

# A comparison of the outcomes revision of the Roux-en-Y and Mini-Gastric Bypass: hard vs. easy

Robert Rutledge,<sup>1</sup> K.S. Kular,<sup>2</sup> Naveen Manchanda,<sup>3</sup> Mohit Bhandari,<sup>4</sup> Rajat Goel<sup>4</sup>

<sup>1</sup>Center Laparoscopic Obesity Surgery, Henderson NV

<sup>2</sup>Kular Group of Institutes, Kular Hospital, Bija, Ludhiana

<sup>3</sup>Department of General Surgery, Kular Hospital, Bija, Ludhiana

<sup>4</sup>Sri Aurobindo Institute of Medical Sciences, India

## ABSTRACT

The Mini-Gastric Bypass (MGB) is growing in popularity. Roux-en-Y gastric bypass (RNY) is one of the most common forms of bariatric surgery. The purpose of this paper was to review some of the recent research reporting outcomes of RNY and MGB and to compare the reported results with special attention to leak and complication rates after revision of MGB and RNY. Although there are reports of RNY with good outcomes, many reports document RNY to be a technically difficult procedure with reported complication rates as high as 10% to 30%. In review of recent papers, revision of RNY was associated with roughly double the rate of leaks and complications compared with primary RNY: 20% to 40%. RNY is one of the most commonly performed forms of bariatric surgery. Primary RNY and RNY revision are technically challenging, with moderately high reported leak and complication rates. Numerous studies of MGB have reported the operation to be straightforward with low risk of complications, leak, or bile reflux. Reports of complications or leak after MGB revision are also quite low, and revision is reported to be "easily done."

**Keywords:** Complications; gastric bypass; leak; obesity; surgery.

## Introduction

The world of bariatric surgery is undergoing rapid changes. Some procedures are on the rise (Sleeve), while others are in decline (Band). Surgeons and patients are seeing more and more failures of primary bariatric operations over time. Thus there is growing need for revision surgery. While there is a large literature on revision of sleeve, band and Roux-en-Y gastric bypass (RNY), the revision of Mini-Gastric Bypass (MGB) is not well documented. The

purpose of this study was to report on review of literature on MGB revisions and compare the results in MGB to recent report of revision in RNY.

Although it contains a duodenal bypass, the RNY is primarily a restrictive procedure. It is hypothesized that the small intestine adapts increasing food intake and absorption, making it less successful in maintaining weight loss over



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Correspondence: Robert Rutledge, M.D., Director Center Laparoscopic Obesity Surgery, 1000 North Green Valley Parkway, Suite 440 box 492, Henderson NV 89074

e-mail: DrR@clos.net

a long term. The MGB has both a restrictive (long gastric sleeve) and a malabsorptive components (bypass segment).

The purpose of this study was to review recent data on the reported outcomes of primary RNY and RNY revision and compare these reported results to the reported outcomes of primary MGB and MGB revisions.

## Materials and Methods

Recently Mahawar and Musella have reported reviews of the publications on the outcomes of MGB.<sup>[1,2]</sup> These and other reports on the outcomes of the MGB were used in comparison to recent high quality reports on the outcomes of RNY, with specific attention to complications and leaks following revisions. Because of the well known publication bias this was not a formal meta-analysis but qualitative review of recent publications.

## Results

### Complications and Leak After RNY and RNY Revision

Although there are many reports of good results in primary RNY a recent study published in JAMA was noted for its remarkably high complication and leak rate. There were 22 serious complications occurred in 60 (36%) RNY patients with two most serious complications anastomotic leaks (3.3%) and one patient suffered anoxic brain injury and amputation of his leg. In addition RNY patients were more likely to have serious complications.<sup>[3]</sup> This randomized prospective controlled trial is notable for the fact that the study included some of the best surgeons and hospitals in the world, yet the complication rates were on the face of it unacceptable 3% leak rate and 30% complication rate in relatively healthy patients.

In another recent study of both primary RNY and RNY revisions, early complications were recorded in 37 (10.2%) patients after primary RNYs and in 24 (22.2%) patients after revision RNY's ( $p < 0.01$ ).<sup>[4]</sup> In the study reoperation in 12 (3.3%) patients after primary RNYs and in 9 (8.3%) patients after revision RNY's ( $p = 0.03$ ). Revisions increase the risk of complications by two fold. In another study there were 8 leaks (0.95%) after primary RNYs and 5 leaks (4.2%) after RNY revisions, an increase in leak rate of four fold after revision.<sup>[5]</sup> In a study of revision of lap band to RNY, revision to RNY after failed laparoscopic gastric banding revealed early complications in 11 (18%) patients, 4 anastomotic leaks (6%), 20% late complications requir-

ing surgery. That is 1 in 5 required reoperation with one death (1.6%).<sup>[6]</sup> In another study of revisions there was an 11% leak rate revising RNYs and leaks increased after revision (11% vs. 1.2%), 1 out of every 10 patients.

There was a 24% (13/55) 90 day readmission rate. One out of every 4 patients require a reoperation. Revisions increased the leak rate five fold.<sup>[7]</sup> In another study pouch resizing for Roux-en-Y was similarly high risk. For example 6 (30%) patients developed complications. Acute abdomen due to volvulus of the small bowel in 1, intra-abdominal abscess in 3, pulmonary embolus in 2 and revision patients had 30% complications.<sup>[8]</sup> In addition review of report rates of Small bowel obstruction (SBO) of 1–16%.<sup>[9]</sup>

### Series of Mini-Gastric Bypass Reported at the European Chapter of IFSO<sup>[10]</sup>

MGB Very Effective & Very Safe

MGB Series

Rutledge U.S.A. 6000 + (16 yr + FU)

Cady France 2000 +

Peraglie U.S.A. 2000 +

Carbajo Spain 2000 +

Noun Lebanon 1000

Lee Taiwan 1000 + (RCT, 10 yr + FU)

Kular India 1000+

Garcia-Caballero Spain 1000 +

Musella et al. Italy 1000(1)

Others (i.e. Chevallier Paris 700, Tacchino Rome 500, etc.)

### Reports of MGB and Revision of MGB

In general the reported studies on MGB are relatively uniform in their assessment of MGB outcomes. For example Noun et al. reported on "One Thousand Consecutive Minigastric Bypass".<sup>[11]</sup> The reported operative time and length of stay for primary vs. revisional MGB were 89±12 min vs. 144±15 min ( $p < 0.01$ ) and 1.8±0.8 day vs. 2.3±1.9 day ( $p < 0.01$ ). Short-term complications were low at 2.7%. Leak occurred in 5 (0.5%) of patients. Excessive weight loss occurred in four patients and again noun reports the MGB was "easily revised". The percent excess weight loss (EWL) was good at 72.5% occurred at 18 months. The 50% EWL was achieved for 95% of patients at 18 months and for 89.8% at 60 months.

### Bile Reflux

Many critics of the MGB have raised fears in the inexpe-

rienced that the Billroth II used in the MGB would result in severe and crippling bile reflux symptoms. In this series only 4 (0.4%) of the 1000 patients had significant bile reflux. In these 4 patients this was easily treated by stapled lateral jejunum-jejunostomy (Braun). They concluded that the “MGB is an effective, relatively low-risk, and low-failure bariatric procedure.” Furthermore they stated “In addition, it can be easily revised, converted, or reversed.” Note this statement “easily revised, converted, or reversed” never appeared in a report on RNY revision.

Recent review studies by Mahawar and Musella so similar results with overall complication rates in recent studies of 1-5% and leak rates of 0.5 to 1%.<sup>[1,2]</sup>

Controlled Prospective Randomized Trial of MGB vs. RNY One of the more powerful studies of MGB is the randomized prospective trial of MGB vs. RNY by Lee et al.<sup>[12]</sup> The study found the MGB superior to RNY in complication rate, length of stay and operation time. In another study by Lee resolution of diabetes at 12 months was essentially twice as good as Sleeve Gastrectomy (Sleeve 47% vs. 93% for MGB) note in the controlled trial of RNY reported in JAMA the resolution of diabetes was 44% at 12 months again 1/2 the rate of MGB.<sup>[13]</sup>

### Revisional Surgery for Laparoscopic Mini-Gastric Bypass (Dr. Lee)<sup>[14]</sup>

Again the studies of Lee and colleagues turns out to be instructive on this issue. In Lee's series of 1322 patients followed for 9 years, he reports only 2% of his MGB patients required revision. In 3 patients out of 1322, revision was required for bile reflux (0.2%). In all revision procedures the operation was performed laparoscopically. And, most importantly for this paper Lee reports “No major complications. 0.0%” for any revision! Again 1322 patients, followed for 9 years ONLY 2% revisions and no major complications (0.0%).

In the study by Mussella of 974 MGB patients reported outcomes from 6 centers in Italy found that their experience demonstrated the MGB to be a short, simple, low-risk, effective, and durable bariatric procedure.<sup>[1]</sup>

## Discussion

In a recent commentary published in JAMA Edward H. Livingston noted that “Accumulating evidence suggests there is no economic benefit for weight loss surgery” specifically referring to a long term study of RNY and Band

patients.<sup>[15]</sup> Furthermore Livingston wrote: “Long-term follow-up from the Swedish Obese Subjects study reported in JAMA showed that although fewer medications were used by bariatric patients compared with controls, the bariatric patients used substantially more hospital resources. A formal cost-effectiveness study using very high-quality data from the US Department of Veterans Affairs did not show a cost benefit for Roux-en-Y gastric bypass. In this issue of JAMA Surgery, an analysis of claims paid by BlueCross BlueShield for bariatric surgery patients for as long as 6 postoperative years failed to demonstrate a cost benefit for weight loss surgery. Coupled with findings that bariatric surgery confers little to no long-term survival benefit, these observations show that bariatric surgery does not provide an overall societal benefit.” This and other studies raise concerns about the RNY.

This review has four primary findings. First, RNY is a technically complex and difficult procedure with moderately high reported rates of complications and leaks in many series. Most studies on RNY report moderate to high risk of post operative small bowel obstruction (SBO). Secondly, revision of RNY is also complex and difficult with many studies reporting complication and leak rates double that of primary RNY. Thirdly, recent reviews of MGB studies show the MGB to be a straight forward procedure with low reported risk of leaks and complications. Most studies of the MGB report very low risk of bile reflux and SBO. Finally studies on revision of MGB report it to be “easy” with very low rates of leaks and complications.

As the number of bariatric procedures has grown so has the number of failures that present with need for consideration for revision. Failure of various bariatric operations requires consideration for revision. The MGB is procedure that is growing in worldwide popularity. This paper undertook a review of recently reported results of MGB in comparison with the RNY special attention to the results of revision of MGB as compared to revision of RNY.

### The RNY is Technically Demanding (500 Cases Learning Curve)

Most surgeons agree that the RNY and RNY revision are technically difficult procedures. A survey of 100 bariatric surgeons performed as part of the First Annual Mini-Gastric Bypass Consensus Conference held in Paris 2012 revealed that the RNY was rated by far as the most technically difficult to perform operation as compared to the Band/Sleeve/MGB. Other studies have commented on the

technical difficulty of the RNY and it has been estimated that the “learning curve” for the RNY is 500 cases.<sup>[16]</sup>

While there are studies that show excellent results with the RNY a recent Controlled Prospective Randomized Trial Study of RNY JAMA 2013 shows very concerning results.<sup>[3]</sup> This study included some of the best surgeons and hospitals in the world. It was a controlled prospective randomized trial in relatively healthy patients. At 12 months only 44% had normal HgbA1c levels and 37% of patients sustained serious complications and 3.3% of patients had a leak and 1 patient suffered anoxic brain injury and leg amputation.

### Revision of RNY

The reasons for revision of for the RNY are primarily weight regain or inadequate weight loss. Other reasons include marginal ulcer and bowel obstruction but since such revisions are frequently urgent or semi urgent they are excluded for most these reported series.

**Techniques of RNY revision:** A variety of techniques of RNY revision have been reported including: narrow GJ, narrow pouch, lengthen roux limb, convert to sleeve, band to pouch, convert to BPD, limb-o-plasty (Gagner). The goal of this paper is not to review the technical details of these various procedures as it is clear from the reported data that the majority of these techniques are moderately to very dangerous and result in little to moderate weight loss, with none showing any marked superiority.

**Complications after RNY and revision RNY:** In this paper many studies reported that the RNY was associated with moderate to high levels of complications and leaks. In addition, although not all studies agree, many studies show that RNY revisions result in roughly twice as many leaks and complications. With several studies reporting 10% leak rates and 40% complication rates.

### The Reported Results of the MGB

The Mini-Bypass was initially greeted with skepticism by American surgeons because of the bad experience with “old Mason Loop” Gastric bypass. When first presented at the ASBS meeting dozens of bariatric surgeons lined up at the microphones to comment on the “new” Mini-Gastric Bypass.<sup>[17]</sup> Essentially every one of the commenters had the same thing to say. “The Loop form of gastric bypass has been tried (i.e. Mason Loop) and it was and always will be a failure”.

The Mason loop patients had suffered from a combination of catastrophic leaks and bile reflux esophagitis. When the MGB was first presented there was widespread opinion that the MGB was simply a version of the old Mason loop and along with the use of the benighted and discredited Billroth II, would come the expected complications, i.e. catastrophic leaks and crippling bile reflux. The critics showed complete blindness to the 100 year history of general abdominal gastric and more specifically peptic ulcer, cancer and trauma surgery. The MGB uses a loop (Billroth II) therefore the MGB and it’s patients will suffer the tragic complications that were suffered by the old Mason Loop patients.

Time has proved the skeptics wrong. Although still used rarely in its home country because of the poorly founded skepticism described above, the MGB is rapidly gaining worldwide support. This increased utilization follows the early work of a small number of intrepid surgeons who had the wherewithal to look beyond the loud but ultimately incorrect criticism of the MGB. These early adopters have led to an increasing number of reports of large series of MGB with low risks and good outcomes.

### Review of Published Series and Controlled Trials of the MGB; One of the Most Effective & Safest Series of Bariatric Surgery<sup>[2]</sup>

As recently reviewed by Mahawar and Musella’s papers,<sup>[1,2]</sup> the published MGB series findings are all essentially the same: they report the MGB as a straight forward operation with a short operation time, with low risk of both short and long term complications and excellent short and long term weight loss 75–100% EWL.<sup>[18,19]</sup> The studies that report on revision of MGB report that the revision of the MGB is “easy” with very low risk of complications (0–2%) almost an order of magnitude less than reported for RNY. Also of note, is the fact that numerous critics of the MGB predicted wrongly that the patients would be devastated by severe bile reflux symptoms. As shown in the recent papers of Musella and Mahawar every study of the MGB reports extremely low rates of significant bile reflux, although it does occur.<sup>[20]</sup> In those rare cases that bile reflux does occur all reports describe the fact that it is easily treated by short laparoscopic revision, usually with Braun side to side jejuno-jejunostomy.

### Revision of MGB

The reasons for revision of the MGB are similar to the RNY although they notably do not include reports of small bowel obstruction. The reasons include inadequate/ex-

cess weight loss/weight regain/other.

In contrast to the RNY all writers who report on revision of the MGB state that it is technically very easy to revise. The steps in revision are simply division of the gastro-jejunos-tomy at the anastomosis and then shortening or lengthening the bypass or alternatively completely taking down the bypass by performing a gastro-gastrostomy.

This review of MGB studies found the following: major complications after primary MGB are low (2–5%), major complications after revision MGB are similarly very low (0–5%). Successful weight loss after primary MGB is excellent (76–97%) and successful weight loss after revision MGB is good as well (+35–40%). And finally although bile reflux does indeed occur it is extremely uncommon (1–5% over 10–15 years) and certainly much much less common than small bowel obstruction after RNY.

## Conclusion

After reviewing recent literature on primary RNY and MGB and revision of RNY and MGB these studies show that the RNY is a technically complex, primarily restrictive operation with a significant learning curve. Some recent RNY series report relatively high complication, leak and bowel obstruction rates and these rates of complications and leaks roughly double in reports on revision of RNY. In contrast, the MGB has emerged as a straight forward combined restrictive and malabsorptive procedure, with a short learning curve and low complication and leak rates for both primary and revision surgery. There appears to be little risk of significant bile reflux in long term studies of the MGB. MGB is a bariatric procedure which is safe, very effective, easily revisable and easily reproducible.

## Disclosures

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

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