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CLINICAL REPORT

Impact of Bariatric Fellowship Training on Perioperative Outcomes for Laparoscopic Roux-en-Y Gastric Bypass in the First Year as Consultant Surgeon

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Abstract There have been few reports of improved perioperative outcomes for laparoscopic gastric bypass in the surgeon's independent practice following completion of fellowship training but none from outside of USA. The aim was to evaluate the impact of fellowship training on perioperative outcomes for gastric bypass in the first year as consultant surgeon. Data of all patients undergoing primary bariatric procedures by the author were extracted from prospectively maintained database. Patients who underwent laparoscopic sleeve gastrectomy and gastric banding were excluded. Data on patient demographics, operative time, conversion to open, length of stay, 30-day complications and mortality were analysed. The Obesity Surgery Mortality Risk Score (OS-MRS) was used for risk stratification. The risk score and perioperative outcomes were compared to mentors' post-learning curve results from host training institution. Out of 83 primary bariatric procedures performed, 74 (63 females, 11 males) were gastric bypasses in first year. The mean age was 45.1 (25–66) years and body mass index was 47.7 (36–57) kg/m^2. There were no immediate postoperative complications, no conversions to open surgery and no mortality. One patient was re-admitted within 30 days (1.4%) with small bowel obstruction following internal hernia and needed re-laparoscopy. As compared with host training institution, the OS-MRS distribution and perioperative outcomes of the author did not differ significantly from that of mentors' post-learning curve results. Bariatric fellowship ensured skills acquisition for the author to safely and effectively perform gastric bypass without any learning curve and with surgical outcomes similar to that of experienced mentor at host training institution. Fellowships should be an essential part of bariatric training worldwide.

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Introduction

Bariatric surgery is the fastest growing surgical specialty worldwide. It has been proven to be the only effective, long-term treatment for morbid obesity [1], the prevalence of which is increasing. Roux-en-Y gastric bypass is the commonest bariatric procedure worldwide. Out of 344,221 bariatric procedures performed in 2008, 39.7% were laparoscopic Roux-en Y gastric bypass (LRYGB), with its popularity increasing in Europe [2].

LRYGB is a technically challenging operation, with a long learning curve. Early on, many surgeons began performing bariatric surgery without any formal training. Today, the challenge is to ensure that surgeons performing gastric bypass are trained appropriately. It has been suggested that fellowship training in advanced laparoscopy and bariatric surgery can attenuate or even eliminate the learning curve for LRYGB. There have been few reports from USA demonstrating improved perioperative outcomes and lower complications with LRYGB in the surgeon's independent practice following completion of fellowship training [3–5]. There are no similar studies published from outside the USA.

The aim of this study was to evaluate the impact of bariatric fellowship training on perioperative outcomes for LRYGB in the first year as consultant surgeon by comparing it to the mentors' post-learning curve results from the host training institution.

Materials and Methods

Following completion of higher surgical training (Certificate of Completion of Training) in the West Midlands deanery, the author undertook a 1-year fellowship in bariatric and upper gastrointestinal (GI) surgery with emphasis on laparoscopic gastric bypass under the National Surgical Fellowship scheme [6] through the Royal College of Surgeons of England in partnership with the Surgical Specialist Associations at Musgrove Park Hospital, Taunton, UK. The bariatric unit in Taunton is one of two centres in the UK accredited as 'International Centers of Excellence' by the American Society for Metabolic and Bariatric Surgery (ASMBS). In addition, the author spent 10 weeks with Dr. Bruno Dillemans in Bruges, Belgium after being awarded an Association of Surgeons in Training bariatric fellowship. Bariatric experience of the author in higher surgical training; Taunton and Belgium are shown in Table 1. The author then joined Homerton University Hospital, London as Consultant Bariatric and Upper GI Surgeon in March, 2010.

Prospective analysis of all patients undergoing primary bariatric procedures by the author in his first year as consultant surgeon was performed. Patients who underwent laparoscopic sleeve gastrectomy and laparoscopic adjustable gastric banding were excluded from the study. Data on patient demographics, operative times, length of hospital stay, conversion to open surgery, perioperative complications and mortality were analysed. Operative times were defined as the time between the initial skin incision and the final skin suture. Perioperative complications were considered to be complications occurring within 30 days of surgery. Weight loss data were also recorded during follow-up visits.

The Obesity Surgery Mortality Risk Score (OS-MRS) was used for risk stratification to compare the authors with the host training institution series. The OS-MRS assigns one point to each of five preoperative clinical risk factors: body mass index (BMI) above 50, male sex, hypertension, known risk factors for pulmonary embolism (previous venous thromboembolism, inferior vena cava filter, obesity hypoventilation and right heart failure/pulmonary hypertension) and age >45 years. Patients with score 0 to 1 are classified as 'A' (lowest) risk group, scores 2 to 3 as 'B' (intermediate) risk group and score 4 to 5 as 'C' (high) risk group [7]. The perioperative outcomes of the author were compared to the mentors' post-learning curve results [8].

Microsoft Excel was used for data management. SPSS statistical software (SPSS Inc., Chicago, IL, USA) was used to analyse the results. Data in Table 2 are expressed as mean. The χ^2 test or the Fisher's exact test (when numbers were small) was used for categorical data. The unpaired t test was used for parametric data. Results were considered significant if $p<0.05$.

Table 1 Bariatric experience prior to appointment as consultant surgeon

Procedure	Assisted	Performed	Total
Bariatric experience in higher surgical training			
Laparoscopic Roux-en-Y gastric bypass	3	0	3
Laparoscopic gastric band	20	29	49
Bariatric experience in Taunton			
Laparoscopic Roux-en-Y gastric bypass (complete)	40	65	105
Laparoscopic gastric band	4	16	20
Laparoscopic sleeve gastrectomy	2	0	2
Intragastric balloon	4	8	12
Revisional bariatric surgery	7	5	12
Bariatric experience in Belgium			
Laparoscopic Roux-en-Y gastric bypass	48	19	67
Laparoscopic gastric band	11	2	13
Laparoscopic sleeve gastrectomy	15	3	18
Revisional bariatric surgery	34	0	34
Total experience			
Laparoscopic Roux-en-Y gastric bypass (complete)	91	84	175
Laparoscopic gastric band	35	47	82
Laparoscopic sleeve gastrectomy	17	3	20
Intragastric balloon	4	8	12
Revisional bariatric surgery	41	5	46

Table 2 Patient demographics, $n=74$

Age (range), in years	45.1 (25–66)
Sex: male/female	13 / 61
Preoperative BMI (range), in kg/m^2	47.7 (36–57)
Preoperative weight (range), in kg	129.1 (85–183.5)
ASA grade: I/II/III/IV	1:53:20:0
Operating time (range), in min	160 (115–247)
Length of hospital stay (range), in days	2.3 (2–6)

BMI body mass index, *ASA* American Society of Anaesthesiologists classification

Perioperative Management and Operative Technique

All patients who underwent bariatric operations met the National Institute for Health and Clinical Excellence guidelines for the management of morbid obesity published in 2006 [9]. Thromboprophylaxis included the routine use of TED stockings and lower limb pneumatic compression devices intraoperatively and post-operatively till discharge from the hospital. In addition, all patients received 40 mg of enoxaparin (low molecular weight heparin) once daily starting 4 h post-operatively and continued for 1 week after discharge from hospital.

All operations were either performed by the author or a senior trainee assisted by the author. The LRYGB was performed with a four-abdominal trocar technique and a Nathanson liver retractor. The surgical technique was linear stapler followed by handsewn enterotomy closure for both anastomoses, a technique described elsewhere in the literature [9]. An isolated lesser curve-based, 15–20-ml gastric pouch was created, and a retocolic antegastric Roux limb was made 100 cm long for patients with a BMI equal to or less than 40 kg/m^2 and 150 cm long for patients with BMI of more than 40 kg/m^2. The biliopancreatic limb was 25 cm. The gastrojejunostomy was closed over a 30-Fr orogastric tube. A methylene blue dye leak test via orogastric tube was routinely performed. The jejunojejunostomy and Petersen's hernia defects were closed in a purse-string fashion, and the mesocolic defect was also closed.

An enhanced recovery protocol was used with patients being offered water in the recovery room with a straw. After full recovery, all patients were transferred to the general surgical ward. Ambulation was begun on the day of surgery. On first postoperative day, all patients were offered free fluids progressing to a soft pureed diet thereafter, as tolerated prior to discharge. The first postoperative review in the outpatient department was 2 weeks with the bariatric nurse specialist and the author reviewing the patient at 6 weeks after discharge.

Results

Between 23rd March, 2010 and 12nd March, 2011, 83 patients underwent primary bariatric procedures by the author. Of these, 74 (63 females, 11 males) patients had LRYGB and were included in the study. The patient demographics are listed in Table 2. The gender distribution demonstrated a preponderance of female patients (85.1%) as is often seen in a population of bariatric surgery patients. The mean age was 45.1 (range, 25–66) years and mean BMI was 47.7 (range, 36–57) kg/m^2. The majority of patients were in class II (71.6%) and III (27%) of the American Society of Anaesthesiologists classification system. The mean operative time was 160 (range, 115–247) min. The mean length of stay was 2.3 (range, 2–6) days.

Table 3 shows the OS-MRS distribution in Taunton and in this series. The number of high-risk patients (OS-MRS=C) was 3 of 74 (4.1%) in the author series. There was no significant difference in the risk profile of the authors' cohort to that of the host training institution series (Table 3).

The perioperative outcomes are listed in Table 4. There were no immediate postoperative complications in this series. One patient (1.4%) was re-admitted within 30 days with small bowel obstruction following internal hernia and needed re-laparoscopy. There were no anastomotic leaks or stricture. There were no conversions to open surgery and no mortality. As compared with the host training institution, the perioperative outcomes of the author did not differ significantly from that of the mentors' post-learning curve results (Table 4).

Discussion

Laparoscopic bariatric surgery, especially LRYGB, is a difficult operation to perform well and is associated with a low but significant risk of complications and mortality. Both the size of the obese patient and the complexity of the reconstructive procedures create major technical barriers. The operation is comprised of many complex tasks that have a small margin of error. Advanced laparoscopic skills such as suturing, stapling and dissection techniques are essential before LRYGB can safely be performed with minimal complications. All this translates into a long learning curve during which patients could be subjected to poor perioperative outcomes.

The learning curves for LRYGB have been defined variously in different studies from 50 to 100 cases [8, 10–13]. Schauer et al. reported that the learning curve for LRYGB is 100 cases [10]. Oliak et al. demonstrated a low mortality rate and conversion rate early on in the learning curve; only after 75 cases did complication rates plateau. Operative times decreased substantially during the first 75 cases and then more gradually [11]. Higa et al. reported a steady decrease in operating time that seemed to stabilise at <2 h after an experience of 100 cases [12]. Wittgrove and

Table 3 The OS-MRS distribution in the Taunton series and in this series

Centre	Class A (%)	Class B (%)	Class C (%)
Taunton series	137 (45.7)	144 (48.0)	19 (6.3)
Homerton	40 (54.0); NS	31 (41.9); NS	3 (4.1); NS

OS-MRS Obesity Surgery Mortality Risk Scoring system, *NS* not significant

Table 4 List of perioperative complications (first 30 days) in Taunton (post-learning curve) and in this series

Complication	Homerton (n=74)	Taunton (n=200)	Significance
Gastrointestinal haemorrhage	0	5 (2.5%)	NS
Anastomotic or gastric pouch leak	0	0	NS
Iatrogenic injury to bowel or other organ	0	0	NS
Pulmonary embolism	0	NM	–
Conversion to open surgery	0	2 (1%)	NS
Internal herniation	1 (1.4%)	0	NS
Anastomotic stenosis	0	0	NS
Adhesive bowel obstruction	0	2 (1%)	NS
Death	0	1 (0.5%)	NS

NS not significant, *NM* not mentioned

Clark reported a steady decrease in operative complications and operative time when they evaluated their experience in 500 consecutive cases [13]. In Taunton, Pournaras et al. showed that operating time continued to shorten and complications continued to decrease after the first 100 patients [8].

The ASMBS has recommended that surgeons should demonstrate an experience of 50 LRYGB cases with successful outcomes to be privileged to perform this operation in its published *Guidelines for Granting Privileges in Bariatric Surgery* (http://www.asbs.org/Newsite07/resources/asbs_granting_privileges.htm). Of note, the author had performed more than 80 complete primary LRYGB operations and assisted a similar number over the course of his fellowship training. Although this study was not designed to determine what number of cases is sufficient for training in LRYGB, it is possible to interpret that experience of between 75 and 100 cases as operating surgeon is sufficient to overcome the learning curve and achieve minimal perioperative complications.

For surgeons interested in laparoscopic bariatric surgery, the options for obtaining training to minimise the learning curve include 1- to 2-day courses [14], mentoring by an experienced surgeon [8], 'mini-fellowships' that range from 1 to 12 weeks in duration [15] and year-long bariatric fellowships [3–6]. Laparoscopic bariatric workshops do not provide the operative skill development and experience required to overcome the learning curve for LRYGB. Similarly, 'mini-fellowships' may not meet every trainee's needs and likely do not eliminate the learning curve. A 1-year fellowship supervised by a bariatric expert is ideal as this provides training to achieve not only baseline competency but also proficiency. Apart from overcoming the learning curve without compromising patient outcomes, other advantages include learning to manage the short and intermediate-term complications of the procedure, ability to track outcomes and being involved in a multidisciplinary approach for care of the bariatric patient.

Kothari et al. reported that fellowship training with emphasis on LRYGB provides the optimal training environment for acquisition of skills necessary to perform the operation safely and effectively [4]. Oliak et al. [3] assessed the impact of fellowship training on a surgeon's early experience with LRYGB. Of the two surgeons compared, one completed a 1-year laparoscopic surgery fellowship in which he participated in 130 LRYGB operations. The second surgeon was experienced in advanced laparoscopy and had completed 20 open gastric bypasses and a 2-day course in which he performed ten procedures on pigs. While conversion rates were comparable, the second surgeon had longer operative times, more frequent major complications and more severe complications. While this comparison by itself is inconclusive, their data support the idea that fellowship training improves perioperative outcomes during a bariatric surgeon's early experience [16]. In a recent paper [5], Ali et al. compared complication-related outcomes for the first 100 consecutive LRYGB performed by five fellows at new institutions to the outcomes for LRYGB performed during their fellowship training at the host training institution. As compared with the training institution data, the overall incidence of complications did not differ statistically from that of the mentors'. Ali et al. concluded that advanced surgical training can eliminate the learning curve associated with LRYGB [5]. In the present series, the author has compared his perioperative outcomes in the first year as consultant surgeon with the results of his mentor at the host training institution with very similar results. The author had no immediate complications with 1.4% overall perioperative (30-day) complications.

Conclusion

In conclusion, this study confirms that laparoscopic Roux-en-Y gastric bypass can be performed safely with minimal complications and without any learning curve in the first year as consultant following completion of fellowship training. Bariatric surgical fellowships should be an essential part of bariatric training worldwide.

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Conflict of Interest The author declares that he has no conflict of interest.

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