

A Case of Obesity Hypoventilation Syndrome with Respiratory Failure that Improved with Abdominoplasty

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We report on a 70-year-old man with severe respiratory failure caused by obesity hypoventilation syndrome due to abdominal adiposis. Obesity hypoventilation syndrome is a severe condition that is diagnosed when all of the following criteria are satisfied: body-mass index >30 kg/m²; apnea hypopnea index >30 ; PaCO₂ >45 mm Hg (in the daytime); and marked daytime somnolence. Abdominoplasty, which is generally used for abdominal laxness, striae, and rectus muscle diastases and for women in the postpartum period, was performed for this patient to facilitate ventilator weaning and produced a satisfactory result. (J Nippon Med Sch 2015; 82: 39–42)

Key words: abdominoplasty, adiposis, respiratory failure, obesity hypoventilation syndrome

Introduction

Abdominal adiposis is recognized as a part of obesity, and patients hope for treatment from the aesthetic perspective. Generally, the treatments of first choice are diet therapy, exercise therapy, and pharmacotherapy. Nevertheless, when these conservative therapies are not effective, surgical therapy is considered. Abdominoplasty is generally used for patients experiencing abdominal laxness or rectus muscle diastases and for women in the postpartum period. However, an extensive review of the literature identified no report of abdominoplasty performed in a patient with severe respiratory failure to improve the condition. We report on a patient with respiratory failure due to abdominal adiposis for whom abdominoplasty was performed to facilitate ventilator weaning.

Case Report

A 70-year-old man was brought by ambulance to the emergency and critical care center of our hospital because of dyspnea and difficulty walking. These symptoms had started several days earlier. The patient's history included hypertension and cerebral hemorrhage.

The patient's level of consciousness was decreased (Glasgow Coma Scale: E2V2M5), and dyspnea was present. The dyspnea was attributed to abdominal adiposis. Blood gas analysis showed respiratory acidosis and hypercapnia, with PaCO₂ of greater than 110 mm Hg, indicating CO₂ narcosis. Results of physical examination on the first hospital day were as follows: weight, 140 kg; height 165 cm; body-mass index, 51.4 kg/m²; blood pressure, 122/68 mm Hg; heart rate, 92 beats/minute; respiratory rate, 28 breaths/minute; and oxygen saturation, 53% (room air). The patient was diagnosed as severe respiratory failure caused by obesity hypoventilation syndrome. An endotracheal tube was inserted to facilitate ventilatory support on the 2nd hospital days. After tracheostomy was performed on the 4th hospital days, the attending physician consulted with our department of plastic and reconstructive surgery for a radical treatment on the 28th hospital days. Abdominoplasty was then planned to facilitate weaning the patient from ventilatory support.

Operation

The patient was unable to maintain a standing posture;

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Fig. 1 Design: The xiphoid process, both sides of the lateral abdominal region, and mons pubis are marked. Diagonal lines are drawn to pass along the umbilical region and these marks.

therefore, the amount of skin to be resected was determined in the 45° head-up position. The operation was performed under general anesthesia, and the patient was put in the semi-Fowler position. Diagonal lines were drawn to pass along the umbilical region and certain landmarks (xiphoid process, both sides of the lateral abdominal region, and the symphysis pubis) (Fig. 1).

The horizontal line was used for marking the skin excision domain. The perpendicular line was used for new navel formation. The umbilical region was designed as a circle about 2 cm in diameter. Moreover, perforators arising from the deep fascia were identified preoperatively by means of multidetector row computed tomography.

The suprapubic incision was made first and continued to the perimysium. An argon laser scalpel may be indicated in a patient with such excessive adiposis. After the perimysium was reached, abruption was performed with a scalpel, gauze, and the surgeon's fingers. The incision of the umbilicus with sufficient subcutaneous tissue was also continued to the perimysium. Perforators were ligated with 2/0 or 3/0 silk suture.

Rectus muscle aponeurotic plication was performed with 1/0 nonabsorbable suture but to a minimal amount because of the possibility it could increase abdominal pressure. After the upper flap was exfoliated, it was split into two across the center. The upper flap was extended to the pubic area and sutured with a skin stapler, and the

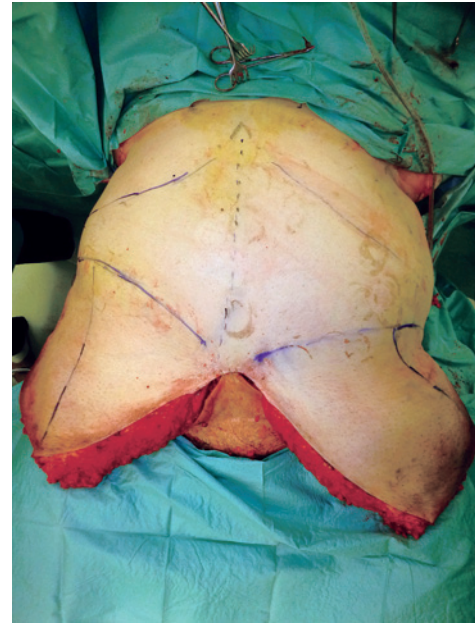


Fig. 2 After the upper flap is exfoliated, it is split in two across the center. The upper flap is extended to the area and sutured with a skin stapler.

amount of skin to be resected was determined (Fig. 2). After the excess skin was excised and the excess abdominal fat was trimmed away, several adhesion stitches were applied to reduce the subcutaneous dead space. Subcutaneous and intradermal sutures were applied using 3/0 absorbable stitches.

Negative-pressure drains were put into the abdomen laterally on both sides. The total weight of the skin excised was 10 kg.

Postoperative Progress

Oxygenation improved postoperatively, and lung compliance was markedly improved (Table 1, Fig. 3). The endotracheal tube was removed on the 4th postoperative day. Drains and all stitches were removed on the 8th and 14th postoperative days, respectively. Although slight epidermolysis of the inguinal region occurred, it has improved under ointment treatment. Ambulation was not able to begun until 3 weeks passed after operation, but rehabilitation was started on the bed from an early stage after operation, and the patient was gradually able to adopt a standing position. The patient left the hospital when he could walk for a few minutes (Fig. 4).

Discussion

Numerous studies have been published in relation to abdominoplasty or lipoabdominoplasty¹⁻⁴. Abdominoplasty is generally used for abdominal laxness, striae, and rec-

Table 1 Course of blood gas analysis

	mode	pH	pO ₂ (mm Hg)	pCO ₂ (mm Hg)	HCO ₃ (mmol/L)	FiO ₂ (%)	PEEP (cm H ₂ O)	PS (cm H ₂ O)	Lung compliance (mL/cm H ₂ O)
Hospital admission	6-L mask	7.2	108	111	41.8	-	-	-	-
under NIPPV	NIPPV	7.187	68.3	111.4	41.3	0.5	4	8	-
tracheal intubation	bilevel	7.578	75.2	34.9	31.8	0.6	6	10	32
After tracheotomy	bilevel	7.397	86.2	48.6	29.2	0.5	6	10	23
hospital day12	CPAP/PS	7.424	68.8	61.2	39.2	0.3	6	14	24
hospital day19	CPAP/PS	7.493	79	51.9	34.4	0.4	6	8	37.5
after operation	CPAP/PS	7.481	71.5	38.1	27.8	0.5	10	8	54
2 weeks POD	CPAP/PS	7.43	80.9	49.4	32.1	0.3	8	4	82.5
3 weeks POD	Room air	7.411	66.6	46	28.7	-	-	-	-

POD: postoperative day; NIPPV: non-invasive positive pressure ventilation; CPAP: continuous positive airway pressure; PS: pressure support

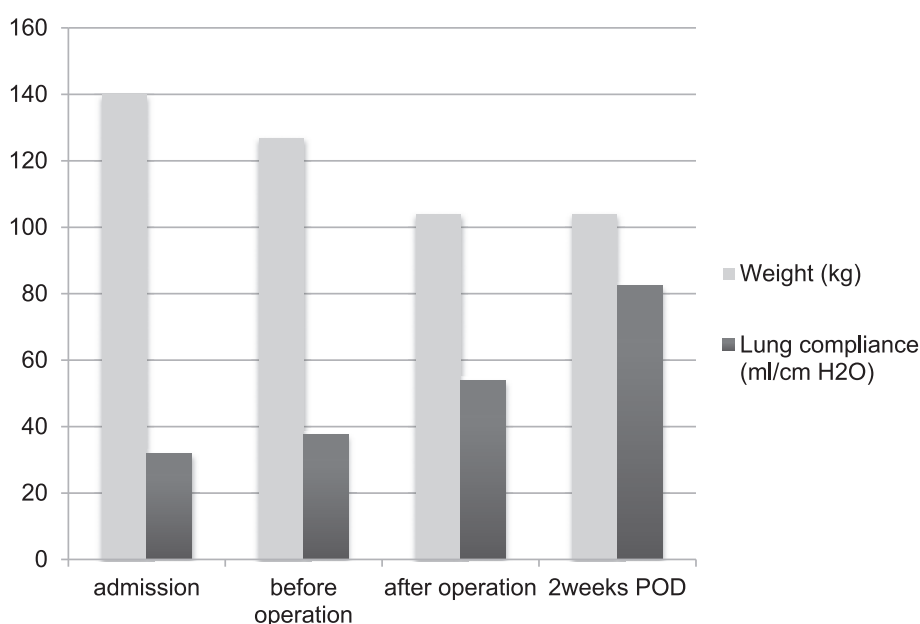


Fig. 3 Graph of body weight and lung compliance over time. Oxygenation postoperatively, and lung compliance markedly improved.

tus muscle diastases and for women in the postpartum period^{5,6}. In this report, we describe our performing abdominoplasty to facilitate weaning from ventilatory support for a patient with respiratory failure. The present case was diagnosed as obesity hypoventilation syndrome (OHS), also known as Pickwickian syndrome, which is indicated when all of the following criteria are satisfied: BMI >30 kg/m²; apnea hypopnea index >30; PaCO₂ >45 mm Hg (in the daytime); and marked daytime somnolence. We suggest taking a detailed history, including smoking history, in advance because such patients often have cardiovascular disease, diabetes mellitus, and functional respiratory disorders.

Although the optimal management of OHS remain un-

clear, many treatments for OHS have been successful and include conservative treatments, such as nasal continuous positive airway pressure and noninvasive positive pressure ventilation^{7,8}, and surgical treatments, such as uvulopalatopharyngoplasty, septostomy, and uvulopalatoplasty for obstructive sleep apnea syndrome and weight loss surgery (gastric surgery-induced weight loss)⁹⁻¹¹. Weight loss surgery is recommended when positive airway pressure therapy fails¹². However, weight loss surgery has risks and adverse effects, such as dumping syndrome, vomiting, and other postoperative complications.

During the abdominoplasty, the patient is placed in either the jackknife or the Fowler position. Slight knee joint flexion should be maintained and the strain on the



Fig. 4 Six-month postoperative view. There were no postoperative complications and he left our hospital walking by himself.

abdominal wall should be reduced. These obese patients have perforators rising from the deep fascia that are thicker than might be expected; therefore, severe bleeding might occur unexpectedly. Rectus muscle aponeurotic plication was performed in this case, but to a minimal amount, because this procedure could increase abdominal pressure and aggravate the patient's respiratory condition.

However, Habib et al. have reported minimal changes from preoperative values in intra-abdominal pressure and minimal-to-negligible changes in intrathoracic pressure after full abdominoplasty with plication of the rectus muscles¹³.

It is important to be aware of potential postoperative complications, including infection, skin/flap necrosis, seroma, scar, sensory disturbance, hematoma, gas/air embolism, and epidermolysis of the suprapubic region^{5,14}. Epidermolysis of the inguinal region occurred in this case as a postoperative complication. Epidermolysis might have been caused by the blood flow and abdominal tension. Uebel has reported that epidermolysis occurs most commonly in patients with a history of smoking⁵. We believe that epidermolysis can be prevented by undermining the lower flap as little as possible.

Rehabilitation for patients with OHS is lengthy because heart failure can occur; there is also a risk of respiratory deterioration. Moreover, when an overweight pa-

tient cannot early, as in the present case, the combined use of a foot pump machine and anticoagulant therapy is recommended because obesity associated with thrombosis^{15,16}.

Conflict of Interest: The authors declare no conflict of interest.

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