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Diagnostic laparoscopy is more accurate than Computerized Tomography for internal hernia after Roux-en-Y gastric bypass

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ABSTRACT

Background: Internal hernia rate after Laparoscopic Roux-en-Y Gastric Bypass (RYGB) is variable (0.5%–9%).
Methods: We retrospectively reviewed all patients who underwent diagnostic laparoscopy for possible internal hernia after RYGB from 2009 to 2016. All internal hernia defects were closed.
Results: We performed 574 RYGB cases between 2013 and 2016, 33 diagnostic laparoscopies were performed (6 after RYGB done at our institution & 27 after RYGB done at outside institutions). Diagnostic laparoscopies after RYGB done at our institution showed internal hernia in 3/6 (50%), none at Petersen space, none had incarcerated small bowel or were converted to open. While 20/27 (74%) of diagnostic laparoscopies after RYGB done at outside institutions had an internal hernia, 18/20 (90%) at Petersen space, 15/27 (55%) had incarcerated small bowel and 3.7% needed small bowel resection or were converted to open. Our internal hernia rate after RYGB was 0.5%. Computerized Tomography (CT scan) was falsely negative in 44–50% of patients with laparoscopy after RYGB.
Conclusion: Diagnostic laparoscopy is more accurate than CT scan in evaluating patients with abdominal pain after RYGB.

Introduction

The potential risk for internal hernia after Roux-en-Y gastric bypass (RYGB) is a concern for bariatric surgeons and patients.[1,2] In addition, studies have shown that the technique of RYGB (retrocolic versus ante-colic) affects the internal hernia rate after RYGB.[3–5] One of the challenges of internal hernia after RYGB is delay in diagnosis of internal hernia especially in patients with abdominal pain after RYGB and normal CT scan of the Abdomen and Pelvis. We propose an algorithm for management of pain after RYGB that involves performing diagnostic laparoscopy if the pain is acute and severe or if the pain is recurrent even in the presence of negative radiologic studies including CT scan of the Abdomen and Pelvis.

Material and methods

We retrospectively reviewed our prospectively maintained database for all patients who had diagnostic laparoscopy after RYGB done at our institution or elsewhere from October 2009 to March 2016. Once we identified patients with diagnostic laparoscopy then we divided them in two groups, patients who had RYGB at our institution and patients who had their RYGB elsewhere (control group). To know the denominator of RYGB cases done elsewhere and for calculation of internal hernia rates, we queried our national society for Metabolic and Bariatric Surgery for the number of RYGB cases done in our country. We performed retro-colic RYGB from October 2009 until December 2010 and switched to antecolic RYGB from January 2011 to March 2016. In the retro-colic and ante-colic RYGB we close the mesenteric and Petersen defects with non-absorbable 2–0 Ethibond in a continuous purse string suture as

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we described previously.[6] In addition, in the retro-colic RYGB the meso-colic defect is closed in a similar fashion. We defined the presence of internal hernia if the internal hernia space was found open during diagnostic laparoscopy without evidence of incarcerated small bowel. If the small bowel was incarcerated within the internal hernia defect, then this was labelled as incarcerated internal hernia. Data is presented as mean and standard deviation.

Algorithm for management of pain after LRYGB at BMI Abu Dhabi

Patients presenting with chronic recurrent or acute abdominal pain after RYGB are investigated to rule out the presence of an internal hernia. Our algorithm for evaluating patients with pain after RYGB depends on the presentation whether it is chronic abdominal pain presenting in the outpatient clinic or acute abdominal pain presenting in the emergency room. For patients presenting in the outpatient clinic with chronic recurrent abdominal pain after RYGB, we perform an abdominal ultrasound if the pain is intermittent or an upper endoscopy if the pain is continuous especially in the presence of previous history of peptic ulcer disease, smoking or use of non-steroidal anti-inflammatory drugs (NSAIDs). If the ultrasound is negative and the pain persists then we perform a Computerized Tomography (CT scan) of the Abdomen and Pelvis), if it is negative and the pain persists then the patient is offered diagnostic laparoscopy to rule out the presence of an internal hernia. If the pain subsides but the ultrasound shows gall stones or the CT scan shows an internal hernia, then the patient is offered diagnostic laparoscopy as well with or without cholecystectomy. For patients presenting to the emergency room with acute abdominal pain after RYGB, we start by performing a CT scan of the abdomen and if the pain is severe and we offer the patients diagnostic laparoscopy regardless of the timing of the day. If the pain improves before or after the CT scan is performed and regardless of the CT scan finding, then the patient is admitted to the hospital and an ultrasound is performed and the patients are offered diagnostic laparoscopy to rule out an internal hernia. We have a low threshold to explore patients with persistent or acute abdominal pain after RYGB. We define an internal hernia as an open internal hernia space even in the absence of incarcerated small bowel.

Results

During the study period, we performed 574 RYGB cases between 2013 and 2016, 982 cases of RYGB were done in the country excluding cases done at our institution (Table 1). We performed 45 retro-colic and 529 ante-colic RYGB procedures. There were 574 RYGB cases between 2013 and 2016. Thirty-three diagnostic laparoscopies were performed (6 after RYGB done at our institution & 27 after RYGB done at outside institutions). Diagnostic laparoscopies after RYGB done at our institution showed internal hernia in 3/6 (50%), none at Petersen space, none had incarcerated small bowel or were converted to open. While 20/27 (74%) of diagnostic laparoscopies after RYGB done at outside institutions had an internal hernia, 18/20 (90%) at Petersen space, 15/27 (55%) had incarcerated small bowel and 3.7% needed small bowel resection or were converted to open. Our internal hernia rate after RYGB in 574 patients was 0.5% compared to 2% after RYGB at outside institutions. CT scan was falsely negative in 50% of patients with laparoscopy after RYGB.

Our follow up rate after RYGB done at our institution was 73.5%, 83%,73.5%, 44%, 43%, 69.4% and 88% at 84 1,2,3,4,5,6,7 years respectively. Pain resolved in 5/6 patients after laparoscopy and 3/3 of patients with a documented internal hernia.

Discussion

Reducing the incidence of small bowel obstruction and the rates of internal hernia after RYGB is important clinically and medico-legally. In a medico-legal analysis of 100 malpractice cases by Cottam et al., 18% of cases were due to bowel obstruction after RYGB.[7] Our study showed that CT scanning of the Abdomen and Pelvis had a high false negative rate (Table 1). Radiographic imaging and especially CT scan of the Abdomen is an important modality to diagnose internal hernia after RYGB. For example, the presence of a dilated gastric remnant, swirling of the mesenteric vessels or dilatation of the small bowel can be very useful to diagnose internal hernia after RYGB.[8–10] We have found CT scan to be misleading when negative in patients with pain after RYGB. Similarly, Higa et al. have found radiographic imaging to be unreliable for detecting internal hernia after RYGB.[4]

In patients undergoing diagnostic laparoscopy after RYGB performed at our institution, we encountered no patients with incarcerated small bowel due to internal hernia or small bowel obstruction after RYGB, no patients needed small bowel resection or conversion to open compared to 55% of incarcerated small bowel and 3.7% small bowel resection and conversion to open in the control group. Furthermore, we had no patients with internal hernia at Petersen space compared to 90% in the control group (Table 1). Similarly, a large meta-analysis and a recent multi-center randomized controlled trial showed that the rate of internal hernia after ante-colic with closure of both Petersen and mesenteric defects is 1%.[5,9] In addition, the same two large series and a large series of retro-colic RYGB showed that the internal hernia rate after retro-colic RYGB or ante-colic when the defects are not closed is 2–3%.[3–5,9] We did not have operative notes for most patients who had RYGB at other institutions. However, RYGB represents less than 10% of procedures performed by few surgeons. We know the practice of these surgeons and from personal communications

Table 1
Comparison of results of Diagnostic laparoscopy for patients presenting with abdominal pain after RYGB performed at our institution compared to RYGB done elsewhere.

	Diagnostic laparoscopy after RYGB at our institution	Diagnostic laparoscopy after RYGB elsewhere
	6	27
Number of RYGB cases	574 (2009–2016)	982 (2013–2016)
CT scan Abdomen results compared to findings on laparoscopy	50% false negative	44% false negative
Internal hernia based on an open internal hernia space	3/574 (0.5%)	20/982 (2%)
Location of internal hernia	0% Petersen space	90% Petersen space
Incarcerated small bowel	0%	55%
Small bowel resection	0%	3.7%
Conversion to open	0%	3.7%
Mortality	0%	0%

RYGB: Roux-en-Y gastric bypass.
CT scan: Computerized Tomography.
The table outlines the CT scan, intraoperative findings of diagnostic laparoscopies done for RYGB patients performed at our institution compared to other institutions.

most if not all don't close Petersen space and some close JJ defect which corresponds with our findings of 90% Petersen space hernia in patients who had RYGB at other institutions. In contrast, Eckhauser et al. have reported that the location of internal hernia was quite variable and least likely to be in Petersen space.[11] It is possible that some patients with internal hernia after RYGB have a delay in diagnosis because surgeons are reluctant to offer surgical intervention (laparoscopy) when the CT scan of the Abdomen and pelvis is negative. Our study shows that algorithm for management of pain after RYGB possibly needs to involve performing diagnostic laparoscopy if the patient presents with acute severe pain or if the pain is recurrent even in the presence of negative radiologic studies including CT scan of the Abdomen and Pelvis. In addition, the study shows that the strategy of closing all mesenteric defects in a continuous fashion using non-absorbable suture and having this aggressive strategy can lead to a low internal hernia rate <1% and low morbidity from internal hernia after RYGB.

Our study has several limitations; it is a retrospective series of RYGB. In addition, despite our center being the main referral center for complications after bariatric surgery, it is possible that we missed patients who had diagnostic laparoscopic or had internal hernia who were treated elsewhere. Furthermore, it is possible that we have missed patients with internal hernia especially patients who had RYGB most recently. Finally, we cannot conclude that our technique has a lower internal hernia rate than RYGB done at other institutions.

Conclusion

Diagnostic laparoscopy is more accurate than CT scan of the abdomen in patients presenting with abdominal pain after RYGB and might help identify internal hernias in patients with pain and a normal CT scan after RYGB.

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Declaration of competing interest

The authors A. Altinoz, A. Nimeri, F. Jouhar, A. Babiker, M. Ibrahim, T. Al Shaban and A. Maasher declare that they have no conflict of interest financial or otherwise to disclose.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amjsurg.2019.10.034.

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