SMALL BOWEL OBSTRUCTION SECONDARY TO RETROGRADE INTUSSUSCEPTION OF THE ROUX LIMB: A COMPLICATION FOLLOWING LAPAROSCOPIC ROUX–EN–Y GASTRIC BYPASS

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ABSTRACT
Small bowel obstruction secondary to intussusception following a roux-en-Y gastric bypass (RYGB) for morbid obesity is an unusual surgical condition that has gained increased prominence with increased utilization of RYGB for the management of morbid obesity worldwide. We present a 34 year old female who presented at the Emergency Room of our facility with complaints of abdominal pain and a history of ante-colic and ante-gastric laparoscopic Roux-en-Y gastric bypass surgery at another facility a year prior to presentation. On account of unremitting abdominal pain, a lactate level of 5.4mg/dl and Abdominal Computed Tomographic Scan which showed evidence of small bowel obstruction with intussusception, an emergency open surgical exploration was performed which revealed intussusception of the biliopancreatic and common limb into the distal aspect of the roux limb. Surgical intervention entailed resection of both the proximal common channel and distal roux and biliopancreatic limbs and surgical reconstruction of the jejunojejunal anastomosis. She is alive and well two years post surgery without any recurrence.

KEYWORDS Intussusception; Roux-en-Y gastric bypass; Roux Limb, Biliopancreatic limb

Introduction
The clinical presentation, radiologic findings and the surgical management of a case of small bowel obstruction secondary to jejunojejunal intussusception one year following laparoscopic roux-en-y gastric bypass (RYGB) for morbid obesity is described in detail.

Case Report
We present a 34-year-old woman who presented to the emergency unit of our center with a first episode of the paroxysmal epigastric pain of a six-hour duration. The pain was of severe intensity, colicky, non-radiating and associated with multiple episodes of non-bilious vomiting. There was no history of fever or diarrhea. She had not passed gas or moved bowel since the onset of her symptoms. Her surgical history was significant for morbid obesity and an ante-colic and ante-gastric laparoscopic Roux-en-Y gastric bypass one year prior to presentation at another facility. She presented with a body mass index of 42 kg/m² and she reported a weight loss of over 105 pounds following surgery till presentation. She presented with a body mass index of 28.2 kg/m²; she was acutely ill-looking with normal vital signs. Her abdomen was soft with
marked tenderness in the epigastrium. There was a palpable mass, no guarding or rebound.

Her complete blood count and serum lipase and amylase levels were normal, she also had normal serum hepatic panel and coagulation profile, normal urine analysis. Her blood electrolytes revealed hypokalemia of 3.18 mg/dl that was corrected and a lactate level of 5.4 mg/dl. An abdominal computed tomographic (CT) scan done showed intussusception in the left hemi-abdomen at the jejunojejunal anastomosis with a long involved segment of jejunum [Fig. 1], the target sign was also seen with crescent-shaped mesenteric fat [Fig. 2].

Figure 1: Coronal slice of abdominal CT scan with arrow pointing to a long-segment jejunojejunal intussusceptiens at the jejuno-jejunal anastomosis.

Figure 2: Axial slice of abdominal CT scan showing the target sign and arrow pointing to crescent-shaped mesenteric fat.

Figure 3: Arrow shows point of invagination of both biliopancreatic and the common channel into the markedly distended roux limb.

An emergency surgical exploration was indicated given the unremitting abdominal pain, elevated lactate concerning for bowel ischemia and CT findings of intussusception. On open exploration, the hard mass was felt in the loops of small bowel corresponding to the three limbs of the Roux- en-Y anastomosis with unsuccessful manual reduction. The distal roux/alimentary limb was observed to be the intussusciptiens while the intussusceptum was 22 centimeters of the common channel and eight centimeters of biliopancreatic limb [Fig. 3 and Fig. 4]. The proximal bowel loops were dilated while the distal jejunum was collapsed with no evidence of bowel ischemia. The three limbs were divided using staplers to excise the involved small bowel segments. The roux limb was 75 cm in length following resection while the biliopancreatic limb was 42 cm in length. The Roux limb was anastomosed to distal jejunum to achieve a side-to-side entero-enterostomy and the biliopancreatic was anastomosed to the roux limb by an end -to-side entero-enteric anastomosis [Fig. 4] and the mesenteric defects were closed to prevent internal herniation. Inspection of the abdominal cavity revealed no other abnormalities. The patient was stepped down to the surgical floor following the conclusion of the surgery with an uneventful post-operative recovery. She was able to tolerate diet on the third day following surgery and was discharged on the fifth postoperative day. Pathology showed no evidence of ischemia, no stenosis or strictures or pathologic lead point in the resected specimens. She has maintained a progressive weight loss trend with no evidence of recurrence two years following the surgical intervention.

Discussion

One of the frequently seen complications following Laparoscopic RYGB is small bowel obstruction with an incidence ranging from 1.8 to 9.7% [1, 2]. Internal hernias are regarded as the commonest etiology of small bowel obstruction following laparoscopic RYGB with an incidence ranging from 0.2-9% [1]. Other less common causes include adhesive bands with an incidence of 0.2-1% [1] anastomotic strictures, ventral hernias, intestinal volvulus, blood clots and Intussusception [1,3, 4]. Cases of jejunal/ileal bezoars causing intussusception has also been reported [5]. Jejunojejunal intussusception is a small bowel anomaly in which a segment of jejunum telescopes into another segment, and it is most commonly seen in children of ages six months to four years. It may be an incidental finding on abdominal tomographic imaging of healthy adults and is usually transient and asymptomatic. It may also be associated with pathologic lead points such as intra-abdominal malignancies or lymph nodes. However, with increasing surgical intervention for morbid obesity, more cases are been seen following RYGB surgical procedures in the US and the United Kingdom [7] with a yearly incidence of 0.1- 0.3% [3, 6].

Most cases of jejunojejunal intussusception occur between 12 to 36 months postoperatively [5 - 7]; a case is occurring seven years post-RYGB has been described [8]. Intussusception following RYGB typically occurs in close to the jejunojejunalostomy with the involvement of the roux limb. Less frequently, a combined involvement of the roux, biliopancreatic and common jejunal limbs of the anastomosis may be observed as described in our case. The Female gender, age below 35 years and significant weight loss following bypass surgery (typically over 150 pounds) with a resultant loss of the cushion effect provided by mesenteric fat are predisposing factors for developing intussusception [3, 5- 7].

The etiology of Intussusception following RYGB has been attributed to multiple factors; research suggests that the roux limb

may also serve as the origin of abnormal ectopic pacemakers which generate disorganized electric potentials that travel both proximally and distally resulting in disordered peristalsis and serving as a possible focus for intussusception [8 - 10]. Hocking et al. described abnormal intestinal motility with areas of high and low pressures that develop following surgical transection of the jejunum [9, 10]. Other possible risk factors include external bowel lead points such as the presence of staple lines, sutures or external adhesions [8].

Making a Diagnosis of Intussusception following an RYGB may be challenging especially in the setting of inconclusive imaging reports intermittent and remitting symptoms. The classic intussusception triad is rarely seen [8]. Abdominal CT scan is the most sensitive radiologic tool [5, 6] and may show the target sign or tube-within-a-tube sign with a crescent shaped mesenteric fat as seen in our case [9]. When abdominal CT imaging is non-diagnostic, diagnostic laparoscopy might be warranted in cases with a high index of suspicion. Delayed surgical intervention may lead to increased morbidity and mortality hence urgent diagnosis of the etiology of small bowel obstruction following laparoscopic RYGB is imperative.

Nasogastric tube decompression and conservative management are not indicated in intussusception following RYGB. Surgical intervention could be either by the laparoscopic route or via open exploration. Singla et al. in 2011 reviewed 70 patients with intussusception following RYGB and found no significant difference in outcome when the open surgery was compared with laparoscopic surgery [3]. Choice of a laparoscopic modality for management of small bowel obstruction is dependent on presence or absence of factors such as hemodynamic stability, massively dilated bowel and gross intra-abdominal spillage [11] coupled with surgical technical know-how and availability of a bariatric surgeon [3,5]. Surgical management is still controversial and the options include simple reduction of the intussuscepted non-ischemic bowel or combined resection and reconstruction of the anastomoses. The laparoscopic simple reduction is an option when there is no gross evidence of bowel ischemia and reduction can be achieved easily with laparoscopic graspers without bowel injury. Dallenbach and Suter documented a significantly higher recurrence rates for the only reduction compared to combined resection with anastomotic reconstruction [9]. Simper et al. (2008) reviewed 22 patients with intussusception following both open and laparoscopic RYGB; they managed 16 by surgical resection (70%) with two post-operative recurrences (12.5%) while simple

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**Figure 4:** Pictoral diagram showing retrograde intussusception involving both common channel and biliopancreatic limb seen intra-op and the cartoon of surgical resection and revision that was done.
reduction managed two patients (9%) with a 100% recurrence and application in five complicated by two (40%) recurrences [6]. Resection and surgical revision of the jejunojejunal anastomosis presently appear to be the most reliable way to prevent recurrence [6-9].

**Conclusion**

An increasing frequency of Intussusception should be anticipated in emergency rooms with the increase in surgical centers performing obesity surgeries in the USA and worldwide. Intussusception should always be considered as a differential for acute or chronic abdominal pain following laparoscopic RYGB and ruled out by the abdominal tomographic scan.

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**References**


