

Large volume liposuction : Perioperative considerations

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Abstract- Liposuction has nowadays become a popular procedure amongst all age groups. Because of the advances in the field of Plastic Surgery and Anesthesia, it is now a fast and safe surgery and delivers good results. But Anesthesiologists must be very vigilant when they are involved in such cases. What an Anesthesiologist must not forget is that the most of the times, the person undergoing liposuction is not a patient. It's a cosmetic procedure. The patient should be well optimized and one should never hesitate to postpone a case if there is slightest of an issue. Pre operative optimization, intraoperative management which includes hemodynamic stability, fluid balance, pain relief, euthermia, documenting input/output and good post operative care can help in preventing catastrophes to happen which if one goes through the literature is not uncommon.

Index Terms- Large volume liposuction, Lignocaine, Residual volume theory, Tranexamic Acid.

I. INTRODUCTION

Liposuction is a cosmetic surgery done to remove fat from deposits under the skin using a canula with a powerful suction. It is also called as lipoplasty or fat moulding. If undertaken at well equipped centres by experienced Surgeons and if Anesthesia management is done by experienced Anesthesiologists, liposuction can be a safe surgery. Proper selection of the patient, appropriate optimization of the patient and closed observation of the patients in a dependency unit, if done can prevent mishaps that can be disastrous and at times life threatening for the patient.

Goals of liposuction

It is to remove target fat thereby leaving desired body contour between suctional and non suctional areas. This is achieved by selecting the patients carefully and using proper method to avoid contour irregularity, and to monitor the patient in a monitored area by trained personnel to avoid post operative complications.

Liposuction has evolved in techniques over years. Now with ultrasonic, power assisted and laser assisted liposuction, large volumes of fat with less blood loss can be achieved in less time. This doesn't mean everyone should be performing large volume liposuction. It requires training, proper selection of patient, address patients co morbidities and optimize them before surgery. The surgery should be carried out in a proper set up where patient can be monitored for vital

signs, input/output and should get adequate pain relief.

II. LARGE VOLUME LIPOSUCTION

The definition of large volume liposuction varies. The most commonly accepted definition is when more than 5 litres of total volume is removed from the patient.^(1,2) Whenever there is more than 5 litre of fat removal, the patient should be monitored in an intensive care set up. Whenever possible, stage the procedure rather than doing multiple areas in a single setting.

There is no distinct boundary line that defines the limits of safe surgery. When liposuction crosses into the domain of excessive surgical trauma, it changes from a benign cosmetic procedure into a potentially lethal process.

There is no antidote for a toxic dose of surgical trauma.

Hence the safe approach is:

- 1) Prevention of excessive trauma,
- 2) Use common sense,
- 3) Respect the patient's co morbidities.

Five pillars of safety which must be strictly adhered to in making the procedure an uneventful one are:⁽²⁾

- 1) To have a trained Surgeon,
- 2) To have a trained Anesthesiologist,
- 3) To have a decent set up to look after the patient after the procedure,
- 4) Trained ICU/ operation room staff,
- 5) To select the patient properly.

Patient selection:

This is the most important step. The patient may have unrealistic expectations. But the surgeon should have a detailed talk to the patient and explain the procedure in detail. The patient should be ASA I/II i.e. should belong to American Society of Anesthesiologist's Grade I/II i.e. without systemic disease or mild systemic disease. There physical activity should be enquired and cardiopulmonary status should be assessed. Make a note of any systemic disease (Hypertension, Type II Diabetes Mellitus, Hypothyroidism, coronary artery disease etc). If necessary they should be referred to the respective physician for a preoperative check up.

Details of ongoing medications should be noted. Many patients take herbal/ Ayurvedic medications which interfere with coagulation system. Patients should be instructed to stop it. Smokers should be advised to stop/ quit smoking as it interferes with healing. Non steroidal anti inflammatory drugs should be stopped as it has anti platelet action.

History of bleeding tendency/ family history of bleeding diathesis should be noted. History of respiratory tract infection should be asked, treated before surgery.

Patients should have reasonable goals & expectations. That's why counseling is important. The skin contour irregularities, asymmetries, skin laxities, redundancies should be noted. Drawing it on case paper will go a long way. Patients with multiple contour related problems should be primed in advance that they may require secondary/ touch up procedures.

Cost of procedure:

Cost of procedure is an important factor due to which many times patients end up with undesirable outcomes. What patients should understand that the quality of liposuction is important than the cost of procedure. They should not go by discount advertisement. They should be enquiring about the expertise of the surgeon, the set up where the procedure will be carried out. Choosing liposuction based on price may turn out to be expensive if surgery is not upto the mark.

Undesirable outcome of liposuction:

- 1) Incomplete liposuction,
- 2) Excessive liposuction- leading to disfigurement,
- 3) Irregular/ uneven depression,
- 4) Bad scars.

Preanesthesia check up: ^(3,4)

The Anesthesiologist is responsible for the proper optimization & selection of the patient for an uneventful liposuction.

They should take detailed history, notes the medications, decide what medications should be continued / stopped before surgery. If required they ask for a specialist consultation if patient is not ready for the proposed procedure. They explain the procedure to the patients and also how they will be monitored in an intensive care set up if required. Along with the Surgeon, the Anesthesiologist should also explain the patient about the post op ooze, pain, discomfort due to garments etc.

Anesthesia management:

For large volume liposuction, general anesthesia with controlled ventilation is the mode of anesthesia of choice but even spinal anesthesia/ spinal and epidural anesthesia is practiced by many Anesthesiologists. The anesthesiologist should confirm preoperative fasting (at least 6 hours). The medication should be reviewed i.e. what medication patient has taken / omitted as advised in the preoperative visit. A Balanced anesthetic technique is used. Short acting benzodiazepines (Midazolam), short acting opioids (Fentanyl), intravenous induction agent (Propofol, Thiopentone), short acting non depolarizing muscle relaxants (Atracurium) can be used. For maintenance of anesthesia, Total Intravenous anesthesia with Propofol infusion or inhalational agent (Sevoflurane, Desflurane, Isoflurane) can be used as per the choice of Anesthesiologist. In pre medication, one should not forget an antiemetic (Ondansetron) and a proton pump inhibitor (Pantoprazole) or an H2 blocker (Ranitidine) should be given intravenously always. Prophylactic antibiotic can be given before surgery starts.

Intra operative monitoring:

Standard intraoperative monitoring should be done and noted every 5 minute in the anesthesia record.

- 1) Heart rate, Electrocardiogram (lead II, V5)
- 2) Blood pressure (Non invasive/ arterial if adequate sized cuff is not available)
- 3) Spo2 (Pulse Oximetry)
- 4) End tidal CO2
- 5) Temperature (nasopharyngeal/ axillary/ oral)
- 6) Input/ output

During surgery there should be constant communication between the Surgeon & the Anesthesiologist.

III. INFILTRATION AND VASOCONSTRICTORS^(5,6)

Lignocaine is added in the wetting solution. For infiltration, a dose upto 35- 55mg/kg of lignocaine has been used, but one must be aware of LAST (Local Anesthesia Systemic Toxicity). Adrenaline is used a vasoconstrictor to reduce capillary bleeding. A dose of 50ug/kg should not be crossed to avoid hemodynamic issues. The dose of lignocaine and adrenaline used in wetting solution should be noted in Anesthesia chart.

In the Anesthesia record , the Anesthesiologist should note the details of the following:

- 1) Quantity of wetting solution used,
- 2) Amount of lignocaine used(should not exceed > 35 mg/kg)
- 3) Fat & saline aspirate,
- 4) Blood loss,
- 5) Urine output.

IV. INTRAOPERATIVE FLUID MANAGEMENT^(7,8,9)

Fluid management in liposuction is different from other surgeries. The insult that patient receives during surgery is similar to second degree burns. But it is difficult to use the Parkland's formula that is used for fluid management in burns in liposuction because we can't estimate the percentage of burns. Patient should receive fluids to correct preoperative deficit and intraoperative maintenance. The INPUT of the patient is intravenous fluids given by Anesthesiologist and wetting solution injected by the Surgeon. The OUTPUT of the patient is the urine and the saline part in the lipoaspirate. The saline is the fluid that collects at the bottom after liposuction which includes a part of wetting solution and blood. Use of crystalloid/ colloid is as per Anesthesiologist's choice but when using colloids, one should use one with low molar substitution and a low C2/C6 ratio as it doesn't lead to coagulation abnormalities.⁽¹⁰⁾

V. RESIDUAL VOLUME THEORY^(7,8,9)

Liposuction involves lots of fluid administration via crystalloid infiltration by surgeon, crystalloid/ colloid infusion by Anesthesiologist, along with a lots of loss in the form of lipoaspirate, blood & urine. Hence Anesthesiologist has to keep a track of all this and see to it that the patient is neither hypovolemic or hypervolemic, both of which has detrimental consequences. To know whether the patient is properly hydrated or not, the residual volume theory has been devised.

RESIDUAL VOLUME= TOTAL FLUID(Intravenous fluids + wetting solution + local anesthetic) – (TOTAL SALINE IN ASPIRATE, not FAT + URINE).

When we divide the residual volume by the patients preoperative weight in KG, the value that we get in ML/KG should be between 90-120 ML/KG. If residual volume is < 90ML/KG, patient deserves volume resuscitation.

In above range, one can be sure that the patient is euvoletic. However, this theory is valid if appropriate compression garments are used to minimize sequestration.

VI. IMPORTANT ANESTHESIA CONSIDERATION^(2,3,4)

- 1) Padding of pressure points, especially in prone (axilla, wrist, elbow, eyes, genitals, brachial plexus, occiput).
- 2) Avoid unnecessary traction.
- 3) Lubricate eyes.
- 4) *Prophylaxis for deep vein thrombosis*: Sequential compression device intra/ post op should be used. ⁽¹⁾ Use TED stockings.

Don't forget early ambulation which is the most important step in preventing DVT.

- 5) Temperature regulation is crucial. Core hypothermia delays recovery of patient from general anesthesia, increases perioperative ooze/ blood loss, increases oxygen consumption post op and makes the patient very uncomfortable. Following measures can be used to prevent hypothermia. Use warm fluids, either pre warmed or fluid warmer. Hot air blankets for patient warming should be used. Use warm wetting solution. Monitor OR temperature.
- 6) Surgeon uses epinephrine with lignocaine in the wetting solution. There is a theoretical possibility that there will be renal vasoconstriction leading to transient oliguria because of absorbed epinephrine. However this is self limiting, but if oliguria persists after adequate fluid administration, one can give a small dose of Furosemide (2.5- 5 mg) intravenously to facilitate diuresis.

VII. COMPLICATIONS OF LARGE VOLUME LIPOSUCTION^(12,13,14)

Although rare, but if occurs, its frustrating for the patient & Surgeon as well because its primarily a cosmetic surgery. Minor complications are unpredictable but the major ones are avoidable by giving astute attention to details and if one adheres to the 5 pillars mentioned earlier.

Minor complications :-

Prolonged swelling, contour related complications, Scarring, delayed healing, blistering, seromas, hyperchromia.

Major complications:-

Pulmonary embolism,
Deep vein thrombosis,
Excessive bleeding,
Pulmonary edema due to fluid overload,
Penetrating injuries, skin/ soft tissue necrosis, shock, fat embolism syndrome,⁽¹⁵⁾
local anesthesia systemic toxicity,⁽⁵⁾

excessive bleeding leading to blood transfusion.

In tumescent technique, a large volume of wetting solution is used unlike superwet technique in which 1:1 ratio is used (volume infused for infiltration = volume of aspirate). Thus theoretically, superwet technique is safe as far as volume overload is concerned.

What if lipoaspirate is bloody?

- 1) Terminate the surgery.
- 2) Reevaluate the technique, enquire about constituents of infiltration.
- 3) Use more wetting solution with epinephrine for hemostatic effect.

Causes of excessive intraoperative bleeding:

- 1) Anti platelet medications (Aspirin, Clopidogrel, Prasugrel),
- 2) Use of NSAIDs, steroids,
- 3) On garlic, garlic pearls, herbal medication etc.,⁽¹⁶⁾
- 4) Male gender,
- 5) Smokers,
- 6) Diabetics (due to small vessel insufficiency).

An experienced Plastic Surgeon can on examination of a patient for liposuction can predict excess intraoperative bleeding by seeing skin texture, etc.

Post operative oozing and bleeding can be distressing for the patient and it increases the possibility of blood transfusion.

The group of patients who suffer from this problem are usually diabetics and patients who are on thyroid hormone replacement therapy.

Advantage of compressive garments:

- 1) Decreases bleeding.
- 2) Decreases swelling.
- 3) Decreases third spacing of fluid.

VIII. USE OF TRANEXAMIC ACID^(17,18,19)

Tranexamic acid is an anti fibrinolytic agent that competitively inhibits activation of plasminogen to plasmin which is responsible for degradation of fibrin, which causes hemorrhage.

A preoperative dose of 10 mg/kg of tranexamic acid in a infusion over 15-20 minutes can significantly reduce intra operative bleeding and reduce the need of peri operative blood transfusion. Trials are awaited to prove the benefit in large volume liposuction.

Contraindication:

- 1) Known allergy,
- 2) Coronary artery disease,
- 3) Renal failure,
- 4) In known prothrombotic states.

IX. POST OPERATIVE CARE

- 1) TPR, BP, Pain relief, input/ output charting.
- 2) IV fluids.
- 3) Analgesia: short acting opioids (Fentanyl infusion), Tramadol, PCM. Avoid NSAIDs on the day of surgery due to intra operative fluid shifts, blood loss, epinephrine causing renal vasoconstriction

leads to reduced renal blood flow. Epidural (If tummy tuck/ abdominoplasty is done).TAP (transversus abdominis plane) block.

- 4) VIT C, Multivitamin preparations.
- 5) Sequential compression device/ Low molecular weight heparin.
- 6) Antiemetics.
- 7) Blood transfusion.
- 8) Serratiopeptidase/ Trypsin : Chymotrypsin preparation.
- 9) Chest physiotherapy/ incentive spirometry in selected cases.

Many plastic surgeons have noted a greater blood loss and more perioperative blood transfusions in patients who are hypothyroid. The reason for this is multifactorial. ⁽²⁰⁾

1. Decrease in plasma factor VII concentration.
2. Increased aPTT.
3. Acquired von Willebrand disease (due to decreased factor VII coagulant activity , decreased vWF activity).
4. Decreased platelet adhesiveness, due to acquired vWF disease.
5. Prolonged t1/2 of factor II, VII, X.

X. CONCLUSION

Large volume liposuction can be done with an uneventful postoperative course if Surgeons and Anesthesiologists select patients carefully and stick to protocols. The patients should be managed in a dependency unit and should be discharged only if they fulfill all criteria's of discharge, are hemodynamically stable and pain free.

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