

## Case Report

# Abdominal compartment syndrome following abdominoplasty: A case report and review

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## ABSTRACT

Abdominoplasty is among the most commonly performed aesthetic procedures in plastic surgery. Despite high complication rate, abdominal contouring procedures are expected to rise in popularity with the advent of bariatric surgery. Patients with a history of gastric bypass surgery have an elevated incidence of small bowel obstruction from internal herniation, which is associated with non-specific upper abdominal pain, nausea, and a decrease in appetite. Internal hernias, when subjected to elevated intra-abdominal pressures, have a high-risk of developing ischemic bowel. We present a case report of patient with previous laparoscopic Roux-en-y gastric bypass who developed acute ischemic bowel leading to abdominal compartment syndrome following abdominoplasty. To the best of our knowledge, this is the first reported case in the literature. We herein emphasise on the subtle symptoms and signs that warrant further investigations in prospective patients for an abdominal contouring procedure with a prior history of gastric bypass surgery.

## KEY WORDS

Abdominoplasty; abdominal compartment syndrome; bariatric surgery

## INTRODUCTION

According to the American Society of Plastic Surgeons, abdominoplasty is the 5<sup>th</sup> most common cosmetic surgery in the United States.<sup>[1]</sup> Patients often request abdominal wall contouring procedures due to excessive skin and fat following pregnancy, excessive weight loss and fat maldistribution, which

can lead to difficulties with exercise, sexual activities, fitting into clothing and hygiene.<sup>[2]</sup> Despite its popularity, abdominoplasty is not devoid of complications. The complications rates remain high, ranging from 34 to 37.4%.<sup>[3-5]</sup> The most common reported complications are seroma formation followed by wound complications and skin flap necrosis.<sup>[6-8]</sup> Less common complications include hematoma formation, umbilical necrosis, wound dehiscence, contour deformities, and abnormal scarring.<sup>[9]</sup> In addition, there are only a few reports of increased intra-abdominal pressures in patients who had recently undergone an abdominoplasty.<sup>[10-12]</sup> Although very small, there is a potential risk of bowel ischemia following abdominoplasty in patients with previous history of intra-abdominal surgeries.

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To best of our knowledge, there have been no previous reports of abdominal compartment syndrome following an abdominoplasty in a patient with history of gastric bypass surgery. As such, surgeons should be aware of increased risk of ischaemic bowel that can occur in post-bariatric patients who undergo abdominal contouring procedures.

## CASE REPORT

A 30-year-old female, G<sub>0</sub>P<sub>0</sub>A<sub>0</sub> non-smoking nurse underwent an abdominoplasty by the senior author. Her past medical history was remarkable for a laparoscopic Roux-en-Y gastric bypass (LRYGB) performed 1-year prior to current presentation. Her initial weight prior to LRYGB was 108 kg with body mass index (BMI) of 42. She subsequently lost over 120 pounds and developed a significant abdominal pannus. Her weight has been stable over 6 months prior to current presentation with her new BMI at 21. She underwent bilateral breast augmentation and an abdominoplasty, without fascia plication and with the use of a standard abdominal binder. The patient was discharged home on the post-operative day 1 in stable conditions. This is the common practice for all uncomplicated abdominoplasties in our institution.

On post-operative day 2, she developed persistent nausea, low urine output, generalised weakness and severe abdominal pain. She presented to the emergency department and was found to be febrile, tachypnoeic and tachycardic. Her abdominal examination revealed significant tenderness and guarding. Computed tomography revealed significant intra-abdominal free fluid and suggestion of pneumatosis intestinalis. While being aggressively resuscitated, the patient became haemodynamically unstable unresponsive to fluids, developed respiratory failure, rising lactate levels (6.7 mmol/L), elevated peak ventilator pressures and was urgently brought into the operating room with the presumptive diagnosis of mesenteric ischemia and abdominal compartment syndrome.

Patient underwent a laparotomy procedure. Upon entry of the peritoneal cavity, her haemodynamics and respiratory status improved immediately. The alimentary limb of the previous Roux-en-Y bypass was completely necrotic all the way from the pouch to the level of the jejunojejunostomy. The volvulised

alimentary as it passes through the transverse mesocolon was excised. A nasogastric tube was inserted intraoperatively to decompress the pouch. 48 h later, a side-to-side gastrogastrostomy between the gastric pouch and the gastric remnant was performed. Her post-operative course was complicated by pneumonia and a localised laparotomy wound infection. Both were treated appropriately with intravenous antibiotics and local wound debridement. She was initially discharged from the hospital on the post-operative day twelve with a vacuum assisted device applied to her abdominal defect. The final closure of this defect was carried out 20 days following discharged with a split thickness skin graft.

## DISCUSSION

Abdominoplasty is amongst the most commonly requested aesthetic procedures in United States. The demand for abdominoplasty is expected to rise with the advent of bariatric procedures. It is therefore imperative that plastic surgeons be aware of all complications that can occur following an abdominoplasty in patients who have previously undergone a bariatric procedure.

The Roux-en-Y gastric bypass (RYGB) is the most common and the standard of care for surgical treatment of obesity.<sup>[13]</sup> The majority of weight loss has been shown to occur within the first 12-18 months through restricted intake, and/or malabsorption.<sup>[14]</sup> Patients requesting body contouring surgery following bariatric surgery can often have chronic nutritional deficiencies, predisposing them to a risk of impaired wound healing.<sup>[15]</sup> A stable weight over 6 months prior to an abdominoplasty has been shown to be associated with less wound healing complications and better aesthetic outcomes.<sup>[15]</sup> Our patient fit this category and therefore there were no concerns about her nutritional status preoperatively.

The months prior to her surgery, she was however complaining of occasional recurrent abdominal discomfort related to food intake. These symptoms could possibly be attributed to the herniation of the alimentary limb of the gastric bypass through the transverse mesocolon as discovered during the exploratory laparotomy. Herniation leading to volvulus subsequent to a RYGB in our patient could have been attributed to

the post-surgical adhesions and presence of a mesenteric defect at the transverse mesocolon.<sup>[16]</sup> Performing a simple non-invasive abdominal ultrasound in patients with previous history of gastric bypass could potentially help in diagnosing internal and external hernias and should be routine in this patient population.

Internal herniation of the small bowel has reported incidence ranging from 1.8% to 4.5% in patients who have had a LRYGB.<sup>[17-20]</sup> In addition, pregnancy has been demonstrated to increase the likelihood of an internal hernia in patients with a RYGB.<sup>[21-24]</sup> Herniation occurs at the jejunojejunostomy site through the transverse mesocolon as seen in our patient, or through Peterson's defect [Figure 1].<sup>[25]</sup> The initial symptoms and signs in our patient were non-specific and included epigastric or periumbilical pain, decreased appetite and nausea, which is in keeping with previous reports.<sup>[25]</sup>

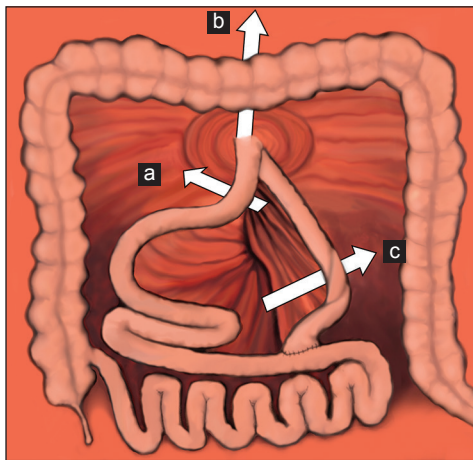
Imaging studies are not always diagnostic. Wang *et al.* concluded that unrelenting epigastric pain in patients

with a history of RYGB surgery should raise concern for small bowel obstruction and exploratory laparotomy or diagnostic laparoscopy should be considered.<sup>[21]</sup> Failing to investigate these patients for internal herniation places them at risk of complications such as ischemic bowel when subjected to elevations in intra-abdominal pressure.

Charles *et al.* in their have reported a patient in her late second trimester having undergone a RYGB 6 months prior to the presentation, that subsequently developed ischemic bowel secondary to an internal herniation of the afferent limb from the raised intra-abdominal pressure due to pregnancy.<sup>[24]</sup> The patient survived but delivered a nonviable foetus in the immediate post-operative period.

Although there have been reports of elevated intra-abdominal pressures post-abdominoplasty, there have been no reported cases of ischaemic bowel<sup>[10,26]</sup> [Table 1]. A delayed small bowel obstruction 2 years following an abdominoplasty in a massive weight loss patient with gastric bypass has been previously reported.<sup>[27]</sup> The patient suffered from an ischaemic bowel obstruction secondary to migration of a gastric band's port chamber of in the anterior abdominal wall.

Abdominal plication and use of binders has been demonstrated to be associated with an increase in abdominal pressure after abdominoplasty.<sup>[11]</sup> Thus, in the absence of plication of the rectus abdominis, we suspect that the ischemia may have resulted primarily from strangulation of an internal hernia due to elevated intra-abdominal pressure from the standard abdominal binder. This was further exacerbated due to the presence of possible hypotension secondary to nausea and lower fluid intake and by excessive narcotic intake in immediate post-operative course. The resultant inflammation and oedema of the necrotic bowel further



**Figure 1:** Potential spaces for internal herniation following Roux-en-Y gastric bypass surgery. (a) Peterson's hernia, through the posterior aspect of the mesentery of the Roux limb. (b) Transverse mesocolon, as witnessed in our patient. (c) Jejunosenteric hernia through the potential space from the jejunojejunostomy

**Table 1: Reported cases of increased abdominal pressure following abdominoplasty**

Publication year	Authors	Complications	Treatment	Outcome
2011	Izadpanah <i>et al.</i>	1 case of ACS	Laparotomy decompression	Satisfactory immediately post-operatively
2007	Shen <i>et al.</i> *	3 cases of ACS	Two patients opted for laparotomy decompression	Satisfactory in 2 years follow-up
2006	Graça Neto <i>et al.</i>	0 cases of ACS Two patients developed mild dyspnoea with mildly elevated abdominal compartment pressures	No treatment was necessary	Not mentioned

\*Only the abstract was accessible; ACS: Abdominal compartment syndrome

elevated the intra-abdominal pressures causing the suspected abdominal compartment syndrome.

## CONCLUSION

In conclusion, with the rise in demand for abdominal contouring procedures from patients who have undergone bariatric surgery, plastic surgeons should be aware of the subtle clinical symptoms and signs, such as abdominal pain, that suggest underlying propensity for internal herniation, which could eventually lead to small bowel obstruction or ischaemia. Furthermore, abdominal compartment syndrome, although rare following abdominoplasty, can be a product of ischemia of an internal herniation of a limb from a previous LRYGP when subjected to elevations in intra-abdominal pressure, leading to patient morbidity and increased health care costs.

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