Perioperative Management of Super Wet Liposuction: A Case Report

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Abstract

We describe a patient who presented in acute respiratory distress following liposuction under general anesthesia. Clinical manifestations and radiologic findings were consistent with fluid overload and acute pulmonary edema. Fortunately the patient recovered well from this complication. Perioperative fluid management during liposuction is discussed.preconditions for improving whole DS systems and their components, such as a network of DS clinics.

Key words: liposuction, super-wet technique, general anesthesia, pulmonary edema.

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Super wet and tumescent liposuction techniques can lead to large fluid shifts and over hydration of patients. We present a patient who exhibited fluid overload and pulmonary edema following super wet liposuction.

Case description

A 25-yr old, 72 kg, 162cm ASA 1 women was admitted to a surgery center for a suction assisted lipectomy of the hips, thighs, buttocks and abdomen. Her past medical history included a previous rhinoplasty and mini liposuction with no complications. Current medications included iron, levothyroxine, doxycycline, and birth control pills. Levothyroxine was given in absence of any known dysthyroid syndrome.

Her physical examination was normal, and her preoperative vital signs were: BP 110/70, P 76, RR 16, T 97.6, and room air SpO_2 100%. Her starting hemoglobin was 14.1g/dl. On the day of surgery the patient received cefazolin 1g and midazolam 2 mg IV via a 20 gauge IV placed in the dorsum of the right hand prior to entering the operating room. In the operating room, the patient was monitored with an electrocardiogram, noninvasive blood pressure, and pulse oximeter. General anesthesia was induced with propofol 140 mg and fentanyl 50 mcg and muscle relaxation achieved with vecuronium 7 mg. She was intubated with a 7.0 ET tube and anesthesia was maintained with 50% inspired oxygen in air and 1.5–2% sevoflurane. After induction, another bolus of 50 mcg of fentanyl and 50 mg of meperidine was administered as well as 8 mg of dexamethasone and 6.25 mg of promethazine. Another dose of vecuronium 3 mg was administered 90 min after the first dose for a total of 10 mg.

During the first hour of surgery the patient was in the dorsal decubitus position and then repositioned in the prone position for the remainder of the surgery. Tumescent liposuction was performed and the patient received a total subcutaneous infiltration of 4000 ml of normal saline solution that contained 90 ml of 0.5% lidocaine with 1:1,000,000 epinephrine. The operation was uneventful and lasted 3 hours and 50 min. The patient remained stable with a typical blood pressure of 120/65, heart rate 65-85 beats per minute, and SpO_2 99%. At the end of surgery, muscle relaxation was reversed with neostigmine 2 mg and glycopyrrolate 0.4 mg. Prior to emergence, ondansetron 4 mg was administered. Intravenous fluid administration consisted of 4000 ml of Ringer's lactate and 1000 ml of hetastarch. The total aspirate was 5200 ml, with an estimated blood loss of 600 ml, and urine output of 450 ml.

In the post anesthesia care unit (PACU) vital signs were as follows: BP 130/80, P 104, RR 16, T 94.4 and SpO_2 97% on 6l/min O_2 via face mask. The patient complained of pain and received intravenous hydromorphone 0.1 mg 25 min after arrival and was encouraged by the nurse to take slow deep breaths because her SpO_2 had dropped to 88%. After one hour in PACU, the patient became very anxious and complained of increased difficulty in breathing. At this time her respiratory rate was 24, SpO_2 77%-88% on 6L/minO_2 via facemask, BP 117/65 and P 119. An anesthesiologist was consulted and the patient was placed on a 100% non-rebreather mask. Lung auscultation demonstrated bilateral and diffuse crackles. The patient was then given furosemide 20 mg and 2 doses of morphine 2 mg.

Approximately 30 minutes later, the patient was feeling better, O_2 saturation was 93- 96% on 100% non-rebreather mask and good urine output. A chest radiograph demonstrated markedly diffuse bilateral pulmonary infiltrates. An arterial blood gas was obtained, with pCO_2 30.8 mmHg and pO_2 73.1. During the next 2 hours, the patient's condition improved. She drank 200 ml of water/apple juice. Her total urine output was 2575 ml. At this time, she was admitted to the hospital for further evaluation and treatment. The patients' vital signs were as follows; BP 132/79, P 133, RR 30, T98.2 and SpO_2 96%, on 2 L/min O_2 via nasal canula.

On admission another dose of furosemide 20 mg was given, as well as a total of 14 mg of morphine over the next 24 hours. A CT pulmonary angiogram was performed which demonstrated diffuse patchy parenteral consolidation throughout both lungs without any evidence for pulmonary emboli. The patient's condition gradually improved over the next 24 hours and oxygen administration was discontinued. Oxygen saturation on room air remained stable (96–98%), pain was controlled, and the patient was discharged home. Patient's 24-hour intake and output showed a positive balance of 750 ml with a total urine output of 6800 ml (table).

Table

Time	0700–1400	1500–2200	2300–0600	24 hour total
In/Out (ml)	5000/1050	360/1750	720/4000	6050/ 6800

Discussion

Tumescent and super wet liposuction techniques have become common practice today as a means of providing analgesia and to decrease blood loss associated with liposuction [1–2]. Tumescent and super wet techniques rely upon large volumes of irrigation (1:3 fat aspirate to irrigation for tumescent and 1:1 for super wet) with the addition of lidocaine and epinephrine. The dose of lidocaine can be well beyond the standard maximum dose recommendations (4 mg/kg or 7 mg/kg with epinephrine), up to 55 mg/kg. With a dramatic rise in cosmetic surgery, the anesthesiologist must be aware of the adverse outcomes associated with this type of procedure [3–5]. The combination of the anesthetic technique and the procedure predispose the patient to several potentially fatal adverse outcomes. The adverse outcomes can be from lidocaine toxicity, fluid overload, and fat or pulmonary embolism [6–8] In this case, we encountered a patient with fluid overload and pulmonary edema.

Proper fluid management and awareness of the fluid shifts taking place with these procedures is extremely important. Literature regarding fluid management for these procedures is sparse. Trott et al recently presented a formula for resuscitation and recommended to replace the fluid deficit and the insensible losses for the procedure with 0.25 ml of crystalloid for every 1 ml of tissue removed beyond 4000 ml. They were able to demonstrate that an intraoperative fluid ratio (intravenous fluid plus subcutaneous infiltration divided by aspiration volume) of 2.1 for volume of aspirate below 4000 ml and 1.4 for large volume liposuction (> 4000 ml) was safe and that the urine outputs during the procedure reflect a mild over-resuscitation with this formula [9]. A repeat study performed by Rohrich et al keep used the same formula and compared it to a formula where all the fluid replacement variables were the same except 0.25 ml of crystalloid was administered for every 1ml of tissue removed beyond 5000 ml. Their intraoperative fluid ratios were 1.8 and 1.2 respectively for volumes of aspirate below and above 5000 ml and urine output between 1.5 and 2.5 ml/kg. These relatively high urine outputs demonstrated that the intraoperative fluid ratio could be further improved perhaps by eliminating fluid replacement [10].

In this report the anesthesiologist replaced the aspirate volume for volume and intraoperative fluid ratio was 1.9. Because only a small portion of the volume of crystalloid solution given intraoperatively remains intravascular, patients can have significant weight gain and fluid retention secondary to third-space loss. The sparse reporting of adverse outcomes makes it difficult to assess the level of morbidity and mortality associated with these techniques: however, when performed under general anesthesia, these procedures may be at higher risk for fluid overload compared to the same procedure performed under local anesthesia [11–12]. Thus anesthesiologists should be aware that large volume IV fluid replacement could be deleterious in these procedures as patients also receive large volumes of absorbable irrigation [13-15]. Evidence of fluid overload should be treated accordingly.

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