



# Incidence and Significance of Intussusception at the Jejunojejunal Anastomosis in Roux-en-Y Gastric Bypass Patients

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## Introduction

Given an increasing incidence of obesity in the United States, bariatric surgery has become an effective long-term solution. Numerous options for bariatric surgery exist. The common contemporary procedures include sleeve gastrectomy, gastric banding, and Roux-en-Y gastric bypass (RYGB) [1]. The choice of which surgery to perform is complex depending on patient factors, surgeon preference and past experience. RYGB, however, is often the prevailing surgical treatment option for weight loss reduction [2].

The RYGB procedure consists of portioning the stomach into a small gastric pouch and a larger excluded stomach. The small gastric pouch is typically 15 – 30 ml in capacity. The jejunum is divided distal to the ligament of Treitz and the distal segment (Roux limb) is attached to the remnant stomach, while the proximal jejunal segment (afferent limb) is attached generally 75-150 cm distal to the gastrojejunal (GJ) anastomosis, creating a jejunojejunal (JJ) anastomosis [3]. Weight loss occurs through a combination of restrictive and malabsorptive processes due to the small pouch and jejunal bypass, respectively.

Common complications in the acute setting from RYGB include stomal edema, leak at the proximal anastomoses, hematoma and abscess. After the acute peri-operative period has passed additional complications include: stomal strictures, gastro-gastric fistulas, internal hernias that may lead to small bowel obstruction, and intussusceptions. In general, complications involving the distal JJ anastomosis are much less common than complications involving the pouch and GJ anastomosis. Intussusceptions in the general adult population are often transient and non-obstructing. More significant obstructing intussusceptions are often associated with a mass acting as a lead point. In the RYGB patient, intussusceptions have been described at both the GJ and JJ anastomosis but are more common at the JJ anastomosis [4,5]. Small bowel obstruction may occur as a result of intussusceptions at the JJ anastomosis [6].

In a retrospective series of 3002 RYGB patients by Stephenson et al, the incidence of JJ intussusceptions was 0.4% [5]. These were cases that were all confirmed intra-operatively. Of those cases, only one had a preoperative CT scan which did demonstrate an intussusception. This series is important for documenting the overall incidence of cases that were symptomatic enough to warrant surgery. Radiologists commonly deal with small bowel intussusceptions in the non bypass patient which are frequently transient and of little clinical importance. The goal of this project is to identify the incidence of JJ intussusception in the RYGB patient as identified on imaging and determine the significance of that finding.

## Methods

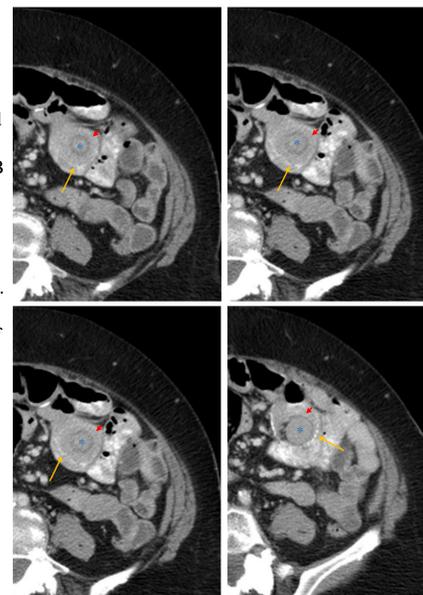
After approval by the Institutional Review Board (IRB), a retrospective review of radiology reports and CT images from the radiology archive for the prospective diagnosis of intussusceptions in symptomatic RYGB patients was performed.

This utilized a medical search engine (Softtek Illuminate, Prairie Village, KS, USA) searching over an approximately 8.5 year time frame (October 2005–February 2014). Data search utilized key phrases including combinations of “gastric bypass,” “gastric surgery,” “bariatric,” “bypass,” and “Roux-en-Y,” with “intussusception.” Results included any patient who had a CT scan in the Henry Ford Health System whose images were on the Picture Archiving System regardless of whether they were initially operated on at our institution, or elsewhere, as our institution is a tertiary care center receiving outside referrals.

Each case was reviewed by an Abdominal Radiologist with 15 years post fellowship experience to confirm the presence of intussusception and location relative to the JJ anastomosis. Review of the electronic medical record was conducted to determine patient management and outcome.

After identifying the population of patients with RYGB surgery and intussusceptions on CT, the total number of RYGB patients who had an abdominal CT scan performed during the same 8.5year period was obtained using the aforementioned key phrases with the exception of the word “intussusception.” In addition, the number of RYGB surgeries performed by the institution’s primary bariatric surgery group between 2005 and 2013 was obtained.

**Figure 1:** Four axial contrast-enhanced CT images demonstrate an intussusception at the JJ anastomotic site identified by the suture material (yellow arrow) in a RYGB patient. Seen here is the invaginated intussusceptum (\*) in the invaginating intussuscipten (red arrow). Clearly seen around the intussusceptum is a rim of mesenteric fat, adding to the classic “target appearance” of an intussusception.



## Results

A total of 1117 CT scans of the abdomen/pelvis were performed on RYGB patients. Of these patients, 54 reports identified the presence of intussusception. Twenty eight of those intussusceptions occurred at the JJ anastomosis for an incidence of 2.5%. The other 26 patients had small bowel intussusceptions elsewhere in the small bowel. No cases of intussusceptions at the GJ anastomosis were found. In the group with JJ intussusception, a total of 8 patients had surgical intervention (0.7% of the patients receiving imaging and 29% of patient with JJ intussusceptions). Of these, 63% (5) of this group had imaging findings of SBO. Four patients in the surgical group spontaneously reduced the intussusception after imaging and prior to surgery. The remaining 4 patients had intussusception reduced or resected at surgery.

Of the 20 patients who were non-operative management, 95% (19) had no imaging findings of SBO. The single patient in this group with findings of SBO resolved symptoms during that admission but recurred by imaging and symptoms and underwent surgery at a later presentation.

A total of 2000 RYGB procedures were performed by the bariatric surgery team between 2005 and 2013. It is difficult to calculate an exact incidence as some patients that had CT scans had the original bariatric surgery outside of our institution and patients underwent bariatric surgery at our institution could have been seen in follow up elsewhere. This yields a crude incidence of 1.4% for intussusception at the JJ anastomosis in RYGB patients.

**Table 1:** Clinical characteristics of symptomatic patients receiving CT scans with intussusception at the JJ anastomosis in RYGB

Number (%)	28 (2.5%*)
Non-operative management	20 (71%)
Surgical treatment	8 (29%)
Small bowel obstruction present	5 (63%)
Intussusception spontaneously reduced pre-operatively	4 (50%)
Intussusception surgical reduced/resected	4 (50%)

\* Percentage based on 1117 CT scans performed.

**Figure 2:** Coronal image of a contrast-enhanced CT demonstrates intussusception at the JJ anastomotic site identified by the suture material (yellow arrow) in a RYGB patient.



## Discussion

While intussusceptions are uncommon in the general adult population without the presence of a lead point, they account for a subset of complications encountered in the post-RYGB patient. In a large series of patients, Stephenson et al identified an incidence of 0.4%. That series differed substantially from our series in that the incidence was calculated based on the number of patients who were sufficiently symptomatic to be taken to the operating room and subsequently had an intussusception identified at surgery. Still, it is relatively comparable to our incidence of patients undergoing surgery of 0.7%. The incidence of imaging identified intussusception at the JJ anastomosis in RYGB patients, although more than three times greater, remains relatively uncommon at 2.5%. As our institution is a major referral center for bariatric surgery patients, patients may have received initial care at a separate institution and presented for evaluation of abdominal pain at our institution. Furthermore, the incidence of JJ intussusception focuses primarily on symptomatic RYGB patients who received a CT scan and not necessarily the entire RYGB population. Patients who went to surgery without any imaging are not identified in our study. The incidence of intussusception at the JJ anastomosis in RYGB patients is much more common on imaging than surgically identified. This is important since not all patients with intussusception seen on CT necessarily require surgical intervention.

In the setting of a symptomatic RYGB patient with intussusception on CT, it is crucial to identify whether an SBO is present, as its occurrence may warrant surgical intervention. In our study, approximately 80% of the patients who demonstrated CT evidence of SBO secondary to intussusception proceeded to operative management with reduction or resection of the intussusception. Therefore, while the overall incidence of JJ intussusceptions may be low, if there patients present with SBO, there is an increased likelihood that surgical intervention will be required.

Radiologist observation of intussusception at the JJ anastomosis in RYGB patients in the absence of findings of SBO, however, is more often a transient phenomenon, being that the great majority of intussusceptions will spontaneously reduce, thus requiring only conservative management.

## References

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