quarter or third of inch. Depending on the amount of fat deposited in the patient incision are made respectively.

STEP: 3 REMOVING EXCESS FAT

A thin tube called cannula is inserted by the surgeon to dislodge the fat cells. The fat is sucked out through a surgical vacuum pump or syringe attached to the cannula. There are some advanced technique like laser, RF, ultrasound etc which is more precision.^{[11][30]}

STEP: 4 CLOSING THE WOUND

After the fat is sucked out, incision are closed with absorbable sutures and firmly bandages. The excess fluids are collected in the drain tubes. The patients are advised to wear compression garments for 3 to 4 weeks to avoid edema^[59].

RECOVERY

After the liposuction surgery, patients can able to recovery within two days to two weeks. Compression garment must have elastic in nature. Non absorbable sutures are used means, it will be removed after five to ten days. If any pain is present, over the counter drug is used. Suctioned fat cells are completely removed. If the patient are not maintained a proper diet and exercise, fat cells are accumulated to enlarged the area.^[60]

SIDE EFFECTS

- 1) Contour irregularities: skin are appeared like bumpy, wavy or withered due to uneven fat removal from the liposuction area, elasticity of the skin is reduced and unusual healing. Damage under the skin from the thin sized tube (cannula) that is used during liposuction is appeared as a permanent spotted appearance.^[63]
- 2) Numbness: May feel temporary or permanent numbness in the affected area. Temporary nerve irritation will happen.
- 3) Fluid accumulation: Temporary pockets of fluid (seromas) will form under the treated area of the skin. Pockets of fluid may need to be drained with a liposuction needle. Fluid may continue to ooze from the incisions.
- 4) Thrombophlebitis: The blood clot are formed in a vein, causing inflammation.
- 5) Internal puncture: A cannula that is penetrated too deeply may cause puncture in internal organ.
- 6) Infections: skin infection may occur after liposuction surgery.
- 7) Fat embolism: After liposuction, Loosened fat may break away and become trapped in a blood vessel and deposited in the lungs or travel to the brain.
- 8) Kidney or heart problems: Fluids are being injected or suctioned, the level of fluids may be decreased, cause kidney or heart problems.
- 9) Pulmonary embolism: Fat may travel to the lungs and blocking circulation in the life-threatening lungs.

10) Lidocaine toxicity: Lidocaine is a local anaesthetic is administered with fluids are injected during liposuction helps to reduce the pain. Lidocaine toxicity may cause, serious of heart and central nervous system problems.^{[60][61]}

ADVANTAGES

Liposuction may cover the areas of one's body parts they are most insecure of thighs, stomach, shoulders, cheeks, jawline, breasts, auxiliary underarms fat.^[65]

- 1) Removing excess of fat to prevents the Chances of occurring Cardiac arrest and Knee replacement in patient.
- 2) It helps to remove benign fatty tumour called as a lipomas.^[52]
- 3) Preventing excessive sweating in the armpit areas and chafing areas such as thigh.
- 4) Its helps to treating the lipodystrophy syndrome and fat embolism cause excessive fat in some areas.
- 5) It is cost efficient and not much pain full.
- 6) It also helps to treat some chronic diseases like diabetes and thyroid related diseases.
- 7) Time required for this procedure is minimal and weight does not increase any time after the procedure.^[64]

DISADVANTAGES

- 1) Swelling of the treated area last up to 2-3 days.
- 2) Wrinkles, dips in surface area of the skin are visible for some times up to settle down.
- 3) Dis colouration of the skin may be happen.
- 4) Liposuction for an aged people is very difficult because elasticity of the skin is reduced.^[66]
- 5) After the liposuction surgery skin infection may occur.
- 6) Skin may show allergic reaction to some medication during the liposuction treatment.
- 7) The movement of cannula may cause skin burns and friction to the nerves.^[61]
- 8) Post-liposuction standing, cause to postural hypotension and syncope during the first 8 to 12 hours is not rare and patients need to be cautioned in this period of time.

RESULTS

Liposuction is particularly used to remove excess deep and superficial fat accumulations and improve the physique and remodel the body contour. It has become an essential complementary technique of aesthetic procedures such as reduction mammoplasty, abdominoplasty, brachioplasty, thigh lift and post bariatric body contouring. However, it

mainly used for the treatment of innumerable pathologies in reconstructive surgery such as lipomas, lipedema, lipodystrophies. The complication of the liposuction is very low, especially when compared with conventional excisional surgery and the major, complications are mainly due to improper performance of the liposuction technique and poor patient management before and after surgery.^[67]

CONCLUSION

More than 40 years are completed of being liposuction is very effective and very safe for weight loss treatment all over the world. Surgical technique is simple and less complication rate.^[68] Liposuction have a great beneficial for redefining the body's profile in patients who need to reduce the weight. It is combined with excision surgery helps to remove the excess skin from the body.^[69] The suction of fat or adipose tissue to make hallow for surgery easier. Liposuction helps to harvesting the autologous fat and adipose tissue derived from stem cells. The harvesting technique is currently the traditional liposuction with syringes method for an traumas on adipocytes.^[70]

Large volume liposuction is advocated as therapeutic body contouring in the excessively obese, well motivated and physically fit patients. It is a standard operative procedure, it carries negligible risks and maximises the eventual realistic aesthetic and functional gains.

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