

## Original Research Article

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# Outcomes of revisional bariatric surgery at a regional centre in United Kingdom

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## ABSTRACT

**Background:** Bariatric surgery has now been well established for long enough that revisional procedures have become more numerous and common, the importance to evaluate services and establish good evidence for our knowledge surrounding reoperations is vital.

**Methods:** A retrospective analysis was conducted, for patients undergone revisional bariatric surgery between June 2010 and July 2017 at a single tertiary centre in the United Kingdom (UK). Revision rates and weight loss for the most common bariatric procedures were established, as well as the documented indications. Data was analysed with Mann-Whitney-U test.

**Results:** The 1619 bariatric procedures were recorded, of which 61 were revisional weight loss procedures. The most common performed primary procedure was gastric bypass (678). Revision rate for gastric band was highest (7%), followed by gastric bypass 5.6% and 2.60% for sleeve gastrectomy. The overall revision rate was 5%. Best weight loss outcomes were shown in conversion of gastric band to sleeve gastrectomy. Main indication for revision weight regain (30%) followed by gastric reflux (21%). Mean duration between primary and revisional procedure was 7 years.

**Conclusions:** Most revisional surgery is performed within the first decade of primary procedure, with weight regain and GORD being most common causes. It is important that revisional surgery, its indications, prevalence, and risks are discussed with patients at the time of primary bariatric surgery.

**Keywords:** Revisional surgery, Weight loss surgery, Bariatric surgery, Obesity surgery

## INTRODUCTION

Bariatric surgery is a well-established treatment modality for weight loss. Various types of bariatric procedures are in practice, and no single procedure is considered as standard, as the practice is varied between individual surgeons, regions and patient preference.<sup>1-3</sup> Every procedure is associated with variable clinical outcomes and complications. Commonly measured outcomes are weight loss, improvement in co-morbidities and complications.<sup>4</sup> It is regarded as a life changing procedure involving a change in anatomy, lifestyle, and psychology. Factors which impact on the clinical and psychological

outcome of patients still need to be fully understood.<sup>5</sup> While many centres report successful outcomes, incidence of revisional bariatric surgery is also rising. Revisional surgery is defined as surgery following a primary bariatric procedure for either a complication or failure to achieve desired outcomes.<sup>6</sup> With a growing population having undergone bariatric surgery along with a longer follow up duration, weight loss surgery has now entered a new phase where provision of revisional weight loss procedures also forms a cornerstone of the service. Similar to primary procedures, there is no single dominant revisional procedure. Any revisional surgery and particularly bariatric revisional surgery is a

challenging undertaking for surgeons, therefore its indications and risks need to be balanced, as it comes with its own caveats. The safety, efficacy, and complications of revisional bariatric procedures is a rising subject of interest.<sup>6</sup>

In order to improve the outcomes of revisional surgery it is prudent to share experience to better establish the safety and outcomes of revisional procedures. The aim of this study is to look at the outcomes of revisional weight loss surgery at a tertiary bariatric centre in the United Kingdom.

## METHODS

Retrospective analysis of an electronically maintained prospective database of all bariatric surgeries, performed at Walsall Manor hospital UK between June 2010 and July 2017, was conducted.

All revisional bariatric procedures where weight loss mechanism was maintained were included in the analysis. Any revisional procedures, where weight loss mechanism was reversed, were excluded from analysis.

Data collection included patient demographics, primary procedure and its outcomes, indication for revision, duration between primary and revisional procedure, type of revision, and its outcomes. Primary outcomes were weight loss and indications for revisional surgery. As a secondary outcome, data was analysed to compare different revisional procedures. Follow up data was collected up to two years after revisional procedure.

Patients who had undergone revisional surgery for reasons other than achieving further weight loss, e.g., correction of gastric band or reversal, were excluded from the weight loss analysis. Details of complications after revisional procedures were also recorded. Weight loss and weight regain, were defined as post-operative changes in BMI at the time of follow-up compared to the baseline BMI on initial presentation.

Patients either self-presented or were referred by their general physician after being discharged from follow up subsequent to their primary surgery. The revisional cases were discussed individually at the bariatric MDT involving surgeon, physician, specialist nurse and dietitian, psychologist and endocrinologist. The decision to perform revisional surgery was made on a case-to-case basis.

Revisional procedure was tailored to the clinical indication. All revisional procedures were performed laparoscopically.

When sleeve gastrectomy was performed as a revisional procedure, it was done as a standard primary sleeve. Use of bougie was at the surgeon's discretion. Standard

laparoscopic staplers were used. The aim was to remove 2/3rds of the stomach including majority the fundus.

Roux en Y gastric bypass revision was mostly for pouch excision candy cane or gastro jejunostomy revision. This was performed using a standard laparoscopic stapler and excision any redundant or excessive stomach or small bowel. The Alimentary limb length was decided on clinical grounds and ranged from 100-150 cm. For any GJ ulcer or anastomotic stricture, the anastomosis was re done using standard 45 mm stapler.

For a mini gastric bypass, the gastro-jejunal anastomosis was made with a 45 mm stapler at 130-200 cm from duodeno-jejunal flexure.

An ethical approval was not required for this study; however, all data was maintained in a hospital-based PC with all patient confidentiality taken into consideration. Data analysis was done using anonymised data.

Results were tabulated on a Microsoft® excel spread sheet (Excel for Windows®; Microsoft corporation, Redmond, Washington, USA) and then analysed using SPSS® for Windows® (SPSS, Chicago, Illinois, USA). Data was analysed using the Mann-Whitney-U test.

## RESULTS

The 1619 bariatric procedures were recorded, 1267 were primary procedures and 67 procedures were for revisional surgery where weight loss mechanism was modified or maintained. Six patients with gastroplasty were excluded as their peri-operative data of primary procedure was not available. 61 patients were included in the final analysis, 12 male and 49 female, with a mean age of 52 (range 40-65).

Mean BMI before primary procedure was 50 (34-73) (Table 1). Mean percent excess weight loss (EWL) achieved after primary procedure was 32% (-41-122) and the mean BMI was 41 (25-56).

Pre revisional surgery mean BMI was 42 (20-72) and %EWL 37% (-41-193). At 6 months follow up the mean post-operative BMI was 36 (18-51) and %EWL was 48% (20-119), p=0.02. At 24 months follow up the post-operative mean BMI was 32 and %EWL was 80%, p=0.004.

**Table 1: Demographics of patients.**

Variables	N
<b>Total patients</b>	61
<b>M:F</b>	12:49
<b>Age (years)</b>	52 (40-65)
<b>Mean initial BMI at primary procedure (kg/m<sup>2</sup>)</b>	50 (34-73)

Overall rate of revisional surgery was 4.8%. Gastric bands had the highest revision rate (7%), followed by gastric bypass (5.6%) and sleeve gastrectomy (2.6%) (Table 2).

Mean duration between primary and revisional surgery 7 years (1-12 years). Common indication for revision was weight regain 30%, followed by GORD 21% and dysphagia 13% (Table 3). Two post-op complications (2.8%) required return to theatre due to staple line bleed and stricture at gastro-jejunal anastomosis.

**Table 2: Frequency of primary surgery and its revision rate.**

Primary surgery	Performed, N (%)	Conversion/ revision	Revised (%)
<b>Gastric bypass</b>	678 (54)	38	5.60
<b>Sleeve gastrectomy</b>	421 (33)	11	2.60
<b>Gastric band</b>	168 (13)	12	7

The most common revisional surgery was revision of gastric bypass (38), followed by gastric sleeve to gastric bypass (11). The greatest average BMI reduction following revision was seen in gastric band to sleeve gastrectomy (50 to 27), followed by gastric sleeve to gastric bypass (34 to 27) (Table 4).

**Table 3: Indications for revisional surgery.**

Indication for revisional surgery	N
<b>Weight regain (2 with gastro gastric fistula, 3 with candy cane)</b>	18
<b>GORD</b>	13
<b>Dysphagia</b>	8
<b>Anastomotic stricture at GJ</b>	5
<b>Anastomotic ulcer + dysphagia + candy cane</b>	4
<b>Intolerance/malnutrition</b>	3
<b>Distension of gastric pouch</b>	2
<b>Band slippage</b>	2
<b>Abdominal pain and candy cane</b>	2
<b>Persistent diarrhoea</b>	1
<b>Leak post sleeve gastrectomy</b>	1
<b>Enterocutaneous fistula</b>	2

**Table 4: BMI prior and following primary and revision surgery.**

Variables	N	BMI at primary surgery	BMI post primary procedure (%EWL)	BMI pre revisional surgery	BMI 6 m post revisional surgery (%EWL)	BMI 24 m post revisional surgery (%)
<b>Gastric band to Roux-en-Y bypass</b>	3	45	43 (25)	44	36 (41)	36 (41)
<b>Gastric band to mini bypass</b>	3	57.5	50 (25)	57	42 (38)	NA, LF
<b>Gastric band to sleeve</b>	6	45	45	50	41 (20)	27 (85)
<b>Gastric sleeve to Roux-en-Y bypass</b>	11	46	38 (47)	34	32 (72)	27 (99)
<b>Revision of gastric bypass</b>	38	50	38 (40)	43	37 (42)	35 (46)

BMI kg/m<sup>2</sup>, EWL=Excess weight loss. NA=not available LF=Lost follow-up.

## DISCUSSION

Obesity epidemic is now a well-recognised major health concern, which also has significant direct and indirect cost implications; the NHS spent an estimated £6.1 billion in 2014/15 on overweight and obesity-related illnesses, with an estimated total of direct and indirect cost to society estimated at £27 billion.<sup>7</sup> Therefore, it cannot be over emphasized that its remedial measures are robust and largely bound to succeed. All interventions have a failure rate and as an intervention evolves, healthcare develops with it to tackle the reasons for its failure.

This study has shown that there is a 4.8% incidence of revisional bariatric surgery, compared to the 9.4% reported in a study from US in 2013, and that of other studies reported rates between 6.3% up to 26%.<sup>8-11</sup>

In this study the highest rate of revision was for gastric band followed by gastric bypass. Revision of gastric bypass commonly involved excision of dilated gastric

pouch, revision of the gastro-jejunostomy and/or excision of candy cane (excessive length of roux limb beyond the gastro-jejunostomy). Rarely the roux limb required adjustment to correct diarrhoea or mal-absorption.

Large scale studies in Sweden and USA have shown similar results, with gastric band procedures having the highest rates of revision, most commonly due to band migration, slippage, stenosis, or nausea/vomiting.<sup>9,12</sup> Literature review of smaller studies show common indications for revision of Roux-en-Y gastric bypass and sleeve gastrectomy were mainly due to weight gain and gastric reflux respectively.<sup>13,14</sup>

It is known that a lot of variation exists in the practice of weight loss surgery either regionally, centre based or even down to patient preference. Similarly, there is no ideal revisional procedure and its practice is also varied. In some cases, revisional surgery can be planned at the time of primary surgery as a two staged weight loss procedure; this is mostly in the cases of the super obesity.<sup>15,16</sup>

The reported data has shown that revisional surgery was required after a mean of 7 years after primary surgery. This high incidence of revisional surgery, particularly within the first decade of the primary procedure, is in line with existing studies.<sup>9,12</sup> It was observed in this study that patients who required revisional surgery were approaching their pre-surgery obesity levels at the time of revision; this was more obvious in the patient group who had gastric banding as a primary procedure. In some cases of sleeve gastrectomy, the procedure was performed because of gastro oesophageal reflux. Conversion of gastric sleeve to a Roux-en-Y bypass showed better weight loss; a strategy that can be utilized in the staged approach for super obese.<sup>15,16</sup>

Revisional bariatric surgery is not risk free, with higher complication rates compared to primary surgery for reasons similar to revisional surgeries in other specialities. In this study the complication rate was 2.8%; complication rates typically range from 3.5 to 11.9%.<sup>17</sup> Encouragingly this study shows a satisfactory weight loss was achieved after revisional surgery at 41-99%, compared to 45.9-74.1% (depending on procedure) shown in relevant systematic reviews.<sup>18</sup>

Notably, both revision rates and complication rates were lower in our data compared to the literature; whether this represents genuinely lower rates is difficult to assess given the small sample size, particularly for gastric banding and sleeves. However, given the great heterogeneity in surgical procedures and patient care between centres, it is plausible that this difference is indeed genuine. Another explanation may owe to the study dates; studies examining data from earlier periods may reflect a learning curve in outcomes associated with revisional bariatric surgery having been an emerging field at that time.

Prior to considering revisional surgery on an individual patient, it is important that patients undergo a complete investigative work up, MDT discussion and psychologist assessment.<sup>19</sup> Anatomic/technical cause and patient factors should also be considered.<sup>6</sup> Patient lifestyle factors can precipitate failure and a reduction in benefit hence these should be considered prior to revisional surgery.<sup>5,20</sup> Furthermore, bariatric surgeries are life-changing procedures, it is vital that patients are well informed about their expectations after surgery, especially factors that can cause failure to achieve desired outcomes. Lastly, given the higher complication rates in revisional surgery, it is advisable that they performed in well-supported, high-volume tertiary bariatric centres.<sup>6</sup>

There are some limitations to this study, it is a retrospective study, number of revisional cases was low despite a high-volume centre, but this is in keeping with a 5% revisional rate reported in literature. Some patients had to be excluded as data of their primary procedures was not available, these not performed at our hospital.

## CONCLUSION

The worldwide incidence of revisional bariatric surgery is rising as more patients are added to the follow-up pool of primary bariatric procedures. Indications for revisional surgery vary depending on the primary procedure but the most common indications are weight regain and gastro-oesophageal reflux. At our tertiary centre, gastric bypass was the most commonly performed primary procedure. The overall revision rate was 4.8%, ranging from 2.6% for sleeve gastrectomy to 7% for gastric banding. The greatest weight loss pre-primary to post-revision procedure was seen in the gastric sleeve to Roux-en-Y gastric bypass group, while the greatest pre-revision to post-revision weight loss was seen in the band to sleeve group. Complication rates were relatively low and weight loss within expected levels, when compared to other studies.

This study adds to the existing evidence base for revisional bariatric surgery. There is a continued need in bariatric surgery to emphasize the use of good, multi-disciplinary pre-surgical evaluation of candidates, and well-organized support post-surgery, and that is even more true for revisional bariatrics in particular.

We conclude that for a patient undergoing a primary procedure, revisional surgery is a very real possibility and should be discussed at initial consultation.

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