

# Concomitant Performance of Laparoscopic Sleeve Gastrectomy and Primary Closure of Incisional Hernia in a Patient with Morbid Obesity: A Case Report

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**Background:** Obesity is prevalent worldwide and is one of the most common causes of incisional hernias. Patients with morbid obesity readily develop perioperative complications and are at increased risk during general anesthesia. In patients with morbid obesity who require surgical hernia repair, a two-stage or step-wise approach preceding bariatric surgery alone is often indicated from a safety viewpoint. However, the optimal surgical strategy for incisional hernia repair in patients with morbid obesity has not been established.

**Case presentation:** A 45-year-old woman with a body mass index (BMI) of 33.4 kg/m<sup>2</sup> underwent laparoscopic transverse colectomy for treatment of transverse colon cancer in August 2015. Her vigorous appetite and body weight recovered after adjuvant chemotherapy. Eventually, in August 2017, her BMI exceeded 35 kg/m<sup>2</sup>. She developed hypertension, hyperlipidemia, and an incisional hernia at the umbilicus. In August 2018, her BMI had reached 42.1 kg/m<sup>2</sup>, and she experienced occasional abdominal pain. Computed tomography showed incarceration of the small intestine through the hernia orifice, which measured 4.5 × 4.0 cm. She improved with conservative treatment for bowel obstruction and was enrolled in a structured weight-loss program. Consequently, her BMI decreased to 36.4 kg/m<sup>2</sup>. In October 2018, as the initial part of a two-stage surgery, laparoscopic sleeve gastrectomy with primary closure of the hernia orifice was performed on an emergency basis for treatment of recurrent bowel obstruction. This initial surgery was performed 3 years 2 months after the transverse colectomy. One year 3 months after the sleeve gastrectomy, her BMI had decreased to 24 kg/m<sup>2</sup>, and no rebound effects were seen. An additional radical surgery with mesh reinforcement was not indicated because of uneventful weight loss and lack of hernia recurrence.

**Conclusions:** A two-stage surgery involving laparoscopic sleeve gastrectomy with primary closure of the orifice of the incisional hernia may be effective in some patients with morbid obesity. This case illustrates the utility of not only bariatric surgery but also simultaneous hernia repair as the initial surgery in morbidly obese patients with a hernia orifice of about 4 cm and preoperative weight loss. This strategy potentially alleviates the need for a subsequent two-stage surgery to decrease the BMI.

Key words: Morbid obesity, Incisional hernia, Primary closure, Sleeve gastrectomy, Two-stage surgery

## 1. BACKGROUND

Obesity is prevalent worldwide and is one of the most common causes of incisional hernias. Morbid obesity is often complicated by heart disease and renal disease, and such patients thus readily develop perioperative complications and are at increased risk during general anesthesia.

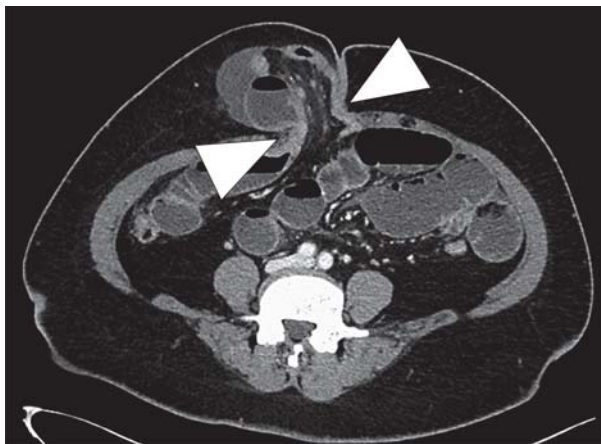
Approximately 10% to 15% of patients with a history of laparotomy reportedly develop incisional hernias<sup>1,2</sup>. Various surgical methods of incisional hernia repair have been reported, but the recurrence rate remains high<sup>3</sup>. In patients with morbid obesity requiring surgical hernia repair, a two-stage or step-wise approach preceding bariatric surgery alone is often indicated from a safety viewpoint<sup>4-6</sup>. The concept underlying this strategy is reduction of the body mass index (BMI) by bariatric surgery with subsequent definitive procedures to address any obesity-related comorbidities. However, the optimal surgical strategy for incisional hernia repair in patients with morbid obesity has not been established.

## 2. CASE PRESENTATION

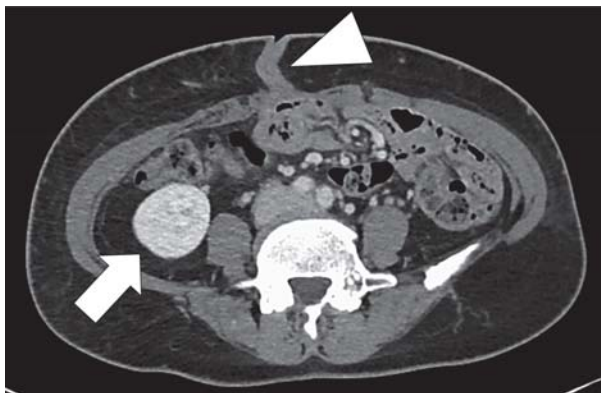
A 45-year-old woman underwent laparoscopic transverse colectomy for treatment of transverse colon cancer in August 2015. At the time of the colectomy, she was 158 cm in height and 83.4 kg in weight. Her BMI was 33.4 kg/m<sup>2</sup>, indicating secondary obesity. The post-operative pathological stage according to the Union for International Cancer Control classification was T4bN1aM0, stage IIIC. Thus, she received adjuvant oral administration of capecitabine for 6 months. After completion of adjuvant therapy, her vigorous appetite and body weight markedly recovered. Eventually, in August 2017, her BMI exceeded 35 kg/m<sup>2</sup> (from 33.4 kg/m<sup>2</sup> in August 2015). She was treated

with oral telmisartan and nifedipine for hypertension, but her blood pressure control was unsatisfactory. Her total cholesterol, triglyceride, high-density lipoprotein cholesterol, and low-density lipoprotein cholesterol levels were 203, 166, 44, and 119 mg/dL, respectively. Her hyperlipidemia was controlled by treatment with atorvastatin. During the same period, she developed a hernia corresponding to the umbilical incision of the laparoscopic transverse colectomy. In August 2018, her body weight had increased to 105 kg, her BMI had reached 42.1 kg/m<sup>2</sup>, and she was experiencing occasional abdominal pain. Computed tomography showed incarceration of the small intestine through the hernia orifice, which measured 4.5 × 4.0 cm (Figure 1a). After conservative treatment for the bowel obstruction, the nutritionist placed the patient on a structured weight-loss program involving dietary and exercise therapy. Consequently, her BMI decreased to 36.4 kg/m<sup>2</sup>. However, in October 2018, refractory abdominal pain and vomiting occurred, suggesting bowel obstruction; therefore, immediate surgical repair of the hernia was recommended. Laparoscopic sleeve gastrectomy and primary closure of the hernia orifice were performed on an emergency basis as a two-stage surgery (initial surgery). Radical surgery for the incisional hernia using mesh was planned as the next step after additional body weight loss. This initial surgery was performed 3 years 2 months after the transverse colectomy. The operation time was 253 minutes, and the intraoperative blood loss was 10 mL. After sleeve gastrectomy, the trocar incision was extended approximately 5 cm craniocaudally, and the hernia orifice was simply closed with 0 Vicryl. Postoperative recovery was uneventful, and the patient was discharged on postoperative day 8. One year 3 months after the sleeve

gastrectomy, the patient had lost 30.8 kg (34% reduction) in body weight, and her BMI was 24 kg/m<sup>2</sup> (34.1% reduction); no rebound effects were seen (Figure 2). Her body fat mass was also markedly reduced 1 year after the surgery compared with her preoperative status, and her skeletal muscle mass was maintained (Figure 3). Her hypertension and hyperlipidemia improved after the surgery, resulting in drug discontinuation. The incisional hernia had not



a



b

Fig. 1. Computed tomography findings.

(a) Computed tomography shows a 5-cm hernia orifice (incision in the umbilicus) with an incarcerated small intestine (arrowheads). (b) Postoperative computed tomography shows a reduction of intra-abdominal fatty tissue and closure of the orifice of the incisional hernia (arrowhead). Intra-abdominal fatty tissue reduction allowed for replacement of the right kidney into the anatomically correct position (arrow).

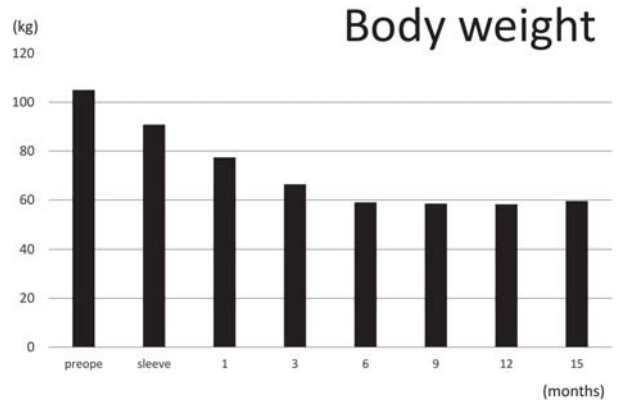


Fig. 2. Changes in body weight from baseline to 1 year 3 months.

preope: preoperative, sleeve: sleeve gastrectomy.

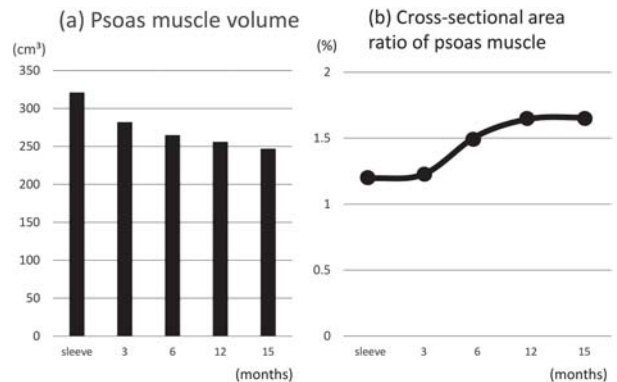


Fig. 3. Changes in the psoas major muscle from baseline to 1 year 3 months.

(a) Measurement of muscle volume by three-dimensional computed tomography. (b) Measurement of the cross-sectional area ratio of the muscle by abdominal computed tomography. sleeve: sleeve gastrectomy.

recurred 1 year 3 months after primary closure (Figure 1b), and radical surgery with mesh reinforcement was not indicated. She was continuing follow-up at the time of this writing.

### 3. CONCLUSIONS

We consider that this case illustrates a potentially beneficial surgical option for select patients. Laparoscopic sleeve gastrectomy and primary closure of the hernia orifice may serve as an alternative initial surgery for incisional hernias in some patients with morbid obesity. Moreover, the primary repair of the incisional

hernia may alleviate the need for subsequent two-stage surgery because of the effects of the reduced intraperitoneal pressure provided by the weight loss after sleeve gastrectomy.

Increasing numbers of patients with obesity are requiring surgical interventions. The optimal timing of and indications for bariatric surgery and radical surgery for the primary disease are important issues. Two-stage surgery is reportedly useful for dissecting aortic aneurysms and pancreatic neuroendocrine tumors in patients with morbid obesity. Additionally, a step-wise approach to benign or low-grade malignant tumors may be advisable to prevent postoperative complications and significantly reduce the risk of surgery<sup>4-6</sup>. Incisional hernias in patients with morbid obesity can reportedly be safely treated after gastric bypass or bariatric surgery<sup>7,8</sup>. However, Newcomb et al.<sup>7</sup> reported that some emergency surgeries for intestinal obstruction associated with ventral hernias were performed by gastric bypass alone. In the emergency setting of the present case, we selected laparoscopic sleeve gastrectomy and primary closure of the hernia orifice as the initial surgery. We considered that the priority of surgical treatment in this patient was to prevent herniation of the incarcerated intestine, and an additional effect of BMI reduction by sleeve gastrectomy was also desired.

According to recent reports, laparoscopic ventral hernia repair using mesh [intra-peritoneal onlay mesh repair (IPOM)] combined with bariatric surgery provided favorable early outcomes in morbidly obese patients<sup>9,10</sup>. However, other reports have stated that the recurrence rate after IPOM (4.4%–29.0%) is quite variable because of the wide range in the BMI among individual patients<sup>11,12</sup>. The treatment outcome will remain uncertain until it can be

clarified during a long-term follow-up period. The patient in the present case was an Asian woman; however, the patients in the study involving the combined surgery were of a different race. Because laparoscopic ventral hernia repair requires mesh placement to provide overlapping circumferential coverage with a margin of at least 5 cm around the hernia orifice, a prolonged operation time is expected in patients with a small abdominal cavity, as in the present case. We consider concomitant radical hernioplasty using mesh to be inappropriate for the emergency setting in terms of risk management because of the potential risk of mesh infection with a longer operation time<sup>13</sup>. Another disadvantage of IPOM is mesh bulging due to unsatisfactory weight loss if the hernial orifice was not tightly closed during surgery.

Our patient did not require an additional surgery because of the uneventful weight loss and absence of hernia recurrence. In terms of achieving reduction of the intra-abdominal pressure due to weight loss, our patient's clinical course suggests that primary closure of the hernia orifice alone may contribute to incisional hernia repair for a morbidly obese patient who has had weight loss before surgery. Future rebound of the BMI increases the risk of hernia recurrence, and patient education is crucial to prevent such BMI rebound. When the BMI exceeds 35 kg/m<sup>2</sup>, a revision surgery should be performed to prevent hernia recurrence.

In conclusion, this case illustrates the utility of not only bariatric surgery but also simultaneous hernia repair as the initial surgery in morbidly obese patients with a hernia orifice of about 4 cm and preoperative weight loss. This procedure may be an alternative to a radical operation for achieving maintenance of BMI reduction in some morbidly obese patients.



### Abbreviations

BMI: body mass index

IPOM: intraperitoneal onlay mesh repair

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### Availability of data and materials

The dataset supporting the conclusions of this article is included within the article.

### Authors' contributions

TS and SK were the attending doctors for the patient. TS, YF, and TS drafted this manuscript. TS supervised the preparation of the case report. All authors have read and approved the final manuscript.

### Ethics approval and consent to participate

Not applicable.

### Consent for publication

Written informed consent was obtained from the patient and her family for publication of this case report and accompanying images.

### Conflict of interest

The authors declare no conflicts of interest associated with this manuscript.

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