Case report

Late intestinal intussusception after Roux-en-Y gastric bypass surgery

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Rudecinda Ramírez Serrano[1]*, Dinora Sofía Abarca Calderón[2], Ernesto Alejandro Canales Gómez[3]

1-3. Emergency Department, Medical-Surgical Hospital, Salvadoran Social Security Institute, San Salvador, El Salvador.

*Correspondence
rude_1709@hotmail.com

1. 0000-0002-9775-5375
2. 0009-0001-3825-6031
3. 0009-0003-6235-9051

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Intususcepción intestinal tardía después de una derivación gástrica en Y de Roux

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Abstract
Obesity is a major public health problem that has driven the development of various therapeutic strategies. Among these, Roux-en-Y gastric bypass stands out for its effectiveness, although it may be associated with rare but serious complications, such as intestinal intussusception, which is challenging to diagnose due to its nonspecific presentation. **Case presentation.** A 45-year-old woman with a history of hypothyroidism treated with levothyroxine and a laparoscopic gastric bypass performed two years prior for morbid obesity (body mass index of 49.5 kg/m^2), with adequate weight loss. She presented with abdominal pain that had been present for six hours, accompanied by nausea, vomiting, and hematemesis. On physical examination, she was hemodynamically stable, with no signs of peritoneal irritation. Upper gastrointestinal endoscopy revealed no significant findings, while abdominal CT scanning showed proximal jejunal intussusception. **Treatment.** An exploratory laparotomy was performed, revealing dilation of the jejuno-jejunal anastomosis and approximately 40 cm of necrotic jejunum; consequently, intestinal resection and reconstruction of the anastomosis were performed. **Outcome.** The postoperative period was complicated by a dynamic ileus, pleural effusion, and a urinary tract infection caused by *Escherichia coli*. The patient made a satisfactory recovery after being discharged from the hospital.

Keywords
Intussusception, Gastric Bypass, Morbid Obesity.

Resumen
La obesidad constituye un importante problema de salud pública, lo que ha impulsado el desarrollo de diversas estrategias terapéuticas. Entre ellas, la derivación gástrica en Y de Roux destaca por su eficacia, aunque puede asociarse a complicaciones infrecuentes pero graves, como la intususcepción intestinal, cuyo diagnóstico resulta desafiante por su presentación inespecífica. **Presentación del caso.** Se trata de una mujer de 45 años, con antecedente de hipotiroidismo en tratamiento con levotiroxina y derivación gástrica laparoscópica realizada dos años antes por obesidad mórbida (índice de masa corporal de 49,5 kg/m^2), con adecuada pérdida ponderal. Consultó por dolor abdominal de seis horas de evolución, acompañado de náuseas, vómitos y hematemesis. Al examen físico, se encontraba hemodinámicamente estable, sin signos de irritación peritoneal. La endoscopia digestiva alta no evidenció hallazgos relevantes, mientras que la tomografía abdominal mostró intususcepción yeyunal proximal. **Intervención terapéutica.** Se realizó laparotomía exploradora, identificándose dilatación de la anastomosis yeyuno-yeyunal y aproximadamente 40 cm de yeyuno necrótico, por lo que se efectuó resección intestinal y reconstrucción de la derivación. **Evolución clínica.** En el postoperatorio se complicó con íleo adinámico, derrame pleural e infección urinaria por *Escherichia coli*. La paciente evolucionó de forma satisfactoria tras el alta hospitalaria.

Palabras clave
Intususcepción, Derivación Gástrica, Obesidad Mórbida.

Introduction

Globally, in 2022, 2.5 billion adults aged 18 and older were overweight, and more than 890 million were obese. This means that 43 % of adults in that age group (43 % of men and 44 % of women) were overweight, an increase from 1990, when 25 % of adults aged 18 and older were overweight[1]. Obesity carries metabolic, cardiovascular, and surgical risks and complications, which increase the economic and social burden on this patient group. Therefore, comprehensive management guidelines that include surgical options are currently being developed.

The Federation for Obesity and Metabolic Disorders Surgery reported 449 583 primary bariatric procedures worldwide in 2023. Roux-en-Y gastric bypass is the second most commonly performed bariatric procedure, accounting for 29.5 % of bariatric procedures.[2] Bariatric surgery also has a low perioperative mortality rate of less than 0.2 %.[3]

The most common complications of Roux-en-Y gastric bypass include bleeding, leaks, internal hernia, anastomotic stenosis, and cholelithiasis. However, intussusception is a rare but potentially serious complication.[4]

According to the US Centers for Disease Control and Prevention, during the period from 2021 to 2023, the prevalence of obesity in adults reached 40.3 %, and severe obesity continued to increase from 7.7 % to 9.7 % in 2023.[5] The increase in the prevalence of obese patients undergoing surgical procedures makes it essential for emergency physicians to have comprehensive knowledge of the immediate and long-term complications arising from surgical procedures.

Intestinal invagination or intussusception is the displacement of one segment of the intestine into the lumen of another adjacent segment. It is uncommon, with an incidence of up to 0.64 % of patients undergoing gastric bypass surgery. Intussusception occurs in relation to the jejuno-jejunal anastomosis and can occur antegrade or retrograde. However, the mechanism by which this entity occurs has not been clearly established.[6]

The lack of specific data in El Salvador makes timely diagnosis difficult, increasing the risk of diagnostic and therapeutic delays. Early identification of this condition is crucial to prevent other complications such as intestinal ischemia. This case aims to contribute to medical knowledge through the systematic description of the diagnostic-therapeutic approach, highlighting the clinical and imaging findings that guided diagnosis and informed clinical decision-making. It also seeks to provide a methodological reference for the management of similar cases, promote awareness among healthcare personnel, and strength evidence-based clinical practice.

Case presentation

A 45-year-old female patient diagnosed with hypothyroidism in 2021 and treated with levothyroxine, 100 µg daily. In June 2022, the patient underwent laparoscopic Roux- en-Y gastric bypass surgery, indicated for morbid obesity (body mass index of 49.5 kg/ m^2), at a hospital in the national network. In addition, she presented with iron-deficiency anemia, diagnosed after the surgical event, which was treated with oral micronutrients. She had lost 46.5 % of her excess weight, weighing 64 kg. The exact surgical technique used is unknown, as the corresponding operative report is not available. She reported no additional surgical history.

The patient consulted the emergency department for abdominal pain of six hours' duration, located in the epigastrium and hypochondria, accompanied by nausea, vomiting, and hematemesis.

Physical examination revealed a soft, depressible abdomen with no signs of peritoneal irritation. Laboratory tests reported: leukocytes 9,170/µL (58.7 % neutrophils), hemoglobin 8.5 g/dL, and C-reactive protein < 0.06 mg/dL.

Initially, a bleeding anastomotic ulcer was suspected. An upper digestive endoscopy was performed, which revealed erosive gastropathy with blood remains at the gastrojejunal anastomosis (Figure 1). However, given the persistence of symptoms, a contrast-enhanced abdominal tomography was requested, which revealed intussusception of the proximal jejunum associated with ischemia and high-grade obstruction (Figure 2).

Treatment

An exploratory laparotomy was performed. The open approach was chosen due to multiple factors, including findings on abdominal tomography showing vascular compromise associated with high-grade obstruction, and the prolonged evolution.

During the surgical procedure, severe inflammation was observed in the abdominal cavity with firm adhesions, severe dilation of the jejuno-jejunal anastomosis, and 40 cm of invaginated jejunum. In addition, the rest of the intestine was found to be collapsed (Figure 3A) and necrotic (Figure 3B).

Manual reduction of the intussusception revealed necrosis, bleeding, and perforation at the site of the 3 x 3 cm jejuno-jejunal anastomosis. The affected segment was resected, including the previous jejuno-jejunal anastomosis, 50 cm from the gastrojejunal anastomosis and 10 cm from the jejuno-jejunal anastomosis, followed by reconstruction of the gastric bypass. A distance of 40 cm was left between both anastomoses (alimentary loop and biliary loop), which are 50 cm apart from the gastrojejunal anastomosis and 50 cm from the proximal jejunum in the biliopancreatic loops using a mechanical technique with staplers, followed by cavity lavage and closure (Figure 4).

Outcome

The patient remained hospitalized for 18 days and required parenteral nutrition for seven days. During the postoperative period, she presented with adynamic ileus, bilateral pleural effusion with atelectasis, and urinary tract infection caused by *Escherichia coli*. The latter presented multidrug-resistant producing carbapenemase and extended-spectrum beta-lactamases, and was treated with ertapenem 1 g daily, combined with fluconazole 800 mg intravenously daily for seven days. Histopathological examination confirmed intestinal infarction with no evidence of malignancy. During outpatient follow-up, the patient did not experience any recurrence of abdominal symptoms.

Clinical diagnosis

Jejunojejunal intussusception and intestinal ischemia, two years following Roux-en-Y gastric bypass in a patient with hypothyroidism and iron-deficiency anemia.

Discussion

Intussusception in adults is a rare condition with clinical and pathophysiological characteristics that differ from those observed in the pediatric population. Intussusception is particularly relevant in clinical practice due to its atypical presentation and the diagnostic and therapeutic challenges. Heersche S, *et al.*, describes intussusception in adults as accounting for 1 % to 5 % of cases of intestinal obstruction. Most intussusceptions in this age group are of enteric origin and benign in nature; however, malignancy has been documented in up to 68 % of colocolic intussusceptions, highlighting the importance of timely and exhaustive surgical evaluation.[7]

Intussusception is classified according to the direction of invagination as antegrade (peristaltic) and retrograde (antiperistaltic). The antegrade form is the most common and occurs when the proximal segment invaginates toward the distal segment following the normal direction of peristalsis. In contrast, retrograde intussusception occurs when a distal segment invaginates in the opposite direction, as has been described mainly in specific postoperative situations. All cases presented by Edwards *et al.*, occurred more than one year after surgery.[8]

The cause of intussusception development is still unclear, but several theories have been proposed. In a review, Duane *et al.*, postulated that suture lines could serve as a guide point for invagination; however,

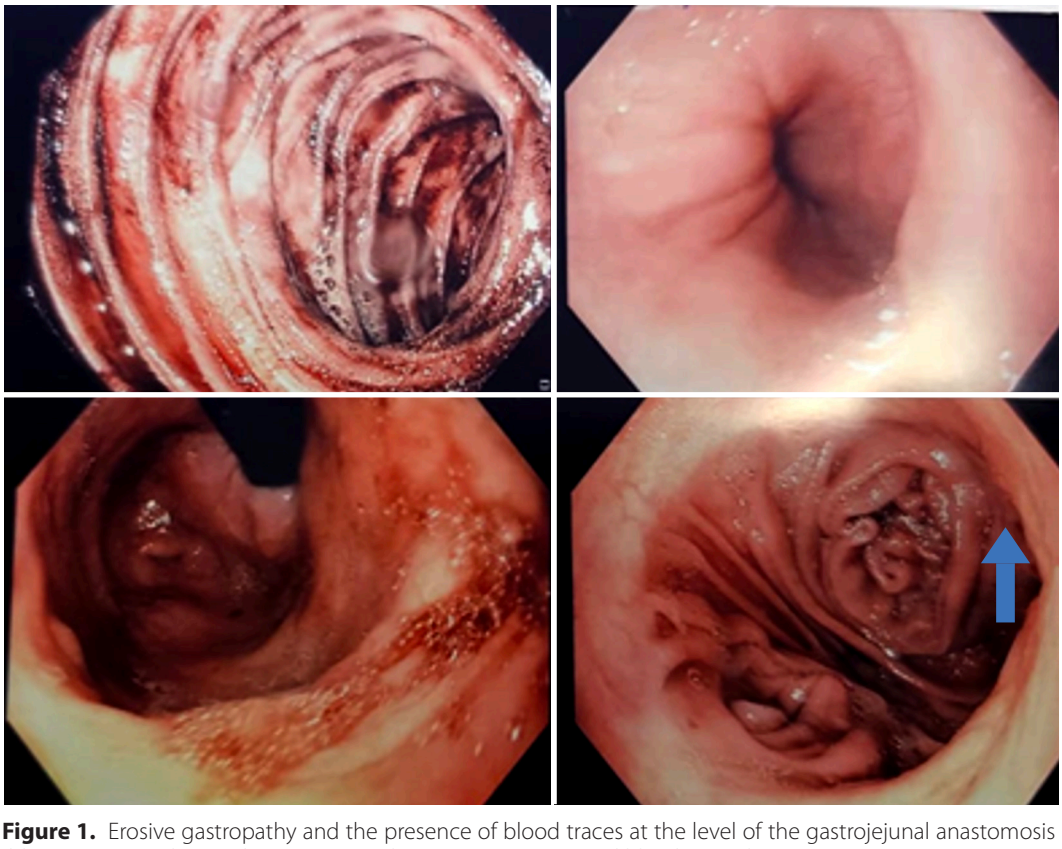

Figure 1. Erosive gastropathy and the presence of blood traces at the level of the gastrojejunal anastomosis (blue arrow) are observed, consistent with upper gastrointestinal bleeding in the postoperative context.

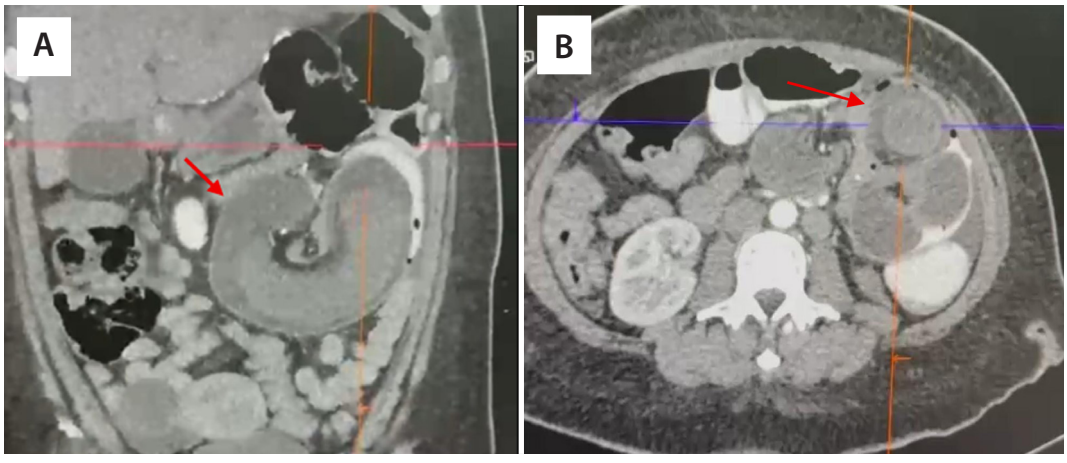

Figure 2. Radiological findings. (A) Coronal section of abdominal computed tomography showing the "sausage" sign, characterized by an elongated tubular image corresponding to a segment of small intestine (jejunal loop) invaginated into another intestinal segment (red arrow). (B) Axial abdominal CT scan showing the "target" or "donut" sign, represented by concentric rings of different density, corresponding to the overlapping intestinal walls of the intussuscepted loop and the receiving loop (red arrow), a classic finding of intestinal intussusception.

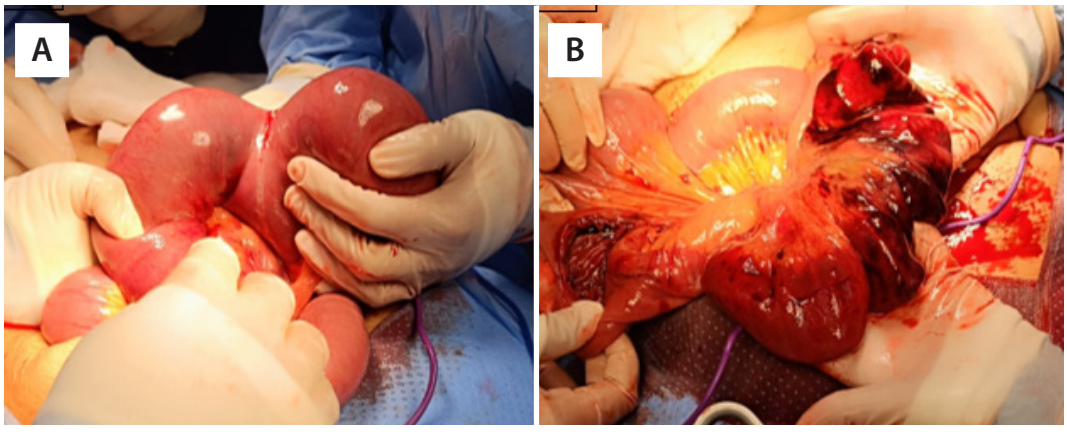

Figure 3. Transsurgical findings. (A) Image of retrograde intussusception. Figure (B) Intestinal loop with necrosis and perforation after reduction of intussusception.

it is not clearly established whether the intestinal section modifies motility and favors an increase in retrograde peristalsis. This hypothesis could explain the higher proportion of retrograde intussusception described after gastric bypass.[9]

Computed tomography is the test of choice, with a sensitivity of 100 %.[10] Gastric bypass has been consolidated as the procedure of choice for the treatment of morbid obesity. Albeit, gastric bypass can cause short-, medium-, and long-term complications. The most common late complications include internal hernia, marginal ulcer, and anastomotic stenosis. In contrast, intussusception is a rare complication, to the point that it is not mentioned in most series analyzing late adverse events following gastric bypass.[4] On the other hand, a review of the literature reveals that the presentation of intussusception cases is highly variable. The most commonly identified symptom is abdominal pain that is disproportionate to the physical findings. Nausea and vomiting are frequent clinical manifestations, while hematemesis occurs occasionally. In most cases, physical examination shows no signs of serious clinical compromise.[11]

Despite this, the relationship between Roux-en-Y gastric bypass and intussusception is well documented. Studies have reported variable incidence rates. A 2021 meta-analysis of 74 studies involving 191 patients revealed a combined incidence of 0.64 % after Roux-en-Y gastric bypass, with a median interval of 52 months between Roux-en-Y gastric bypass and the onset of intussusception. Risk factors associated with post-Roux-en-Y gastric bypass intussusception include female sex (98 %) and significant postoperative weight loss, described as > 65 % of excess weight.[12]

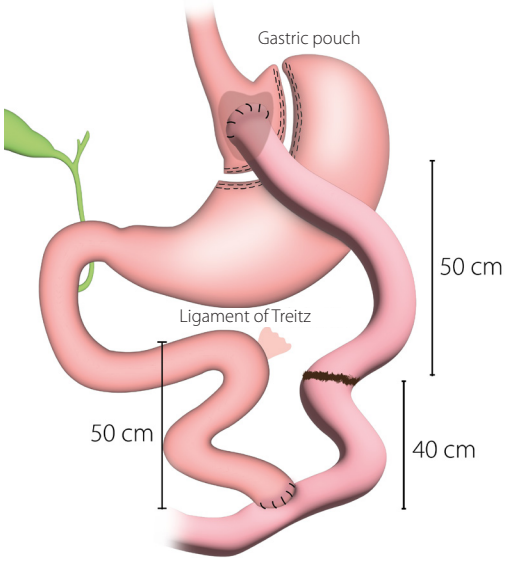

Figure 4. Reconstruction of gastric bypass after intestinal resection.

Published data evaluating radiological diagnosis of intussusception in adults are limited. Imaging options include upper gastrointestinal radiocontrast studies, ultrasonography, and computed tomography. Computed tomography is now considered the modality of choice for diagnosing intussusception in adults, with a reported diagnostic accuracy of 80 %. This was undoubtedly diagnostic in the patient, with the pathognomonic "target sign" on axial images and a sausage-shaped mass seen on reconstructed sagittal images. Therefore, Computed tomography should be recommended for all bariatric patients presenting with abdominal symptoms.[11]

In a study conducted at Skåne University Hospital in Sweden, CT findings were associated with a higher likelihood of requiring urgent surgical intervention. In particular, an intussusception length >100 mm and proximal intestinal dilation on CT were correlated with clinically significant intestinal obstruction.[13] Preferably, surgical treatment involves resection of the jejuno-jejunostomy and reconstruction of a new jejuno-jejunostomy. Simple reduction and reduction with folding of the intestine are associated with a higher recurrence rate.[14] Despite treatment, the recurrence rate is approximately 0.2 % with a mortality rate between 1 % and 16 %.[15]

In the case studies reported and reviewed for this presentation, intussusception following a Roux-en-Y gastric bypass is recorded as an uncommon but potentially fatal complication.[14] This complication has been documented to occur with greater frequency in women, as was observed in this case. It has been proposed that alterations in the peristaltic coordination of the alimentary loop could generate foci of aberrant motor activity that act as "ectopic pacemakers." Given that the physiological intestinal pacemaker is located in the duodenum, the anatomical modification secondary to surgery would favor the appearance of these ectopic foci along the jejunum, leading to dysmotility and, eventually, retrograde intussusception. The diagnosis should be suspected in the presence in patients with a surgical history and an obstructive condition, and confirmed by computed tomography.[16]

Surgical treatment involving resection of the affected segment and reconstruction of the anastomosis is the most recommended strategy to reduce the risk of recurrence. In conclusion, intussusception is a rare but potentially serious postoperative complication in patients undergoing bariatric surgery, whose diagnosis may be delayed due to nonspecific clinical presentation and low initial suspicion. This case is particularly relevant, as it shows a severe progression with extensive intestinal necrosis that required surgical resection, unlike most cases reported in the literature, in which the compromised intestinal loop is usually viable and amenable to reduction. This finding broadens the spectrum of severity described for this complication and underscores the importance of considering intussusception in the differential diagnosis of acute abdomen in bariatric patients. In addition, it provides valuable information for understanding the pathophysiology, clinical course, and therapeutic approach, and reinforces the need for a high index of suspicion and timely intervention to prevent adverse outcomes.

Ethical considerations

The patient gave her informed consent for the publication of this case for academic and scientific purposes. The ethical principles of the Declaration of Helsinki and international guidelines for research involving human subjects were respected. The confidentiality of the information and the patient's anonymity were guaranteed.

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