Impact of Minimally Invasive/Bariatric Surgery Fellowship on Perioperative Complications and Outcomes in the First Year of Practice

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Abstract

Background: Several reports have described worse perioperative outcomes of laparoscopic gastric bypass procedure during learning curve, which improved after completion of one-year fellowship training. Aims: The aim of this study was to evaluate the immediate impact of fellowship training on perioperative complications and outcomes of various bariatric procedures. Materials and Methods: One hundred initial patients who underwent laparoscopic gastric banding, laparoscopic Roux-en-Y gastric bypass, laparoscopic vertical sleeve gastrectomy, and robotically-assisted laparoscopic biliopancreatic diversion with duodenal switch by a single fellowship trained surgeon were analyzed. Results: Overall average Body Mass Index (BMI) of the patients was 45.9 kg/m², age was 47.5 years, and the American Society of Anesthesiologist Score was 2.89. There were no intraoperative, major 30-day complications, or open conversions. Average operative time was 62 minutes in gastric banding, 160 minutes in gastric bypass, 119 minutes in vertical sleeve gastrectomy, and 320 minutes in biliopancreatic diversion. Length of stay ranged from 0.5 day after gastric banding to 3.9 days after biliopancreatic diversion. The perioperative complications and outcomes are comparable with those reported by experienced surgeons. No mortality occurred in this series. Conclusions: Bariatric fellowship ensured skills acquisition for new surgeons to safely and effectively perform various types of bariatric operations, with minimal perioperative complications and excellent outcomes.

Keywords: Complications, Fellowship, Impact, Outcomes

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Introduction

Over the past decade, the increasing application of minimally invasive techniques has revolutionized bariatric surgery. Laparoscopic Roux-En-Y gastric bypass (LRYGB) and laparoscopic biliopancreatic diversion with duodenal switch (LBPD/DS) are currently the two most complex and technically challenging bariatric operations, and require a steep learning curve. There have been few reports that have demonstrated improved perioperative outcomes and lower complications with LRYGB in a surgeon's independent practice, after completion of a dedicated fellowship training.[1,2] The current study is designed to evaluate the impact of bariatric fellowship training on the perioperative outcomes and complications in the first 100 cases performed in an early bariatric practice.

Methods and Results

The records of 100 initial patients selected were reviewed for patient demographics, operative times, and length of hospital stay, conversion rate, perioperative complications, and mortality. Excess weight loss outcome was also recorded during follow-up visits, up to 1 year postoperatively. Case distribution consisted of the following: Laparoscopic gastric banding (LGB) \( n = 28 \), laparoscopic vertical sleeve gastrectomy (LVSG) \( n = 9 \), LRYGB \( n = 41 \), and LBPD/DS \( n = 22 \). All cases were performed by the senior author (GA), a fellowship-trained minimally invasive/bariatric surgeon. The results were compared with the outcomes...
and complications of LRYGB and LBPD/DS (both are more technically demanding than LGB and LVSG), reported by experienced bariatric surgeons at other centers.

The overall average of body mass index (BMI) was 45.9 (range: 39-62.4) kg/m², age was 47.5 (range: 21-71) years, and the American Society of Anesthesiologist (ASA) score was 2.89. There were no intraoperative, 30-day major, or minor complications (major complications were defined as anastomotic/staple line leak, bleeding, intestinal obstruction, and iatrogenic injury to other organs; minor complications include surgical site infection and other soft tissue-related complications). In the LBPD/DS group, one patient developed carpal tunnel syndrome exacerbation, and another developed port-site infection, which required a return to the operating room for skin/soft tissue debridement. The second patient had a prolonged hospital stay for 13 days. All study cases were completed using minimally invasive approach, except one patient in the LBPD/DS group, who required an open conversion related to significant intra-abdominal adhesions from prior operations [Table 1]. When the perioperative outcomes and complications were compared with those reported by Ali et al. (LRYGB performed by experienced surgeons), the incidence of anastomotic leak (0 vs. 2.6%), bleeding (0 vs. 0.2%), and intestinal obstruction (0 vs. 2.9%), did not differ significantly. [1] Our mean operative time (158 vs. 160 minutes) and rate of conversion (0 vs. 1%), were also comparable with those reported by Agrawal et al.[2]

For LBPD/DS, our results are similar to those reported by Sudan et al., in which both surgeons performed LBPD/DS by using robotic system to create the duodenal-ileal anastomosis.[3] The conversion rate (4.5% vs. 6.3%) was comparable. The median operative time (267.5 vs. 514 minutes) and the incidence of anastomotic leak (0 vs. 8%) were lower in our series. The excess weight loss outcome after different types of bariatric operations in our early series is shown in Table 2. No mortality occurred in this series.

**Discussion**

Laparoscopic bariatric surgery, especially the LRYGB and RALBPD/DS, are known to be technically demanding operations, and are associated with significant potential risk of complications and death. Both, the size of the patients and the complexity of the reconstructive procedures, can create major technical barriers. All this translates into a long learning curve, during which the patients could be subjected to poor perioperative outcomes.[1] For LRYGB, the learning curves have been defined in different studies as varying from 50 to 100 cases.[2]

For surgeons interested in performing laparoscopic bariatric surgery, the options for obtaining training to minimize the learning curve include 1-2 day workshops, mentoring by an experienced surgeon, 1-12 week mini-fellowships, and a dedicated minimally invasive/bariatric fellowship with defined didactic and operative curriculum to achieve proficiency in operative skills and perioperative patient care. Laparoscopic bariatric workshops do not provide the operative skill development and experience required to overcome the learning curve. Similarly, the mini-fellowship may not meet every trainee’s need, and likely do not eliminate the steep learning curve. Dedicated fellowship training under supervision of

**Table 1: 30-day perioperative outcomes and complications as seen in the patients in the study**

| 30-day outcomes and complications | LGB (n=28) | LVSG (n=9) | LRYGB (n=41) | LBPD/DS (n=22) |
|-----------------------------------|-----------|-----------|-------------|----------------|
| Preoperative BMI (kg/m²)          | 44.1 (35.5-62.4) | 45.7 (39.3-51.6) | 44.9 (36.6-59.4) | 49 (39-62.1) |
| Operative time (minute)           | 62 (49-87) | 119 (90-180) | 158 (126-339) | 320 (243-425) |
| Conversion rate (%)               | 0         | 0         | 0           | 4.5            |
| Major complications (n)           |           |           |             |                |
| Anastomotic/staple line leak      | 0         | 0         | 0           | 0              |
| Bleeding                          | 0         | 0         | 0           | 0              |
| Intestinal obstruction            | 0         | 0         | 0           | 0              |
| Iatrogenic injury to other organs| 0         | 0         | 0           | 0              |
| Minor complications (n)           |           |           |             |                |
| Surgical site infection           | 0         | 0         | 0           | 1              |
| Carpal tunnel syndrome            | 0         | 0         | 0           | 1              |
| Reoperation rate (%)†             | 0         | 0         | 0           | 1              |
| Length of stay (d)                | 0.5 (0-1) | 2.6 (2-3) | 3.2 (3-4)   | 4 (2-13)       |
| Readmission rate (%)              | 0         | 0         | 0           | 0              |

BMI: Body mass index; LGB: Laparoscopic gastric banding; LVSG: Laparoscopic vertical sleeve gastrectomy; LRYGB: Laparoscopic Roux-En-Y gastric bypass; LBPD/DS: Laparoscopic biliopancreatic diversion with duodenal switch; †: One patient in the LBPD/DS returned to the operating room for endoscopic release of an inadvertently sutured nasogastric tube during creation of the duodenal-ileal anastomosis.
a bariatric expert is ideal, as this provides training to achieve not only baseline competency, but also proficiency.\textsuperscript{[1‑3]}

In conclusion, our study suggests that a formal minimally invasive/bariatric fellowship training is an optimal training option for general surgery graduates who are interested in starting a bariatric practice. The fellowship training facilitates skills acquisition for the new surgeons to safely and effectively perform various types of bariatric operations, with minimal perioperative complications and excellent outcomes.

### References

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### Table 2: Excess weight loss outcome after different types of bariatric operations as seen in the patients in the study

| Type of operation | 1 mo | 3 mos | 6 mos | 12 mos |
|-------------------|------|-------|-------|--------|
| LGB ($n=28$)      | 13.5 | 19.8  | 24.6  | 28.2   |
| LVSG ($n=9$)      | 17.4 | 31.2  | 38.1  | 49.4   |
| LRYGB ($n=41$)    | 20.8 | 37.0  | 53.8  | 69.8   |
| LBPD/DS ($n=22$)  | 19.0 | 36.9  | 54.3  | 76.9   |

LGB: Laparoscopic gastric banding; LVSG: Laparoscopic vertical sleeve gastrectomy; LRYGB: Laparoscopic Roux-En-Y gastric bypass; LBPD/DS: Laparoscopic biliopancreatic diversion with duodenal switch