

Microvascular Surgery

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With more emphasis on health and fitness, people are finding their bodies holding up better than a couple of decades ago. Having a fit body is just not enough, people want their faces to match their svelte forms. With dynamic developments in Plastic Surgery over recent years, changes have been more striking and rapid. These developments have radically changed the face of Plastic Surgery e.g. Microsurgery, Cranio-facial Surgery and Suction Assisted lipolysis. These technical advances have opened up newer frontiers in into the area of mutilating and extensive trauma, treatment of malignancy and Aesthetic Surgery. Today synthetic material can rebuilt Cheekbones or Chins, augment depressed Noses or reconstruct Breasts, Testes, Phallus, etc. to a normal shape and size.

▶ **Aesthetic Plastic Surgery**

Some people, even if they are not very fat, retain localized abnormal fat deposits, which are referred to as "Reserved fat" or "Cellulite fat". These abnormal "Cellulite fat" deposits can not be shed off even by crash dieting. Suction Assisted Lipolysis is gaining popularity for treatment of these "Cellulite fat".

▶ **Is Plastic Surgery considered to be a luxury and is un-affordable by most in our society?**

No, not any longer now. It has become almost a social necessity. Physical attractiveness is legitimate and Plastic Surgery has become more acceptable and affordable to people. Changes effected in expression and appearance are subtle and natural and patients from all walks of life seek relief in this Beauty Conscious Society.

▶ **Can Plastic Surgery help the "average not so attractive" individual and how?**

More attractive you are, more confident you feel. It may be just psychological, beauty does boost a person's ego. There are people who in spite of being unattractive, do not lack self confidence, but there are few, who camouflage their physical defects by make-up and other possible ways. Plastic Surgery does play a roll in image building.

▶ **Do only women undergo cosmetic surgery, What about men?**

By and large, women constitute a major portion of patients seeking help for aesthetic surgery, as beauty has been delegated to womanhood. Percentage of males seeking help has increased over past few decades, not only for baldness or a crooked nose, but also for aging faces and obesity.

▶ **Would Plastic Surgery help one to achieve a perfect physical perfection?**

Physical perfection is hardly ever achieved. In fact, quite a number of people bank all their hopes on Plastic Surgery to bring love and social acceptance. Plastic Surgeons aim at perfection and want to surpass the normal. Aesthetic Surgery covers a broad spectrum of procedures as simple as treatment of baldness to as complex as reconstruction of missing breasts. No Plastic Surgeon can ever create beauty, he can help the individual to reveal it, when it is present innately, but is hidden by imbalance in arrangements of various body features. Surgery would definitely improve one's appearance in the eyes of people around him and would relieve to some extent the mental suffering or lack of confidence, the person had earlier.

▶ **Why is there an increase in demand for Plastic Surgery allover the World?**

One of the main reasons is that our social attitudes have changed. It is not a big deal any more to have an Aesthetic Surgery done. With more women working outside their homes, professional reasons and Affluence have added to its need. With more emphasis on health and fitness, people are finding their bodies are holding up better. They want their faces to

match their svelte forms.

➤ **Are there any adverse effects following Plastic Surgery?**

Effects and failures are mostly due to wrong selection of patients and psychosocial elements. It needs to be stressed that the doctor-patient relationship, is altogether different from normal doctor-patient relationship. Some patients are generally healthy and seek improvement in form and not restoration of health.

➤ **Suction Assisted Lipolysis**

Some people, even if they are not very fat, retain localized fat deposits, which is often referred to as "Reserved fat" or "Cellulite fat". This fat deposit is resistant to all type of dieting and exercises and cannot be got rid off easily.

Suction Assisted Lipolysis is gaining popularity as treatment of choice for these deformities, to flatten fatty bulges due to natural, unnatural deposition of the fat in the body. Suction Assisted Lipolysis makes the skin fit more gracefully without excessive cutting.

➤ **Why can't we get rid of this fat by dieting or exercises?**

Suction Assisted Lipolysis procedure is no alternative to dieting, but is supplementary to it and helps remove the fat resistant to dieting. Localized Lipo-dystrophy (abnormal deposition of fat) remains stable, despite severe and un-physiological dieting. Hereditary and familial tendencies add up to retain these localized fat deposits, which may disappear only in the extreme situation of famine or other such physiological stresses.

➤ **Can Suction Assisted Lipolysis help every person with excess fat?**

This technique of Suction Assisted Lipolysis is most suitable for those people who have mild to moderate amount of adipose tissue, without significant excess of skin. Suction Assisted Lipolysis alone, would not be suitable, in giant Lipo-dystrophy or with moderate to marked redundancy of the skin, poor quality of skin or requires resuction due to previous scars. However, it may be used as an ancillary procedure to classical Open Derma-lipectomy. Removal of excess fat, may bring about a relief in chronic chest, digestive or locomotive systems, along with psychological satisfaction to these patients.

One must understand that, we all are born with a fixed amount of adipocytes (fat cells), which multiply and develop till puberty, thereafter, they remain constant in number but continue to increase in size. Lipo-dystrophy is hereditary among certain groups of people.

➤ **Can you describe the procedure of Suction Assisted Lipolysis?**

Suction Assisted Lipolysis is a simple, less traumatizing procedure with minimum hospitalization. Results are immediate and definite. With the patient in standing position, fatty deposits to be contoured are outlined and the amount of fat to be removed is estimated roughly by using " Pinch Test" both pre and intra-operatively. The skin is pinched between the Index finger and the Thumb and the width of the skin fold is measured. This is a very useful method of assessing the thickness of the fold of the fat to be treated with Suction Assisted Lipolysis . During the process of suction, surgeons invariably uses this simple test to confirm and to compare various areas for sameness of the amount of fat suctioned and the layer of the fat left behind under the skin.

➤ **What type of instruments / apparatus are used in Suction Lipolysis?**

Hollow Metal Canula, connected to a strong negative suction apparatus using non-collapsible Silicon Tubes are used in this technique. Through a small (1/2 cm) incision, the suction Metal Canula are inserted in the area and with backward and forward motion in a fan shaped manner, the liquefied fatty tissue is first disconnected (Pre-suction) and aspirated thereafter. By doing the same procedure using either single or multiple small

incisions, a honeycomb type of lipolysis is performed, leaving bridges of normal fat and blood vessels attached to the skin. 4 to 6 mm. Canula is preferably used for large fatty deposits such as "saddle bags" or "buttocks", 4 mm. size Canula for arms, abdomen, knee and ankle, while 2 mm. Canula is preferred for face and sub-mandibular area.

➤ **Can the entire fat be removed together?**

It is possible to remove up to 3000 gm's of fat safely in a patient with enormous saddle bags. More than 3000 gm's of fat suction at one attempt may lead to some complication. It is advisable to remove about 2000 gm's to 2500 gm's at each stage, but never more than 4000 gm's under any circumstances.

➤ **What is the postoperative care after Suction Assisted Lipolysis?**

After the Suction Assisted Lipolysis, the treated area is well supported with compression dressing for about seven to ten days. Locally there may be bruises, which usually disappear by two week's time. To avoid subcutaneous fibrosis and hardness, it is often recommended to wear Elastic Pressure Support and to massage the areas for about three to six months. This helps the skin to shrink in size.

➤ **What is the procedure for removal of Abdominal fat?**

Procedures like Abdominoplasty, Abdominal Lipectomy, Riding Breeches, Seat lift etc. are often combined with suction lipolysis. Frequent or multiple pregnancies, neurectomy in surgical operations on the abdomen may cause muscular flaccidity, diastases of rectus muscles and / or ventral hernia. Skin deformities due to striae or intertrigo (skin disorder) or previous surgical scars, call for a combined procedure. Using a 'W' incision in the pubic area, the excess skin is pulled down and excised. The umbilicus (belly button) is freed by a separate incision and repositioned to a new location. Suction assisted lipolysis is used to remove the fat from flanks, upper and lower abdominal flaps.

➤ **Which is the easier surgical operation for removal of such fat?**

Surgical excision of excess skin with fat to correct riding breeches or saddle bags are no more popular. Suction lipolysis has offered excellent results in these cases. Even a new gluteal fold (for the buttocks) can be created by this technique.

➤ **How the method of Suction Assisted Lipolysis was evolved?**

The technique of Suction Assisted lipolysis was first used by a French Plastic Surgeon Dr. Illuze to remove extra fat at and around hips, calves and ankles. Initially, Canula used for abortion, were used, but over a period of time, these Canula have been specially designed for different areas.

➤ **Is the method of Suction Assisted Lipolysis Standardized?**

The method of Suction Assisted Lipolysis, has been universally accepted. Over 1,00,000 such procedures are being undertaken every year all over the world. There are two distinct types of Suction Assisted lipolysis . i.e. Dry and Wet method. In the wet method, which is a popular method, a solution of fat dissolving enzyme and adrenaline in normal saline is injected prior to the Suction. This allows an easier suction with a minimum blood loss. Relatively large areas with practically no notable complications can be attended by this method. The dry method is useful in very large pad of fat or for a small and limited area of suction. No fluid or enzyme is injected before the Suction Assisted lipolysis.

➤ **Are there some serious complications of SAL?**

Theoretically speaking, there is a potential risk of Fat Embolism following Suction Assisted lipolysis, which could be fatal, but the clinical incidence of such a complication is practically nil. If the suction exceeds 4.0 Liters of fat, there are chances of fall in blood pressure and oxygenation and may require a blood transfusion.

➤ **What are other minor complications of SAL?**

Complication like bruises in the area of SAL is part of the procedure, which normally disappear by two weeks. Whenever a larger Canula is being used or a satisfactory quantity of subcutaneous fat is not maintained, localized waves and daves may develop and may be unacceptable aesthetically and may require revision surgery.

➤ **Can this procedure be repeated and if so how soon?**

It may be possible to repeat the Suction Assisted lipolysis for a touch up job in previously aspirated area, but technically it is more difficult than otherwise. However, it is recommended to defer the subsequent stages of Suction Assisted lipolysis for at least three weeks, when done in different zones and for three months in the same area.

➤ **How much weight loss can be effected by SAL?**

By and large, Suction Assisted lipolysis is aimed at reduction in girth and extra deposits of fat. The actual weight loss immediately Post-SAL may not be so significant, however, the contouring is excellent. Body itself releases some sort of inhibitory substance, which does not allow re-deposition of fat in the lipolysed area.

Suction Assisted lipolysis has been termed as the most significant surgical development of the "Decade in Aesthetic Surgery".

➤ **What is an Auto-Fat injection method or procedure?**

It is one of the ancillary procedure, which has become popular for smaller defects. A relatively small quantity of fine fat globules are aspirated, using a special syringe and thereafter, it is injected in areas like face, cheek, small depression on extremities etc. It must be warned at this stage that the fat transplanted may not remain in the injected area and may get absorbed with more fibrosis. Results achieved may be temporary and may require a number of re-injections.

➤ **What is superficial Lipo-suction?**

Superficial Suction Assisted lipolysis is relatively new in clinical practice. The amount of depth of subcutaneous fat left underneath the skin is kept to minimum in superficial Suction Assisted lipolysis. It is an extremely useful method for countering of the facial region, gynecomastia, thin abdomen, banana fold in the gluteal region, calf and ankles etc. Fine size Canula 1 - 2 mm. with a hand-operating syringe is used. Suction performed without the suction machine has extremely gratifying results, but without the complications of waves and daves. It can be combined with an ancillary procedure like face-lift.

Ultra Sound Assisted lipolysis (UAL) has been introduced recently, promising a voluminous body contouring without significant blood loss and absence of any postoperative bruising.

➤ **Ultra Sound Assisted lipolysis (UAL)**

A revolutionary body-contouring technique based on the use of Ultrasonic Energy allows the selective destruction of only Adipose Tissue. Cavitation caused by the Ultrasonic Energy acts primarily on the liquid within the fat cells and if properly used, has no effect on the vascular, nervous, or connective tissue components. Ultrasonic-assisted Lipoplasty (UAL) evolved from Closed Liposuction developed in the late 1970s by Schrudde, Fisher, and above all Illouz? who were prominent in advancing the technique of closed Liposuction through small incisions.

Closed Liposuction has been refined by many surgeons and is the most frequently performed surgical procedure. Ultrasonic Lipo-sculpture, in which fat is liquefied with the use of Ultrasonic Energy and then evacuated from the subcutaneous space, offers the advantages of reduced blood loss, more specific treatment and removal of excess fat, and

the possibility of massive reduction of fat (up to 12 L in the same surgical session without major hemoglobin loss (less than 4 g).

Ultrasound waves are produced by transforming normal electric energy into high-frequency energy-over 16 kHz (16,000 cps), which is too high to be perceived by the human ear. This energy, which is transmitted to one or more piezoelectric quartz crystal or ceramic transducers, is transformed into mechanical vibrations that are amplified and transmitted. Ultrasound has been used in industry for plastic material welding and metal cleaning and in medicine to obtain images for diagnostic purposes. Nevertheless, none of these applications make use of ultrasound's physicochemical effects.

Ultrasonic effects on fluids are mainly caused by the complex physical processes produced, i.e., by implosion of Micro-cavities containing gas and vapors. Ultrasonic waves, like all sound waves, have expansion and compression cycles. Compression cycles exert positive pressure on fluid molecules, whereas expansion cycles exert negative pressure. A sound wave of adequate intensity can generate Micro-cavities during its expansion cycle. If Micro-cavities are overexposed to Ultrasonic Energy, they are affected by alternate expansion and compression cycles of the sound wave. This makes the bubbles expand and contract continuously at a frequency corresponding to the ultrasonic wave. A dynamic balance between the gas inside the bubble and the surrounding structures is reached. In some cases, ultrasonic waves feed a bubble whose dimensions continuously change; in other cases, the average size of the bubble tends to increase.

The increase in size of a cavity also depends on the intensity of the sound wave. High-intensity ultrasound can cause a Micro-cavity to expand so quickly during the negative-pressure cycle (expansion) that it can no longer contract during the positive-pressure cycle (compression). Therefore in this process, Micro-cavities can increase in size and reach the critical phase in a very short time. However, with low-intensity ultrasound, the size of the Micro-cavity changes according to expansion and compression cycles. The surface of a Micro-cavity produced by low-intensity ultrasound is slightly bigger during expansion cycles than during compression cycles. Since the amount of gas diffusing into and out of the Micro-cavity depends on its surface, outward diffusion during expansion cycles slightly exceeds that during compression cycles; therefore at every wave cycle the Micro-cavity expands a little more than it contracts. Many cycles are needed to slowly increase the size of a Micro-cavity.

With high-intensity and low-intensity ultrasound, the Micro-cavities do eventually reach a critical size enabling them to absorb energy efficiently from the ultrasound as a function of the frequency of the ultrasonic waves. For example, at 20 kHz (the frequency used to perform Ultrasonic Lipo-sculpturing) the critical size of a Micro-cavity has a diameter of about 170 fEm. At this point the size of a Micro-cavity increases logarithmically during a single cycle of the sound wave, but the Micro-cavity cannot absorb further energy from subsequent sound waves. Because of the lack of further energy, a Micro-cavity cannot survive and succumbs to the surrounding pressure by imploding.

Clinical application of ultrasound energy requires a device that works in the low range of ultrasound (20 kHz). The frequency of the ceramic piezoelectric transducer we use functions at just under 20 kHz (19,800 cps). We employ an ultrasonic generator that can produce 99 W of total power; for standard body remodeling, we usually operate the machine at a setting level between 60% and 70% of maximum power. The amplitude is automatically set to a level of 140/150fE by the ultrasonic machine, which adapts the setting to the different types of titanium probes and the consistency of the tissues being treated. The energy delivered at these levels can cavitate and destroy lipocytes while sparing the important vascular, neural, and other connective tissues. The liquefied fat must be removed from the treated site mechanically with low-level aspiration (0.2 to 0.4 bar), and then all the denser tissues left in place are manually remodeled and homogeneously spread by external pressure on the treated area immediately after completion of the ultrasonic treatment, using a special instrument developed for this purpose.

➤ **Surgical Procedure**

The surgical technique is based on five fundamental steps that need to be followed by the operating surgeon to achieve appropriate results:

- Preoperative planning
- Tumescent infiltration
- Ultrasonic treatment
- Cleaning
- Manual remodeling

➤ **Pre-Operative Evaluation**

Ultrasonic-assisted Lipoplasty differs from traditional Liposuction that the fat is not removed immediately and continuously as the procedure proceeds, so very accurate preoperative markings are important for the specific surgical plan. The outer limits of the area to be treated are outlined, and then topographic markings are made to indicate progressively thicker areas of fat to be liquefied and removed. These topographic markings thus demarcate areas that need greater or lesser amounts of Ultrasonic Energy applied. The usual preoperative evaluation of subcutaneous tissue thickness with the pinch test and the rolling test is helpful in determining where to place these markings before performing UAL.

➤ **Infiltration Solution**

After the preoperative markings have been made, a large volume of hypotonic fluid is infiltrated into the treatment site. The function of hypotonic solution infiltration is to reduce the density of the subcutaneous tissue. The infusion of this additional fluid facilitates cavitation of the subcutaneous fat. The hypo-osmolarity of the solution weakens the lipocyte membrane, swells the cells, and aids in the liquefaction process produced by the Ultrasonic Energy.

Ultrasonic-assisted Lipo-sculpture is often done with the patient neuro-lepto-anesthetized and constantly monitored. In this case the infiltration primarily functions as a local anesthetic when an anesthetic (Lidocaine or Bupivacaine), vasoconstrictor (epinephrine), and sodium bicarbonate are added to the hypotonic solution. The sodium bicarbonate stabilizes the solution and facilitates the effect of the anesthetic. When general anesthesia is used, intra-operative local anesthesia in a lesser dose (Lidocaine, 150 mg/L) is helpful to reduce postoperative pain.

The duration of the procedure and the amount of energy required to liquefy the excess fat vary with the character of the tissue, volume of the planned reduction, and type of lipodystrophy; hypertrophied lipodystrophy is easier to treat than mixed or hyperplastic lipodystrophy.

Less energy is required when the lipocytes contain large volumes of fluid, whereas when the tissues are firm and the fat content and the ratio of tissue to fat are less, more energy is required. For example, for treatment of the inner aspect of the thighs, the application of Ultrasonic Energy at 65% maximum power for 10 to 12 minutes is required to obtain a volumetric reduction of 250 to 300 cc and give good skin stimulation. In a primary session in which virginal areas of mixed lipodystrophy are treated, when the ultrasonic machine is set at 70% power and a long, blunt-tipped probe is used, approximately 45 to 60 cc/min of fat is destroyed.

➤ **Cleaning**

The use of aspiration simultaneously with Ultrasonic Energy application is not recommended. Concurrent suctioning reduces the volume of fluid that was added to enhance the cavitation effect. The resultant increased density of the tissues being treated logarithmically reduces the degree of cavitation and consequently increases the amount of heat generated and decreases the specificity, with significant side effects.

After ultrasonic treatment of each single area, it is recommended that traditional surgical suction be performed with clear tubing to remove the liquefied fat after cavitation. In this way the aspirate can be carefully monitored visually; when whole adipocytes are observed in the aspirate, suctioning should immediately be ceased. Even small-diameter nasogastric tubing has been satisfactorily employed for this purpose, but it is best to use very slow back-and-forth movements and very thin (2 or 3 mm) Teflon-coated Canula connected to a very low-suction source, not more than 0.2 to 0.4 bar.

► **Remodeling**

The subcutaneous liquefied fat is removed by suctioning the residue of the lipocytes, and the connective tissue containing Autologous collagen remains in place. When the treated areas are clean and empty, they are manually "remodeled", and the remnant fluid is expressed with a device developed for this purpose. This maneuver removes the remaining fluid and modifies the shape of the tissues remaining at the treated site. A typical case of lipodystrophy in which six areas (e.g., bilateral treatment of the pretrochanteric area, inner aspect of the thigh, and knee) are treated takes only a short time. However, major body remodeling with massive volume reduction (8,000 cc or more) can easily require up to 4 hours. Overall, UAL requires a longer time (30% longer) than traditional Liposuction, but more conditions can be treated.

► **Post-Operative Care**

Wearing compression garments on the treated area for 4 to 6 weeks postoperatively is important to achieve long-lasting results. Usually two pairs of high-density panty hose (14 to 18 mm of Hg) worn over one another are comfortable, effective, and safe and permit early recovery. Other adjuncts in the postoperative protocol include in the administration of broad-spectrum antibiotics and anti-inflammatory agents, the use of suction drains for large treated areas and the application of cold compresses during the first 48 hours postoperatively.

► **Lipoplasty Patient Review and Advisory**

The following items should be discussed with the patient prior to the performance of the suction-assisted-lipectomy procedure.

General: This surgery is purely elective. Explanation and discussion of reasonable expectations.

What Will Usually Be Helped By Suction Lipectomy? - Disproportionate and localized accumulations of fat Body contour irregularities due to localized accumulations of fat.

What Will Be Helped by Suction Lipectomy? - General Obesity, Excess or loose skin without traditional resection; Body contour irregularities if due to structures other than fat (e.g., muscle weakness, bone, intra-abdominal contents); Persistent fat not responsive to SAL.

Goals: Improve body contour but cannot change nature of skin; Establish more normal proportions between areas of body; Improve appearance both in and out of clothing
Surgical Techniques/ Anesthesia / Facility / Recovery: Selection of anesthesia; (Local, Local with IV Sedation, Epidural or General); Selection of facility (Office OR, Outpatient Surgical Facility, Hospital OR Dressings, Support Garments Post-op Hospitalization (optional, but strongly recommended for suction over 3,000 ml./ (over 2,000 ml, for patients over 55 years); Restrictions and return to normal activities.

Possible Results:

Temporary

Discoloration / swelling
Discomfort (pain and sensitivity)
Numbness
Lumps / Irregularities
Asymmetry
Restricted activity
Permanent

Scars (very small)
Waviness - surface irregularities (unpredictable)
Pigmentation (very rare)
Asymmetry
(Note : Fairly rapid resolution of most changes listed as temporary is expected, but final contouring may not be complete for a minimum of three (3) months.)

Common Risks / Complications :
Contour irregularities/depressions?
Persistent edema?
Altered areas of sensation that may remain permanently impaired, including paresthesia or anesthesia?
Uncommon Risks / Complications: Shock requiring transfusion (Mostly with large volume Suction)
Autologous blood discussed?
Fluid collections (seroma / hematoma)?
Infection?
Skin loss?
Remote possibility of Pulmonary Fat Embolism?
*Note : Must be off all aspirin-containing products for 2 weeks before surgery and for two 2 weeks after surgery. (Check all medications; some medications and other non-steroidal anti-inflammatory drugs also may affect clotting.)

Any and all of the risks and complications can result in:

Additional surgery?
Hospitalization?
Time of work?
Expense to the patient?
On occasion, surgical revisions (secondary, touch-up) may be indicated following the original surgery
Even though the risks and complications cited occur infrequently, these are the ones that are particularly peculiar to the operation; other complications and risks can occur but are even more uncommon.

Patient does wish to have these described.
Patient does not wish to have these described.
The Practice of medicine and surgery is not an exact science. Although good results are expected, there cannot be any guarantee, nor warranty, expressed or implied by anyone as to the results that may be obtained.

Any fee paid is for Performance of procedure not for a guaranteed result.

IMPORTANT:

Some psychologically unstable persons, selects a part of their body, which they claims, is highly deformed, subconsciously to avoid their own personal shortcomings. He / she may attributes all his / her failures to that single deformity and feel that Plastic Surgery would magically transform their lives. He / she invariably keep shifting attention from one part of the body to another and keep move from one Plastic Surgeon to another, seeking relief, which often ends disastrously.

At the same time Plastic Surgeon's high sensitivity to the slightest asymmetry and his zeal to beautify, may tempt him to propose an aesthetic improvement, commonly called "Pygmalion Complex" and may obscure the difference between "the desire to cure and the need to cure".