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Intraoperative factors associated with postoperative complications in body contouring surgery

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ABSTRACT

Background: Several preoperative factors have been shown to influence outcome of body contouring surgeries. The effect of intraoperative features, including fluid volume administered, hemodynamic and respiratory parameters, and body temperature on postoperative complication, has not been reported to date.

Materials and methods: All subsequent patients undergoing body contouring surgery in the Tel Aviv Medical Center between 2007 and 2012 were enrolled. Demographic and intraoperative data were collected and analyzed for possible associations with postoperative complications, including formation of seroma, hematoma/bleeding, other surgical site complications (infection, adhesiolysis, or need for debridement), formation of a hypertrophic scar, any documented, infection or a composite outcome of any of the previously mentioned.

Results: Data of 218 patients were assessed. Mean (standard deviation) age of patients was 41(14) y. Intraoperative administration of higher volumes of fluids was significantly associated with formation of seroma ($P = 0.01$), hematoma/bleeding ($P = 0.03$), hypertrophic scar ($P = 0.01$), surgical site complications ($P = 0.01$), and a composite outcome ($P < 0.001$). Development of hematoma/bleeding was associated with longer periods of low (<35.6°C) intraoperative core temperature (72% *versus* 50% of surgery duration in patients who did not develop this complication, $P < 0.05$). Surgical site complications were associated with longer periods of intraoperative oxygen desaturation (saturation ≤92%, 4.2% *versus* 0.9% of surgery duration in patients who did not develop surgical site complications, $P < 0.01$).

Conclusions: Intraoperative moderate hypothermia, hypoxemia, and liberal fluid administration are associated with worse surgical outcome in patients undergoing body contouring surgery. Increased awareness of the potential adverse effects of these factors in body contouring surgery will enhance interventions aimed at avoiding and promptly treating such events.

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Introduction

Availability of bariatric surgery for extreme obesity has improved in recent years, making super morbid obesity patients legitimate candidates for weight reduction operations.[1-4] This has raised the need for body contouring surgery for patients after massive weight loss. Body contouring surgeries are fairly extensive, might be prolonged, and can possibly involve several different regions of the body. The reported morbidity is relatively high, approaching 50%, mostly related to various wound healing complications which can be managed conservatively and rarely require return to the operating room.[5-8] Recent studies reported higher complication rates in patients who have body contouring surgery after bariatric surgery.[5-8] Identification of controllable variables associated with increased risk of postoperative wound complications will help reduce morbidity in this vulnerable patient population.

Several patient's risk factors and surgical aspects have been shown to affect postoperative outcome in body contouring surgery. These include the initial body mass index (BMI), smoking, and the amount of tissue removed during surgery.[6,7,9] A recent review concludes that carefully monitoring operating room temperature and fluids status can help avoid complications; however, scarce data are presented to support this comment.[10] Thus, the present study aimed to evaluate the influence of various intraoperative factors on postoperative wound healing complication rate in body contouring surgery.

Material and methods

This single-center retrospective cohort study was approved by the Tel Aviv Medical Center (TLVMC) Institutional Review Board (IRB no. 0089-11-TLV) that waived the need for informed consent.

All consecutive adult patients undergoing post bariatric abdominoplasty under general anesthesia for massive weight loss in the TLVMC from January 2007 till May 2012 were included. TLVMC is a referral center for such operations. Patients were admitted to the hospital the night before surgery to meet the anesthesiologist and have a blood workup. Patients received a standardized thromboembolic prevention protocol (subcutaneous enoxaparin [Clexane], 40 mg preoperatively, which is continued throughout the hospital stay and for 2 wk after hospital discharge) and immediate preoperative intravenous antibiotics. Temperatures were measured by mean of esophageal probe.

The relevant perioperative data were extracted from the computerized medical records at TLVMC.

1. Demographic and anthropometric data: age, gender, BMI, American Society of Anesthesiologists (ASA) physical status score, smoking habits
2. Duration of surgery
3. Preoperative and postoperative complete blood count
4. Fluid volume administration during surgery as well as the volume of administered blood products, if any
5. Intraoperative hemodynamic and respiratory parameters (intraoperative heart rate, respiratory rate, blood pressure, oxygen saturation, temperature, respiratory pressures, inspired oxygen concentration, end-tidal CO_2 concentration). Hypothermia was defined as core temperature below 35.6°C. Oxygen desaturation was defined as oxygen saturation $\leq$92%.
6. Intraoperative administration of vasopressors.

Postoperatively, all patients were examined and interviewed daily as part of the departmental routine medical care by an attending physician. Most patients were discharged with the drains and returned to the outpatient clinic to have those removed. The drains were removed systematically in all patients when fluid output was <30 mL/d. After hospital discharge, patients were seen in the outpatient surgical clinic, weekly for 1 mo and then at 3 mo. Complications detected by the attending physician during patients' hospital stay and 30 d follow-up were recorded.

Primary endpoint

The primary endpoint was occurrence of any of the listed postoperative (30 d) surgical site morbidities: seroma formation (detected clinically or radiologically irrespective of the need for evacuation), hematoma (including documented postoperative bleeding), hypertrophic scar, and other surgical site complications (infection, wound dehiscence, or need for debridement) and a composite outcome of these complications.

Secondary endpoints

Postoperative anemia (hemoglobin concentration <12 g/dL or a drop >1.5 g/dL compared with the preoperative level), the occurrence till 30 d postoperatively of systemic infection, deep venous thrombosis, and pulmonary embolism.

Any association between demographic or hemodynamic/respiratory/temperature parameters and the defined outcomes was evaluated.

Statistical analysis was performed using SPSS software (SPSS for windows version 21.0; IBM corp, Armonk, NY). Categorical data were analyzed by logistic regression models and compared by squared Chi test. Continuous variables were compared using the Student's *t*-test for unpaired samples when normal deviation was assumed. When the data were not assumed to deviate normally, the nonparametric Wilcoxon test was used. Significance level was set to a P value <0.05.

Results

The records of 218 consecutive adult patients undergoing abdominoplasty for massive weight loss ($\geq$50% loss of the excess weight, weight loss between 45 and 73 kg in this cohort) under general anesthesia in TLVMC from January 2007 till May 2012 were reviewed. These were mainly female patients ($n = 152$, 70%), mean (standard deviation [SD]) age of 41(14) y, average BMI of 29.6 kg/m^2 (3.1), and the vast majority of