

## PERIOPERATIVE ANESTHETIC MANAGEMENT IN LIPOSUCTION SURGERY



CrossMark

Gusti Ayu Pitria Septiani,<sup>1\*</sup> Cindy Henrietta Nasrani<sup>2</sup>

### ABSTRACT

Liposuction or lipoplasty is one of the most popular treatment modalities in aesthetic surgery which brings the certain unique anesthesia considerations. The patient should be assessed by the same standards as anyone else who is undergoing any surgery including a complete preoperative history and physical examination. The patients undergoing major liposuction procedure have a greater associated comorbid condition with the incidence of obesity. Moreover, intraoperative fluid management in liposuction procedure is also different from other surgeries where this procedure has the higher risk for fluid overload. Some complications related to liposuction are pulmonary

thromboembolism, fat embolism syndrome, and anesthesia-related complications. This case report describes an obese class I (BMI >30.3 kg/m<sup>2</sup>) patient who was undergoing an elective tumescent liposuction surgery under general anesthesia. During surgery, this patient received total subcutaneous infiltration of 1,200 mL tumescent solution and the total lipoaspirate was 3,300 mL. The surgery was uneventful without any certain complication. The anesthetic management of liposuction includes the preoperative evaluation, with particular attention to anything that might predispose the patient to complications, being essential to avoid unwanted occurrences.

**Keywords:** Obesity, perioperative management, complication, anesthesia

**Cite This Article:** Septiani, G.A.P., Nasrani, C.H. 2018. PERIOPERATIVE ANESTHETIC MANAGEMENT IN LIPOSUCTION SURGERY. *Bali Journal of Anesthesiology* 2(3): 56-60. DOI:10.15562/bjoa.v2i3.79

<sup>1</sup>General Practitioner, BIMC Ubud Medical Centre, Bali

<sup>2</sup>Anesthesiologist, BIMC Siloam Nusa Dua, Bali

### INTRODUCTION

Liposuction is a cosmetic surgery to remove the excess fat in the panniculus adipose found in both men and women by using a cannula with the assistance of a powerful vacuum.<sup>1,2</sup> In the US itself, more than 341,000 liposuctions were performed just in 2008 and it was ranked second among all invasive cosmetic procedures, according to the American Society for Aesthetic Plastic Surgery.<sup>1,3</sup>

One of the most important aspects of the successfulness of this procedure is the physical condition of the patient at the time of surgery.<sup>3</sup> The patient should be well optimized and must be assessed by the same standards as anyone else who is undergoing any surgery, including a complete preoperative history and physical examination. Preoperative evaluation reveals that the patients undergoing major liposuction procedure have a greater associated comorbid condition with the incidence of obesity.

In general, obese patients should not be considered for ambulatory liposuction procedure and the general anesthesia with controlled mechanical ventilation is recommended. The goals of general anesthesia are a smooth induction, a prompt recovery, and minimal side effects postoperatively, such as nausea, vomiting, or a sore throat.<sup>5</sup>

However, all these goals of general anesthesia in an obese patient are not without any challenges, especially associated with the abnormal upper

airway anatomical features: fat face and cheeks, short and a very thick neck, and a Mallampati score of 3 or higher are the reliable likelihood of a difficult intubation.<sup>2</sup> Moreover, the induction and ventilation of an obese patient is not without a risk too, as they may have a decreased functional residual capacity (FRC), decreased lung oxygen reserves, and suffering earlier desaturation during periods of hypoventilation or apnea than do normal-weight patient.<sup>2</sup>

Intraoperative fluid management in liposuction procedure is also different from other surgeries where the total fluids received by the patient is intravenous fluids given by Anesthesiologist and volume of wetting solution injected by the surgeon. Meanwhile, the output includes the urine output and saline portion from the wetting solution, fat, and blood in the lipoaspirate.<sup>1,4</sup> The residual volume is the difference between them, which remains in the extravascular compartment and acts as an interstitial infusion, thus any excess of fluid administered can easily produce fluid overload, which is an important cause of morbidity in these obese patients, hence the accurate intake and output monitoring utilized must be made.<sup>3</sup>

Eventually, postoperative care and monitoring include pain relief management and prevention of potential major complication, such as deep vein thrombosis (DVT), pulmonary embolism, fat

\*Correspondence to:  
Gusti Ayu Pitria Septiani, BIMC Ubud Medical Centre, Jl. Sanggingan No. 21 Kedewatan, Ubud-Gianyar 80561, Indonesia  
pitriaseptianigustiayu@gmail.com

embolism syndrome (FES), and anesthesia-related complications should be judiciously addressed.<sup>4</sup>

## CASE REPORT

A 48-year-old Caucasian male, 108 kg, 188 cm, ASA II, was admitted and planned for liposuction procedure with tumescent solution infiltration technique to remove excess fat in the abdominal area under general anesthesia. His past medical history included mild intermittent asthma with occasional salbutamol inhaler usage which his last attack was several years ago.

He underwent an orthopedic surgery before due to a closed fracture of right radial bone by general anesthesia without any complications. He was not an active smoker, other than his obese body mass index (BMI) classification, no present systemic medical history was recorded. His physical examination upon admission was normal, and his preoperative vital signs were unremarkable.

His BMI was defined as obesity class I with BMI was 30.32 kg/m<sup>2</sup> and waist circumference was 110 cm (43.30 inches). The physical examinations upon chest region were negative for additional abnormal breathing sounds such as expiratory wheezing or any sign of increasing the work of breathing, and his heart sounds were unremarkable. LEMON assessment for difficult intubation found as follow: unremarkable external look, adequate alignment of the oral, pharyngeal, and laryngeal axes by 3-3-2 evaluation, Mallampati class II, no obvious obstruction of the airway, and his neck mobility was normal.

The preoperative laboratory testing and imaging workups included 12 leads of electrocardiogram (ECG) and chest X-ray posteroanterior view was unremarkable. By the hospital standard, he was on DVT prophylaxis with wearing compression stockings, applied since admission.

Upon arrival at the operating theatre, the patient was on supine position and monitored by noninvasive blood pressure (NIBP), electrocardiogram (ECG), and pulse oximetry (SpO<sub>2</sub>) were set on every 5 minutes-interval recorded. A blanket warmer was applied on to prevent hypothermia. He received premedication with midazolam 2 mg (0.01mg/kg BW) at the preparation room and co-induction with fentanyl 100mcg (1mcg/kg BW) intravenously.

Anesthesia was initiated with induction of propofol 200 mg IV (2 mg/kg BW), then tracheal intubation was facilitated by rocuronium 50 mg IV (0.5mg/kg BW). First attempt intubation was executed by placing a ramp-shaped pillow behind his head, putting him in the sniffing position, but it was unsuccessful due to lack of glottic visualization.

The patient was pre-oxygenated again and the second attempt of direct intubation was done by removing the pillow and switching the size of laryngoscope's blade into a 4.0 Macintosh blade. We successfully intubated the patient with a 7.5 Fr endotracheal tube, confirmed with bilateral, equal breath sounds.

Initial end-tidal CO<sub>2</sub> (EtCO<sub>2</sub>) was 34-36 mmHg. The endotracheal tube was fixed and a pharyngeal packing was placed on. The ETT was connected to the mechanical ventilator on volume control mode-on, set to tidal volume (TV) 500 ml, respiration rate (RR) 12x/min, I:E ratio of 1:2, peak pressure of 17 mmHg, and FiO<sub>2</sub> at 40%. The patient was maintained under anesthesia by N<sub>2</sub>O:O<sub>2</sub>=60%:40% and sevoflurane with targeted minimal alveolar concentration (MAC) to 1.0-1.2.

Tumescent liposuction was performed and a total subcutaneous infiltration of 1,200 ml normal saline solution mixed with epinephrine 1mg was infiltrated. During surgery, he received esomeprazole 40 mg, metoclopramide 10 mg, and ketorolac 30 mg intravenously. Through the length of surgery, the patient was on the controlled hemodynamic status with MAP ranged within 65-72mmHg, heart rate within 70-80 beat per minutes, SpO<sub>2</sub> at 98%, temperature at 36.0°C, and EtCO<sub>2</sub> at 32-36mmHg. The surgery was uneventful and lasted for about 2 hours and 52 minutes. He received tramadol 50 mg intravenously just before surgery ended for postoperative analgesia. At the end of surgery, sevoflurane was stopped, salivary secretion gently cleansed and suctioned, oropharyngeal airway device (OPA) 120 mm was inserted, then the patient was extubated. Muscle relaxation was reversed with neostigmine 1 mg (0.01 mg/kg BW) and atropine sulfate 0.5 mg (0.005 mg/kg BW) intravenously.

The total intravenously fluid administration was 900 ml of Ringer's lactate and total lipoaspirate 3.300 ml consisted of infiltration solution, fat, and blood. The estimated blood loss was 50 ml. He was then observed at the post-anesthesia care unit (PACU). He reported postoperative pain with scale 6 and received paracetamol 1g intravenously. His Aldrette's score was 9-10-10 during the first 30 minutes and he was discharged to the ward within 2 hours after anesthesia without significant complaints.

He was admitted for 2 days inward, still on compression stockings. There was one episode of postoperative nausea and vomiting (PONV) reported, however, it was relieved by the administration of ondansetron 8 mg IV. Meanwhile, postoperative pain was well controlled using ketorolac 30 mg IV in combination with oral paracetamol 500 mg and codeine 30 mg administered 8 hourly. On the second day after surgery, he has had a good

ambulation, wore an abdominal compression garment, a tolerable pain scale and no more nausea/vomiting without anti-emetic medication, thus the patient can be discharged from the hospital.

## DISCUSSION

Based on the volume of infiltration or wetting solution injected, liposuction techniques are divided into four main types: viz dry, wet, super wet, and tumescent technique. The tumescent technique is the most common of all liposuction procedure. It uses large volume (2-3 ml of infiltrating per 1ml of aspirate) of a mixture of lidocaine (the dosage used can be up to 35 mg/kg BW), adrenaline, and normal saline which are injected into the subcutaneous fat tissue to expand it and make it firm and turgid, before fat can be removed.<sup>1,3,4</sup>

The tumescent liposuction technique in this case report used the modified infiltration solution by using normal saline infiltration only with the small dosage of epinephrine without lidocaine. Some data on anesthesia studies have revealed the use of lidocaine and epinephrine may result in toxicity in some cases, especially for the central nervous system and cardiac arrhythmia.<sup>3</sup> Throughout intraoperative monitoring, ECG showed unremarkable sinus rhythm without any premature extra beat or cardiac arrhythmia episode.

Preoperative evaluation is the crucial component in establishing patient's level of risk, since many obese patients undergoing liposuction may have other comorbidities condition like hypertension, diabetes mellitus type 2 (DMT2), obstructive sleep apnea (OSA), asthma or other pulmonary diseases, and coronary artery disease (CAD).

Special attention should be addressed to look for the possibility of upper airway abnormality that may predispose the likelihood of a difficult intubation and mechanical ventilation in obese patients. The mnemonic LEMON is helpful as a prompt method when assessing the potential for a difficult intubation. It consists of some points: look externally of the anatomic features and characteristic of the upper airway: fat face and cheeks, short and increased neck circumference at the level of thyroid cartilage; evaluate 3-3-2 rule to allow alignment of the oral, pharyngeal, and laryngeal axes; Mallampati classification for hypopharynx visualization; obstruction of the airway (if any); and neck mobility.<sup>2,6</sup>

LEMON assessment of this patient was unremarkable. Patient's past medical history of mild intermittent asthma and BMI at 30.32 kg/m<sup>2</sup> may influence his pulmonary function in the perioperative period, thus classifying him as ASA class II. The obese population are associated with decreased

lung compliance, decreased of FRC, and increased airway resistance. These changes are most evident in the supine position, thus making controlled mechanical ventilation problematic.

Currently, there are no data to indicate which mode of mechanical ventilation is best for obese patients. In the acute asthmatic attack with concomitant pulmonary infection or significant dyspnea notified, the patient should be referred to a pulmonologist, further medical stabilization, and general endotracheal intubation postponing for up to 5 weeks until the patient is completely asymptomatic. However, with regard to treated stable pulmonary disease, it probably confers no additional risk for perioperative complications. There is no definitive evidence or prospective and randomized studies to indicate which medication or anesthesia technique would be more superior or improve patient outcome.<sup>5</sup>

In this patient, we need to do twice attempts of direct intubation after manual adjusted his neck to "the sniffing position" without a ramp-shaped pillow behind his head and switched the size of laryngoscope's blade into a 4.0 Macintosh blade, then ETT was successfully connected to a ventilator with volume controlled mode on. Intraoperative monitoring showed no hypoventilation and hypoxemia episode occurred.

Patients with clinically obese are increased risk of pulmonary aspiration due to higher incidence of a hiatal hernia, reduced gastric motility, gastroesophageal reflux disease (GERD), and increased gastric volume (>25ml with pH<2.5 in >75% obese patient), thus abstinence from solid food ingestion for 10-12 hours prior surgery is recommended. These patients may benefit from selected prophylactic treatments with H<sub>2</sub> receptor antagonist (ranitidine 100 mg IV 60-90 minutes before surgery) which can reduce gastric volume and pH effectively. Alternatively, a proton pump inhibitor may prove to be a safe and effective alternative to the H<sub>2</sub> receptor antagonist. A gastrokinetic agent (metoclopramide 10-20 mg IV) which increase gastric motility and lower esophageal sphincter tone, may be effective to for certain patient.<sup>5,8</sup> This patient has conducted preoperative fasting for more than 8 hours and received esomeprazole 40 mg in combination with metoclopramide 10 mg intravenously during surgery.

General anesthesia is especially appropriate when surgery involves a large volume of liposuction, especially in the thigh, abdomen, and buttocks area.<sup>4</sup> For induction, the special consideration needs to be addressed for a patient with decreased mandibular and neck mobility due to excessive fat tissue by planning for awake intubation with fiber optic laryngoscope and anticipation for the faster

desaturation period during periods of hypoventilation should be considered.<sup>2,8</sup>

Balanced general anesthesia technique is used for maintenance, which employed a combination of medications from different classes of rapid onset and shorter duration of anesthetic agents to achieve the desired level of sedation and analgesic effect, thus reducing the morbidity in the obese patient. Typically, sedative/tranquilizer such as benzodiazepine (midazolam 1-2 mg IV) is combined with a narcotic analgesic such as fentanyl (1-10 mcg/kg BW/hr IV), morphine, or meperidine. Other medications with the sedative-hypnotic effect such as propofol (1.5-2.5mg/kg BW IV for induction and 50-200mcg/kg/min IV for maintenance) may be administered. Fentanyl has the advantage of rapid onset and short duration which less than 60 minutes of action, however, because the synergistic action with other sedative agents, even doses 25-50 mcg can result in depression or respiratory. Adjunct analgesic with ketorolac can be added for analgesic activity.

As long as the obese patient is carefully monitored, several medications may be titrated together to achieve the required effects. A fixed combination of medications are not advised.<sup>5,8</sup> Standards ASA monitoring such as noninvasive blood pressure (NIBP), EtCO<sub>2</sub>, ECG, and temperature monitoring should be done and noted every 5 minutes in the anesthesia recorded. Invasive monitoring such as central venous pressure (CVP) line and arterial blood pressure are required for a morbidly obese patient (BMI  $\geq 35\text{kg/m}^2$ ) and undergoing large volume of liposuction ( $\geq 4,000$  ml volume aspiration carried out).<sup>4</sup>

The intraoperative fluid administration in the liposuction procedure is different from other surgeries where the total fluids received by the patient is a summation of intravenous fluids given by anesthesiologist and volume of wetting solution injected by the surgeon, meanwhile, the output includes the urine output and saline portion from wetting solution, fat, and blood in the lipoaspirate.<sup>1,4</sup> The residual volume is the difference between them, which remains in the extravascular compartment and acts as an interstitial infusion, thus any excess fluid administered can easily produce fluid overload (hypervolemic). To limit the degree of fluid overloading and possibility of pulmonary edema, Rohrich et al. suggested guidelines for intraoperative fluid resuscitation.

The patient will receive maintenance fluid only plus subcutaneous infiltrate if they are having  $< 5,000$  ml of lipoaspirate, whereas those having  $> 5,000$  ml of lipoaspirate removal, received maintenance plus 0.25 ml of intravenous fluid for each milliliter aspirated over 5,000 ml plus subcutaneous

infiltrate. This patient has received 2,100 ml total volume IV with tumescent solution infiltrated and 3,300 ml of total volume aspirate, hence patient should receive maintenance fluid only plus subcutaneous infiltrate. Based on the 4-2-1 rule calculation he should be given 440 ml intravenously of maintenance fluid for 3 hours of surgery. The sum of total intraoperative fluid should be 1.640ml, hence this patient has been slightly overhydrated however he did not develop any sign of fluid overload.

Special attention should be addressed for intraoperative positioning in liposuction surgery. The purpose is how to provide adequate surgical exposure according to plastic surgeon request and area need to be fat aspirated, while maintaining adequate ventilation and prevent desaturation and hypoventilation. Some morbidly obese patient needs to use a ramp-shaped pillow that extends from behind the lumbar area to the neck and adjusted head position above the chest in a horizontal plane formed between sternal notch and the external auditory meatus. This position has benefits to facilitate intubation and better ventilator mechanics. In addition, particular care should be employed in protecting pressure area prone of pressure sore and nerve injuries (i.e. brachial plexus, sciatica, and ulnar nerves palsies), which are more common in a morbidly obese patient. Appropriate precaution should be taken by carefully padding the sensitive pressure point such as elbow and heel in supine position.<sup>2,3,4</sup>

Several precautions of some complications perioperative for liposuction also should be addressed. According to Grazer and De Jong have identified a total number of 130 deaths in almost 500,000 surgical procedure, of which the most important causes were thromboembolism (23.1%), abdomen or viscera perforation (14.6%), anesthesia/sedation/medication (10%), fat embolism (8.5%) and others (43.9%).<sup>3</sup> One of the most feared complications is deep vein thrombosis and pulmonary embolism, which the incidence has been reported  $< 1\%$  in liposuction, but marked increase when combined with other surgery (abdominoplasty/sleeve gastrectomy). The use of preventive measures (stocking, pneumatic intermittent compression, etc), together with early mobilization, and anticoagulation (if indicated) are sufficient to prevent the risk of DVT.<sup>3</sup> In this patient, there were no clinical signs of DVT reported during admission.

Fat embolism syndrome (FES) occurs in 5-10% of the cases, but is usually minor, self-limiting disease, and resolved within a week. However, the clinician should not underestimate its importance as it can share the same features as other fatal complication such as pulmonary embolism and sepsis, especially for the fulminant FES. The clinician should be aware if there are three classic symptoms of FES

as follow: respiratory distress, cerebral dysfunction, and petechial rash, usually appear within 24-72 hours after the procedure.<sup>3</sup> There were no signs of FES reported from this patient.

Another most common postoperative complication is postoperative nausea and vomiting (PONV) with the incidence range >35% has reported. Antiemetic medication with ondansetron 4-8 mg IV or SL, a serotonin antagonist, is probably the most effective and safe postoperative anti-emetic (compared with droperidol 0.625-1.25mg IV, the most common used anti-emetic prior, but recently considered unsafe due to its potential cardiac complications). This patient has experienced one episode of nausea and vomiting which was well controlled by ondansetron 8mg IV. For the postoperative analgesia, the requirement may be minimal, as the numeric pain scale postoperatively ranges between 2-4.<sup>8</sup> the non-steroid anti-inflammatory drugs (NSAIDs) may also be prescribed for pain relief in combination with mild to moderate opiate analgesics such as tramadol or codein.<sup>1,5,8</sup>

## CONCLUSION

Liposuction is one of the most popular treatment modalities in aesthetic surgery due to increased awareness of the advances in the field of plastic surgery and anesthesia. Its low complication rate accentuated this procedure popularity, hence

should be considered a safe surgical procedure. By following the protocols carefully, liposuction can be a safe procedure that results in significant patient outcome and satisfaction.

## REFERENCE

1. Abhijit SN, Sriprakash K, Anand MN, *et al.* Large volume liposuction: perioperative considerations. *International Journal of Scientific and Research Publication.* 2013; 13: 1-4.
2. Matei V, Wanda MP. Nutritional disease: obesity and malnutrition. In: Robera LH, Nicholas MG, Katherine EM, editors. *Stoelting's anesthesia and co-existing disease 7<sup>th</sup> ed.* Philadelphia: *Elsevier.* 2018; pp. 385-405.
3. Alethia RP. Liposuction: where are we and where are we going?. *Anaplastology.* 2015; 4: 147. DOI: [10.417/2161-1173.1000147](https://doi.org/10.417/2161-1173.1000147).
4. Bennett GD. Anesthesia for liposuction and abdominoplasty. In: Shiffman MA, Mirrafati S, editors. *Aesthetic surgery of the abdominal wall.* Berlin: *Springer.* 2005; pp.29-47. DOI: [10.1007/3-540-27263-1\\_2](https://doi.org/10.1007/3-540-27263-1_2).
5. Sood J, Jayaraman L, Sethi N. Liposuction: Anesthesia challenges. *Indian J Anaesth.* 2011; 55:220-7.
6. Claire Merrick. *Advanced trauma life support (ATLS) student course manual 10<sup>th</sup> ed.* Chicago: *American College of Surgeons.* 2018; pp. 22-41
7. Giffard AG, Vistnes LM. Aesthetic surgery. In: Jaffe RA, Samuels SI, editors. *Anesthesiologist's manual of surgical procedures.* Philadelphia: *Lippincott-Raven;* 1996. pp. 717-22.



This work is licensed under a Creative Commons Attribution