General anesthesia for the heaviest man in the world

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ABSTRACT

The prevalence of obesity has increased greatly over the last 20 years, resulting in an increase in the number of bariatric and nonbariatric surgeries in this population. We present the case of a 20-year-old male, weighing 610 kg (1345 lb), and believed to be the heaviest living man in the world. After 4 months of rigorous in-hospital weight reduction, now weighing 510 kg (1125 lb), he underwent a laparoscopic gastric sleeve procedure under general anesthesia. This report describes the management of his anesthetic and exemplifies the challenges associated with this patient population.

Key words: *Anesthesia, Guinness world records, heaviest man, obesity*

INTRODUCTION

The prevalence of obesity has increased greatly over the last 20 years, associated with an increase in the number of bariatric and nonbariatric surgeries in this population.[1] This is of importance to anesthesiologists, as these patients have special anthropometric and physiological challenges and considerations. Saudi Arabia, the United States, and Mexico are considered the countries with the highest prevalence of obesity (body mass index [BMI] ≥30 kg/m^2) worldwide: 35.2%, 31.8%, and 32.8%, respectively, according to the World Health Organization 2008 data.[2] The largest patient reported having undergone surgery weighed 880 lb (400 kg). She died 12 days after her gastric bypass surgery in 2007 due to a massive heart attack.[3]

We recently encountered a 610 kg (1345 lb) man admitted to our hospital who is believed to be the heaviest living man in the world (the Guinness World Records lists Manuel Uribe, from Mexico,; he weighed 560 kg (1235 Ib) in 2006[4] and died recently).

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CASE REPORT

A 20-year old male weighing 610 kg (1345 lb) was airlifted from his native city to King Fahad Medical City in Riyadh (Saudi Arabia), for the management of hyperobesity [Figure 1a]. He had been bedridden for the previous 2 years. A multidisciplinary team was arranged for management of the patient. The patient's past medical history included development of a seizure disorder at the age of 4 months, managed with single antiepileptic medication until the age of 14 years when it was discontinued. He had been free of seizures since. The patient had suffered mild mental retardation since childhood, no record of assessment or management of which was found. He was diagnosed with nesidioblastosis with hyperinsulinemia at the age of 8 years and underwent partial pancreatectomy. He had

been continuously gaining weight since childhood. His diet consisted mainly of processed food and sugared beverages. Due to lack of physical activity and high-calorie intake he reached his present weight of 610 kg.

On arrival to the hospital a thorough evaluation (including the physical exam, blood workup and various functional tests) was performed by various specialties. He was started on weight loss regimes, including the commonwealth surgical associates instructions for pre- and post-sleeve gastrectomy diet,[5] and extensive physical therapy was undertaken. He was diagnosed with type 2 diabetes mellitus. His cardiac physical examination was normal; electrocardiogram was normal, and echocardiogram showed good ejection fraction but mild pulmonary hypertension. Neurologic assessment was normal. Pulmonary assessment found moderate sleep apnea, and comprehensive chest physiotherapy with incentive spirometry was instituted. Overnight continuous positive airways pressure (CPAP) of 10 cm of H_2O was started. SpO_2 on room air ranged from 71% to 94% with the lowest values recorded during sleep without CPAP. Psychological assessment confirmed mild mental retardation (using Stanford-Binet Intelligence Scales) with depression. Depression was successfully managed by behavioral therapy. He was started on unfractionated heparin 7500 IU 8 h subcutaneously. After 4 months of rigorous hospital management his weight had been reduced by approximately 100 kg (220 Ib), and a laparoscopic gastric sleeve procedure was planned. Patient's informed consent and institutional review board approval were obtained for the purpose of publication.

Preoperative assessment

Assessment of the airway revealed: Neck circumference 42 cm, thyromental distance 6 cm, full mouth opening, free neck movement, no loss of teeth, and Mallampati score 4 [Figure 2]. Intubation was anticipated to be difficult. Complete blood count, liver function tests, renal function tests, serum electrolytes, coagulation profile, complete hormonal profile, vitamin levels, leptin level, and brain natriuretic peptide level were within normal limits. Prader Willy and Angelman syndrome were ruled out. Arterial blood gas on room air showed PCO_2 41 mmHg and PO_2 69 mmHg with a base deficit of one, on the day before surgery. STOP BANG score was 6.

The patient received 40 mg omeprazole the night before surgery, and was fasted for 12 h. Intravenous metoclopramide 10 mg and ranitidine 50 mg were given 2 h prior to surgery. The estimated weight before surgery was 510 kg (1125 lb), height 165 cm (5.4 feet), BMI: 187.3 kg/m^2, ideal body weight (IBW) 61.4 kg, adjusted body weight 240.8 kg, while lean body weight (LBW) was 193.8 kg.

Intraoperative care

The patient was shifted to the operating table using a Volaro Lifter (SMT Health Systems™, Detroit Lakes, MN) [Figure 1b and c]. Positioning on the operating table was done with care, and all pressure points were padded. An arterial line and two 16 G intravenous cannulas were placed under local anesthesia. The patient was placed in a ramped position using pillows, in order to facilitate airway management. Preoxygenation with 100% oxygen and CPAP of 10 cm H_2O was performed for 3 min. Various airway devices (e.g., fiberoptic bronchoscope, and laryngeal mask airway), as well as extra-corporal membrane oxygenation, were available as a backup. Anesthesia was induced slowly with propofol 350 mg and fentanyl 200 mcg under bispectral index (BIS) monitoring. After confirming that mask ventilation was feasible, rocuronium 80 mg was administered. LBW dosing scalar was used for induction medication and guided by BIS monitoring while IBW was used for rocuronium. Tracheal intubation was performed using a video laryngoscope (Glidescope, Verathon Inc., Bothel, WA) and an 8.0 mm endotracheal tube was placed on the first attempt [Video 1]. Anesthesia was maintained with desflurane at an end-tidal concentration of 6-8% in 50% oxygen and remifentanil infusion of 0.1-0.2 mcg/kg LBW/min while incremental rocuronium was given as required. Intraoperative alveolar recruitment using a vital capacity maneuver was performed for 8 s after intubation and before extubation. Pressure control ventilation with pressure ranging from 25 mmHg to 30 mmHg and PEEP of 10 cm H_2O were applied to achieve an end-tidal CO_2 of 40-45 mmHg.

The patient was positioned, and the surgical procedure was conducted uneventfully and finished within 2 h. Intraoperatively, acetaminophen 2 g, diclofenac sodium 75 mg, dexamethasone 12 mg, fentanyl 50 mcg and granisetron 2 mg were administered. Neuromuscular blockade was reversed using sugammadex 400 mg. Once train-of-four ratio was >90%, desflurane was discontinued, and once awake, the patient's airway was extubated. Total intraoperative fluid intake was 1000 ml normal saline and estimated blood loss was 100 ml.

The patient was transferred to the post-anesthesia care unit, where CPAP of 10 cm H_2O was applied. After 2 h he was transferred to a high-dependency unit for further management. Deep venous thrombosis prophylaxis (sequential compression devices and unfractioned heparin 7500 IU 8 h subcutaneously) was re-established postoperatively. At 1 month follow-up no venous thrombosis, pulmonary or wound infections were reported.

Figure 1: (a) The patient was lifted by the firefighters from his room by the four-clefts then by airplane to our hospital. (b and c) intraoperative transportation of the patient to the OR table

Figure 2: Airway assessment, (a) The patient obesity is mainly on his trunk and limbs, (b) Mallampati 4 (only hard palate is visible), (c) lateral view, neck circumference equal 42 cm

DISCUSSION

Obesity is a multisystem, chronic, pro-inflammatory and metabolic disorder.[6] The marked increase in the obese population makes it almost certain anesthesiologists will be taking care of such patients. A thorough preoperative assessment and optimization, meticulous intraoperative and postoperative cares are essential elements for a successful outcome of morbidly obese patients undergoing various surgical procedures.[1,6] Although anesthesia for obese patients tends to have higher mortality and morbidity than nonobese patients, the advances in anesthetic medications,

ventilator techniques, and other devices allow performing safer anesthesia with better postoperative recovery in such patients.[6] Anesthesiologists should be fully skilled and knowledgeable to deal with these patients, and they must be always aware of the ongoing advances in research in obesity anesthesia and surgery.

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