International Surgery Journal
Parks KG et al. Int Surg J. 2024 Apr;11(4):617-620
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20240683

Case Series

Barbed suture related small bowel obstruction in bariatric surgery: a case series

Kirra G. Parks, Nicholas E. Williams*

Department of Surgery, Wagga Wagga Base Hospital, New South Wales, Australia

Received: 23 February 2024
Accepted: 11 March 2024

***Correspondence:**
Dr. Nicholas E. Williams,
E-mail: nick@hwpconsulting.com.au

ABSTRACT

Bariatric surgeries are amongst the most commonly performed yet technically demanding laparoscopic procedures in Australia. The use of barbed suture has been widely adopted for use in gastric bypass surgeries to avoid the need for intracorporeal knot tying while maintaining tension and improving surgical efficiency. Whilst barbed suture has been reported as safe with similar outcomes to traditional suture use in bariatric surgery there is a risk that the barbs on the tail of the suture can grasp other tissues and form band adhesions resulting in small bowel obstruction (SBO). We present a series of four cases of barbed suture related SBO post Roux-en-Y gastric bypass (RYGB) surgery. In all four patients the SBO was caused by a band adhesion related to the tail of the non-absorbable (permanent) barbed suture used to close the mesenteric defect adjacent to the jejunojejunostomy. The time to presentation with SBO ranged from 1 day to 20 months post RYGB and all patients underwent diagnostic laparoscopy where the adhesion was divided and the tail of the suture trimmed. To avoid this uncommon complication, we recommend the use of absorbable barbed suture with two extra passes beyond the completion of the suture line and the tail cut almost flush with the tissue. Further data is needed to determine if the recommended modified technique still poses a risk of SBO or if use of absorbable suture to close the mesenteric defect increases the risk of internal hernia.

Keywords: Barbed suture, RYGB, Intestinal obstruction, Bowel obstruction, Bariatric surgery

INTRODUCTION

Bariatric surgery now represents the most commonly performed group of laparoscopic procedures in australia.[1] whilst sleeve gastrectomy has been the most common bariatric procedure since 2014, gastric bypass surgeries are increasing in popularity year upon year for both primary and revisional indications.[2]

Laparoscopic bypass surgeries are technically demanding with a long learning curve, particularly because of the need to perform laparoscopic intracorporeal sutured anastomoses.[3,4] barbed sutures have gained popularity for this indication as they improve efficiency, maintain tension, are self-following, and eliminate the need for laparoscopic knot tying.[3,4] barbed sutures however remain off-label for this indication.[5,6] the barbs of the suture tail have the potential to adhere to other tissues causing band adhesions and consequently bowel obstruction. SBOs are a known complication of laparoscopic Roux-en-Y gastric bypass (RYGB) surgery, most commonly secondary to internal hernia (IH) and adhesions.[7] SBO secondary to the use of barbed suture material in bariatric surgery are not common, however they have previously been reported in other areas of abdominal surgery.[8,9]

We present a series of four cases of this uncommon complication demonstrating that it can occur in both the early and late post-operative period.

All cases reported in this review underwent an antecolic, ante gastric RYGB by a single, experienced bariatric and upper gastrointestinal surgeon in a single facility over four years. Gastrojejunostomy and jejunojejunostomy

anastomoses were performed with a linear stapler and absorbable barbed suture, and both mesenteric windows closed with non-absorbable (permanent) barbed suture.

CASE SERIES

Case 1

A 62-year-old woman with a BMI of 39.1 at index operation presented to the emergency department twenty months post RYGB with sudden onset, severe, diffuse abdominal pain. Her past surgical history also included a laparoscopic cholecystectomy and open appendicectomy. At presentation her blood biochemistry and physical examination were unremarkable. CT abdomen was also unremarkable. The patient was discussed with the bariatric surgeon who performed her RYGB who recommended prompt gastroscopy and laparoscopy. Gastroscopy revealed an ulcer at the gastrojejunostomy and at laparoscopy she was found to have a band adhesion involving the tail of the barbed suture used to close the mesenteric defect at RYGB with an associated closed loop SBO (Figure 1). The adhesion was divided, the bowel was viable and she was discharged home on third post-operative day with no further complications.

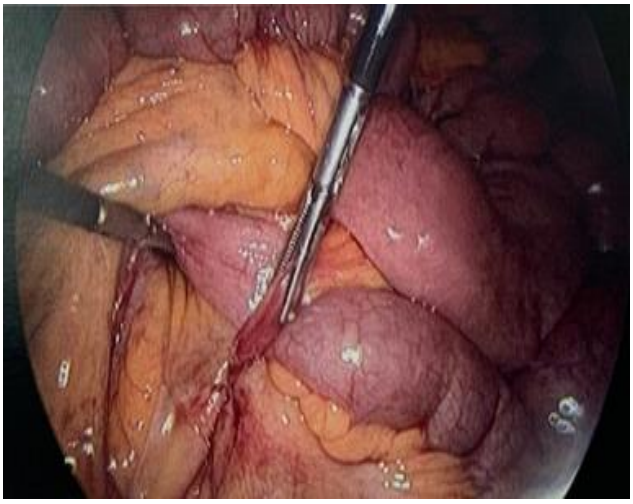

Figure 1: Intraoperative image demonstrating a band adhesion involving the tail of the barbed suture used to close the mesenteric defect in RYGB.

Case 2

A 45-year-old woman with a BMI of 26.6 underwent a laparoscopic conversion of sleeve gastrectomy to RYGB for uncontrolled reflux. Patient experienced persistent abdominal pain in the days following surgery and was unable to tolerate oral fluids. Gastroscopy was performed and confirmed a patent gastrojejunostomy. Subsequent CT abdomen showed SBO at level of jejunojejunostomy (Figure 2). Laparoscopy was undertaken and there was obvious distention of alimentary limb, collapse of the common channel and an obstruction caused by the tail of the barbed suture used to close the mesenteric defect adhering to mesentery. Suture tail was trimmed and she was discharged home 3 days later.

Figure 2: Coronal section of CT abdomen and pelvis demonstrating SBO at the level of jejunojejunostomy with dilated small bowel loops.

Case 3

A 38-year-old woman with a BMI of 38 at index operation presented to a regional emergency department at nineteen weeks gestation with sudden onset, severe epigastric pain ten months after undergoing RYGB. There was no associated nausea or vomiting and she had ceased passing flatus with bowels not open for several days. Her blood biochemistry was unremarkable and she subsequently had an abdominal ultrasound to investigate her symptoms. The ultrasound demonstrated a live intrauterine pregnancy and was otherwise normal. She then proceeded to have a contrast small bowel series that demonstrated no passage of contrast beyond the jejunum at 30-minutes and prominent small bowel loops in the left upper quadrant (Figure 3). The patient was transferred to a large regional centre for diagnostic laparoscopy with the on-call general surgeon. At laparoscopy there was distended, ischaemic small bowel, distension of the alimentary limb, collapse of the common channel and a band adhesion containing the tail of the barbed suture used to close the mesenteric defect at her index operation. The band adhesion was divided and the ischemia resolved without the need for bowel resection. She had complete resolution of her symptoms and she was discharged home on post operative day two.

Case 4

A 39-year-old woman with a BMI of 40.1 at index operation presented to the emergency department with severe abdominal pain six days post laparoscopic conversion of sleeve gastrectomy to RYGB for uncontrolled reflux. At presentation her blood biochemistry was unremarkable and her CT abdomen

demonstrated a high grade SBO of the alimentary limb with stenosis of the anastomosis of the jejunum and biliopancreatic limb and collapse of the common channel distal to this point (Figure 4). She underwent a laparoscopy performed by the on-call general surgeon who found an acute band adhesion around the distal portion of alimentary limb at site of jejunojejunostomy. Band adhesion was divided and she had complete resolution of her symptoms post-operatively. She was discharged home on post-operative day 5.

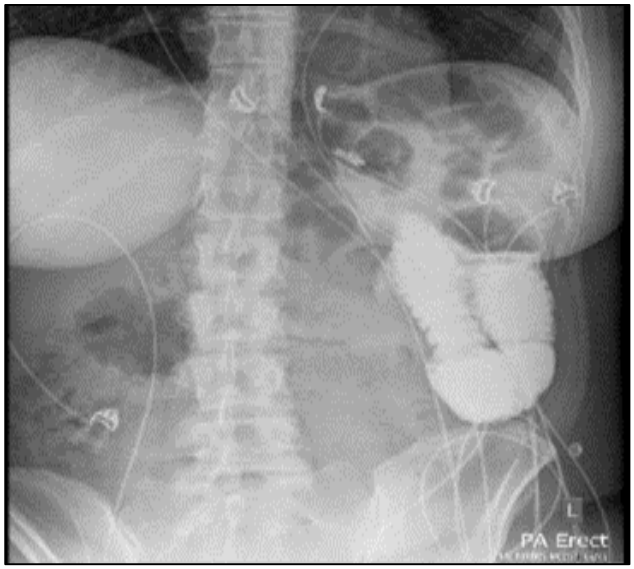

Figure 3: Abdominal x-ray with Gastrografin swallow demonstrating obstruction at level of the jejunum and prominent small bowel loops in left upper quadrant.

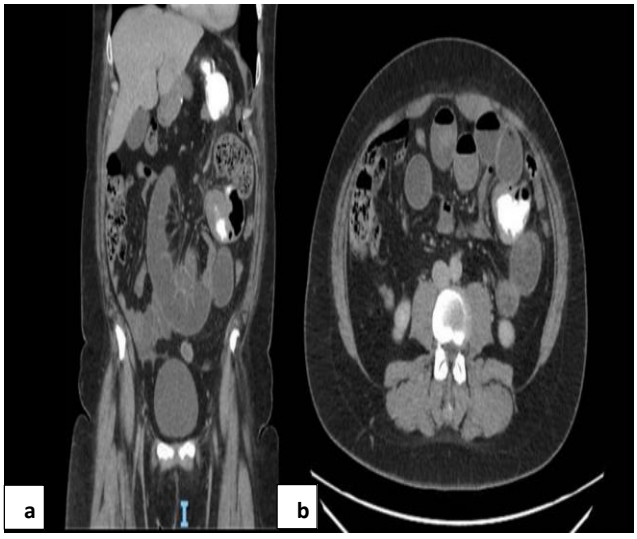

Figure 4 (a and b): Coronal and axial sections of CT abdomen and pelvis with dilated small bowel.

DISCUSSION

Barbed Suture use in bariatric surgery has been demonstrated to be both beneficial and safe with similar outcomes to traditional suture use.[3,4,10] Whilst SBO post RYGB has already been identified as a possible complication resulting from both IH and strictures, it now appears that band adhesions secondary to the use of barbed sutures are another possible cause to consider with multiple other cases published.[11-15]

It is established in the current literature that routine closure of the mesenteric defect during RYGB is effective in reducing the rate of IH.[16] In meta-analyses published by Lin et al and Magouliotis it has thus far been suggested that the use of non-absorbable suture is superior to absorbable due to the increasing rates of IH over time and that there is no increase in post operative complications with the use of barbed suture.[3,16] There were no reported cases of barbed suture related SBO in either meta-analysis however they suggested longer term studies and further comparison of suture types.

A recent study in obese rat models undergoing RYGB suggested that the use of absorbable suture for closure of mesenteric defects was non-inferior.[17] Another prospective study by Gumbs et al compared rates of SBO in patients undergoing RYGB with closure of the mesenteric defect using either non-absorbable or absorbable suture.[18] They reported higher rates of SBO in patients where non-absorbable suture was used. This is consistent with the majority of the other published cases of post RYGB barbed suture related SBO where the involved suture tail was from the mesenteric closure and was non-absorbable.[13] This raises the question as to whether absorbable barbed suture use for the closure of the mesenteric defect would potentially reduce the rate of barbed suture related SBO whilst still reducing rate of IH.

The time from index surgery to presentation with SBO has previously been reported as commonly within 30 days of surgery and up to a maximum of 334 days with all other reported cases falling in-between.[12-15] In our series of 4 cases, time from operation to SBO were: 1 day, 6 days, 10 months and lastly 20 months which is a considerably longer interval between surgery and SBO than any other reported case. While safety and efficacy of barbed suture use in bariatric surgery was supported in the meta-analysis by Lin et al it is noted that all but one of the studies included in this review reported median follow-up of no more than 6 months post procedure.[3] This raises the possibility that number of barbed suture related SBO is higher than currently reported given short data collection period of existing studies.

Given the increasingly large pool of gastric bypass patients in the Australian community, general surgeons must be able to both diagnose and manage post RYGB patients with acute SBO. CT remains the gold standard for diagnosis of SBO however there is no way to distinguish barbed suture band adhesions from other causes of SBO on imaging. Findings on CT are often localised dilated loops, a mesenteric "swirl" sign or an abnormal lie of small bowel on one side of the abdomen.

The CT scan may also be deceptively normal, as it was in case 1 of this series.

CONCLUSION

The large majority of these cases can be managed laparoscopically. The surgeon should endeavour to speak to the primary surgeon and access operative notes wherever possible, noting the type of suture used for anastomosis formation and mesenteric defect closure. In order to mitigate the risk of SBO from band adhesions secondary to barbed suture use, suggest using absorbable barbed suture with 2 extra passes beyond the completion of the suture line and the tail cut almost flush with tissue. Further data is needed to determine if the recommended modified technique for use of barbed suture still poses a risk of SBO/increased risk of IH over time with change from non-absorbable to absorbable suture for closure of mesenteric defect. Additionally, given long interval between surgery and time of presentation that has been demonstrated in this series longer study duration for future research is recommended.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Parks KG, Williams NE. Barbed suture related small bowel obstruction in bariatric surgery: a case series. Int Surg J 2024;11:617-20.