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Editorial

First of all, I would like to wish 'Happy New Year' to all the readers of World Journal of Laparoscopic Surgery (WJOLS). As minimal access surgeons, we are the only group of people on earth whom our patient gives formal consent to render them unconscious and enter their body with telescope. Thus, we have the highest onus to leave no stone unturned in our quest to do the perfectly right thing for our patients. WJOLS is helping surgeons and gynecologists of all over world to get the highest standard of knowledge available in minimal access surgery.

WJOLS has seen a tremendous start in its first 4 years, and we have successfully resolved some of the initial problems of any new journal. The implementation of WJOLS as a new journal in field of minimal access surgery was accompanied by multiple challenges and hurdles. As an anecdotal example of WJOLS history, many friends and colleague laparoscopic surgeons initially discouraged the founding editors from introducing an article category on 'Review article'.

Within last few year strikingly, we were astonished by the unexpected high online article submission rate on minimal access original article, complications, case report and review article through our website www.wjols.com. Beyond a doubt, the main barrier in the past which deters authors from submitting their work online to WJOLS was represented by the extremely high waiting time. This impressive fact supports the notion that surgeons and gynecologists all over the globe appear to strive, to get up, to date knowledge of laparoscopic and robotic surgery, analyze complication, and discuss root causes and preventive measures of adverse events which lead to unnecessary patient harm, in order to provide more transparency to surgical skill.

In a united consensus, we reasoned that the best option for creating a world class laparoscopic journal of unrestricted reporting and debate on quality of care issues in the modern operative setting would be to give quality scientific article. Therefore, we will continue to strive to offer WJOLS as a vehicle of transparency, trust and credibility for the laparoscopic surgeons who have a right to know the truth about the quality and safety of minimal access surgical care provided around the globe.

At last, once again I wish a very prosperous new year to our entire colleagues and request all of you to send your valuable feedback to make this journal world leader in the field of minimal access surgery.

RK Mishra
Editor-in-Chief

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ORIGINAL ARTICLE

Prophylactic Ureteric Catheterization with Illuminated Ureteric Stent during Difficult Laparoscopic Colorectal Surgeries

Manash Ranjan Sahoo, T Anil Kumar

ABSTRACT

Background: The close proximity of ureters to the colon and rectum, ureteric injury is a potential complication in colorectal surgery. Incidence of iatrogenic ureteric injury ranges from 1 to 10%.

Aim: The aim of this study is to evaluate the operative time, the efficacy in preventing iatrogenic ureteric injuries and the complications associated with prophylactic illuminated ureteric catheterization in the difficult laparoscopic colorectal surgeries.

Materials and methods: Twenty-two patients who underwent difficult laparoscopic colorectal surgery from 2009 to 2011 in Department of General Surgery in SCB Medical College Hospital, Cuttack, were included in the study. The ureteric catheterizations were cystoscopically performed by using number 5 French illuminated ureteric catheter.

Results: The use of ureteric catheters added a mean of 20 minutes to the total surgical procedure time. Postoperative complications oliguria or anuria not seen. Urinary tract infection seen in one patient which makes the incidence of 4.5% in our study. There was no ureteric injury during surgery. Average hospital stay was 6 days. Overall cost did not alter. There were no cases of conversion to laparotomy in our study.

Conclusion: With negligible morbidity, the use of illuminated ureteric stents ensure ureteric safety in complex cases by direct visualization of the ureteric position throughout the dissection, especially in laparoscopic surgeries. Iatrogenic ureteric injuries and conversion to laparotomies are minimized by using illuminated ureteric stent.

Keywords: Laparoscopic, Colorectal surgery, Ureteric injuries, Illuminated ureteric catheters.

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INTRODUCTION

Proximity of ureters to the colon and rectum, ureteric injury is a potential complication in colorectal surgery, especially in advanced carcinoma, previous surgery, radiation which displaces the ureter, eventually making the identification difficult.

Incidence of iatrogenic ureteic injury ranges from 1 to 10%. Most injuries occur during rectal and sigmoid mobilization.

Ureteric stents can be of great help if ureter identification difficulty is anticipated. The use of illuminated ureteric stents adds another dimension to ensure ureteric safety in complex cases by giving direct visualization of the ureteric position throughout the dissection.[1]

AIM

The aim of this study is to evaluate the operative time, the efficacy in preventing iatrogenic ureteric injuries and the complications associated with prophylactic ureteric catheterization with illuminated ureteric stents in the difficult laparoscopic colorectal surgeries.

MATERIALS AND METHODS

Twenty-two patients who underwent difficult laparoscopic colorectal surgery from 2009 to 2011 in Department of General Surgery in SCB Medical College and Hospital, Cuttack, were included in this retrospective study.

All patients who underwent laparoscopic colorectal surgery were assessed. Patient variables that were analyzed included surgical indications, history of prior abdominal surgery, time from induction of anesthesia to surgical incision (preparation time), total operative and total anesthesia times (beginning of stent insertion to completion of surgery) and postoperative morbidity.

All ureteric catheters were tested for illumination before surgery (Fig. 1). All ureteric catheterizations were

Fig. 1: Illuminating ureteric stent

cystoscopically performed by one of the staff urologists using number 5 French ureteric catheters (Fig. 2). The catheters were placed after induction of general endotracheal anesthesia and in the modified supine lithotomy position but prior to the commencement of the laparoscopic colorectal procedure. The catheter which was inside ureter was illuminated after connecting to light source (Fig. 3). All stents were removed in the operating room immediately prior to reversal of anesthesia.

Prophylactic antibiotics were given preoperatively to all the patients; oral neomycin 1 gm two times a day and metronidazole 500 mg three times a day on the day before surgery and intravenous cefuroxime 1 gm at the induction of anesthesia.

RESULTS

In our study, 22 patients who underwent elective laparoscopic colorectal surgery, the most common indication for ureteric catheterization was those who had previous lower abdominal surgery followed by colorectal malignancy and obesity (Table 1).

Among them, catheterization was done bilaterally in 15 patients and unilaterally in seven.

The most common surgery performed was laparoscopic abdominal rectopexy followed by colonic resections (Table 2).

There was no iatrogenic ureteric injury during laparoscopic colorectal surgeries in any of the patients. In our study, there was no morbidity directly related to the ureteric catheters, such as oliguria and anuria. The postoperative urinary tract infection was noted in one patient which accounts for the incidence of 4.5% in our study. So the incidence of urinary tract infection was similar in the catheterized group compared to the colorectal laparoscopic surgeries performed without ureteric catheters which are around 0.6 to 5.5%.

The insertion of preoperative ureteric catheters increases both the length of time in the operating room and that under anesthesia. The overall operative times were increased to an average of 20 ± 5 minutes in the catheterized group.

The hospital stay was on average of 6 days.

Overall cost of the surgery to the patient also did not alter.

There were no cases of conversion of laparoscopic surgery to laparotomy in our study.

Indications for ureteric catheterization in laparoscopic colorectal surgery in our patients is shown in Table 1. Surgeries performed in which ureteric stenting was done is shown in Table 2.

DISCUSSION

Most ureteral injuries are iatrogenic and they arise as potential complications of urological, abdominal or pelvic operations;[2] these injuries have an overall incidence of 0.3 to 10%. Although the surgical management of ureteral injuries is simple and successful once they are recognized during surgery but these injuries are generally missed in 67 to 89% of all cases.

Table 1: Common indication for ureteric catheterization

Indications	*No. of cases*	*Percentage*
Previous abdominal surgery	9	40.90
Obesity	6	27.27
Tumors	4	18.18
Crohn's disease	3	13.63

Table 2: Common surgeries performed

Surgery	*No. of cases*	*Percentage*
Rectopexy	12	54.4
APR	4	18.18
LAR	3	13.63
Segmental colectomy	3	13.63

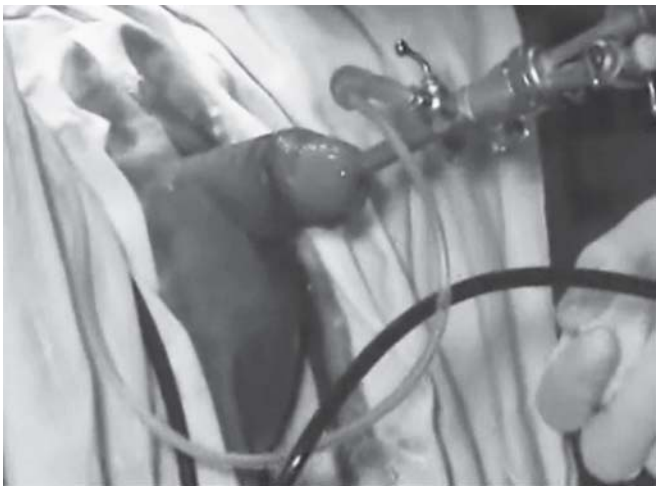

Fig. 2: Usage of cystoscope for introduction of ureteric stent

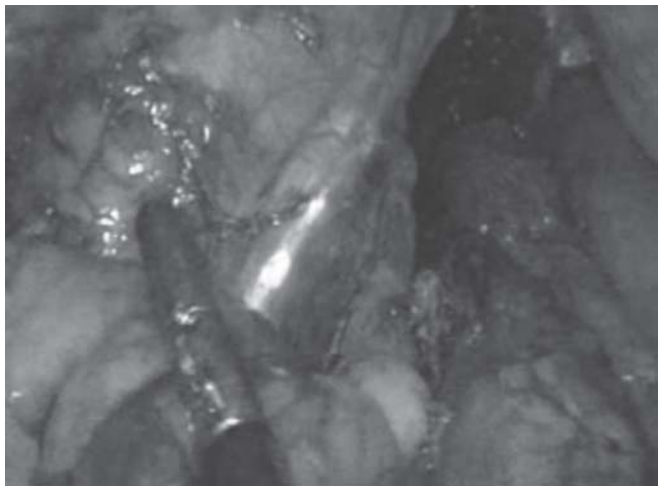

Fig. 3: Intracorporeal view of illuminated ureteric stent

Some surgeons advocate that this practice of preoperative placement of ureteric stents should help avoid ureteric injury,[1,3,4] while others fear the potential injury during insertion and postoperative urinary complications including oliguria, anuria and urinary tract infection. Moreover, the insertion of preoperative ureteric catheters increases both the length of time in the operating room and that under anesthesia as well as the overall cost of the procedure.

Ureteric stents can be of great help, if ureter identification difficulty is anticipated.[5] Standard 5F stents placement at the beginning of surgery allows easy identification by palpation. However, this is not 100% reliable. The use of illuminated ureteric stents adds another dimension to ensuring ureteric safety in complex cases by giving direct visualization of the ureteric position throughout the dissection.[6] Ureteric catheters may be particularly useful during laparoscopic colorectal procedures in which tactile localization is difficult.

Intraoperative complications have included laceration or perforation of the ureter during the stent placement.[7] Well et al noted a 2.2% intraoperative complication rate in 561 prophylactic ureteric catheterizations, similar to the 2% rate reported by Leff et al.[8] No iatrogenic injury to ureters were observed in our study.

Pandya et al investigated the conversions in 200 laparoscopic colorectal surgeries to laparotomies in 47 of them for which the indication was nonidentification of ureters.[9] In another study by Huscher et al there were 21 conversions out of 200 for nonvisualization of ureters. In our study, since the ureters were identified in all the patients there was no conversion of laparoscopic surgery to laparotomy. So, this is an advantage in reducing the number of conversions.

CONCLUSION

To conclude, prophylactic placement of illuminated ureteric catheters can be of great help in identifying the ureters especially in difficult colorectal surgeries and can be performed with minimal morbidity to the patient.[3,4] The indications being the inflammatory bowel diseases, previous abdominal or pelvic surgeries, previous exposure to radiation, obesity and colorectal malignancies. Due to the intraoperative identification of ureters, the iatrogenic injury due to surgery and also the conversion rate to laparotomies is also minimized. Hence, use of prophylactic illuminated ureteric catheters is justified.

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ABOUT THE AUTHORS

Manash Ranjan Sahoo (Corresponding Author)

Associate Professor, Department of Surgery, SCB Medical College Cuttack, Odisha, India, Phone: 06712414034, 09937025779 e-mail: manash67@gmail.com

T Anil Kumar

Postgraduate Student, Department of Surgery, SCB Medical College Cuttack, Odisha, India

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REVIEW ARTICLE

Review of Various Aspects of Laparoscopic Roux-en-Y Gastric Bypass to Emphasize its Significance in Bariatric Surgery

Danish Javed

ABSTRACT

Obesity is a form of malnutrition and it has been growing globally. Surgical management of morbid obesity is increasing in response to its epidemic rise. The growth of laparoscopic bariatric surgery greatly exceeds that of open bariatric surgery. The aim of this study is to review the various aspect of the laparoscopic Roux-en-Y Gastric Bypass (LRYGBP) to emphasize its significance in Bariatric Surgery. Laparoscopic Roux-en-Y gastric bypass is a well-structured and well-understood operation that is valuable for the treatment of rigorous obesity. The laparoscopic Roux-en-Y gastric bypass has been shown to be safe and effective. The individual will recognize that the best preference for most patients looking for surgical treatment of clinical severe obesity is laparoscopic RYGBP.

Keywords: Morbid obesity, Laparoscopy bariatric surgery, Roux-en-y, Comparison obesity surgery, Open laparoscopy bariatric, Complication Roux-en-Y.

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INTRODUCTION

Obesity is the commonest form of malnutrition and it has been increasing over the last few decades globally.[1-3] In India up to 50% of women and 32.2% of men in the upper socioeconomic class come under the obese category. In Delhi, the prevalence of obesity is 33.4% in women and 21.3% in men.[4,5] According to Framingham data for each pound weight gained between ages 30 and 42 years, there is 1% increased mortality within 26 years, and for each pound gained after that, it is the 2% increased mortality. In morbid obese, average life expectancy is reduced by 12 years in men and 9 years in women.[6] Type 2 diabetes, hypertension, hyperlipidemia, stroke, atherosclerosis, osteoarthritis, hypoventilation, sleep apnea syndrome, GERD, infertility and urinary stress incontinence in females, certain cancers (endometrium, colon, breast, prostate) and sudden death are comorbidities.[7] Surgical management of morbid obesity is increasing in response to its epidemic rise.[8] Between 1998 and 2002, there was a 450% increase in the number of bariatric operations performed in the United States, a 144% increase in the number of American Society for Bariatric Surgery bariatric surgeons, and a 146% increase in the number of bariatric centers. The growth of laparoscopic bariatric surgery during this 5-year period greatly exceeds that of open bariatric surgery.[9] National Institutes of Health Consensus (NIH) Conference convened in 1991, specifically identified Roux-en-Y gastric bypass (RGB) and vertical banded gastroplasty (VBG) as surgical options that provide significant benefits for patients with clinical severe obesity. In 1994, Wittgrove, Clark and Tremblay performed the first laparoscopic RYGB (LRYGB), which at the time was considered a technical tour de force.[10]

There are following different options available in bariatric surgery.[11]

- Purely malabsorptive procedures
  - Jejunoileostomy
  - Biliopancreatic diversion
- Combined malabsorptive and restrictive procedures
  - Duodenal switch
  - Gastric bypass
  - Digestive adaptation
- Restrictive procedures
  - Gastroplasty
  - Gastric banding
  - Sleeve gastrectomy
  - Gastric pacing
- Robotic surgery
- Endoluminal bariatric surgery
- Restrictive endoluminal procedures
- Malabsorptive endoluminal procedures.

AIM

The aim of this study is to review the various aspect of the LRYGB to emphasize its significance in bariatric surgery.

MATERIALS AND METHODS

A thorough literature and clinical search was performed. The following search terms was used: Morbid obesity, laparoscopy bariatric surgery, Roux-en-Y, comparison obesity surgery, open laparoscopy bariatric, complication Roux-en-Y.

HISTORY

In 1954, Kremen et al performed the first intestinal bypass via jejunoileostomy, and in 1956, Payne and DeWind performed a distal jejunocolonic anastomosis. Later it was modified by Sherman et al, who sutured 14 inches of proximal jejunum end-to-side to the terminal ileum, 4 inches proximal to the ileocecal valve. Mason and Ito devised a gastric bypass procedure for morbid obesity in 1966, after noting the weight reduction in gastric resection for gastric ulcer. Initially, they transected the stomach horizontally and performed a loop gastrojejunostomy to the proximal portion of the stomach. Over several decades, the gastric bypass has been modified into its current form, using a Roux-en-Y limb of intestine (RYGBP). In 1994, Wittgrove, Clark and Tremblay reported the first case series of laparoscopic RYGBP.[10]

SURGICAL TECHNIQUE

In LRYGBP procedure, six small incisions are made, through which ports are inserted for abdominal access. Dissection is started at the fundus of stomach with division of phrenico-gastric ligament. The stomach is divided with laparoscopic straight four row cutting 60 mm stapler to create a 15 to 20 cc pouch. The ligament of Treitz is identified initially, and the proximal jejunum is divided approximately 50 cm distal to this point. A gastrojejunostomy is performed either hand sutured, linear staplers or by circular staplers. A jejunojejunostomy is performed with laparoscopic staplers. A Roux limb of between 75 and 200 cm is formed depending on the BMI, and the jejunojejunal mesenteric defect is closed to avoid postoperative internal hernias. The Roux limb is placed in an antecolic fashion. The anastomosis is tested by gastroscopy for evidence of any leak after the procedure.

COMPARISON OF LRYGBP WITH OTHER METHODS OF LAPAROSCOPIC BARIATRIC SURGERY

LRYGP is in reality, a well-structured and well-understood operation that is valuable for the treatment of clinical severe obesity. Longer follow-up evaluation and experience with VBG shows that patients frequently changes dietary habits postoperatively, ingests high-calorie soft foods and liquids and regains weight.[12] Because of these long-term results, the operation has been largely abandoned.

A prospective, comparative analysis performed by Bowne et al (2006), has shown that the laparoscopic gastric bypass is superior to adjustable gastric band in super morbidly obese patients. The patients who underwent laparoscopic adjustable gastric banding (LAGB) experienced a greater incidence of late complications ($p < 0.05$), reoperations ($p < 0.04$), less weight loss ($p < 0.001$) and decreased overall satisfaction ($p < 0.006$). Likewise, patients who underwent LRYGB had a greater resolution of concomitant diabetes mellitus ($p < 0.05$) and sleep apnea ($p < 0.01$) compared with the LAGB group. Furthermore, postoperative adjustments to achieve consistent weight loss for LAGB recipients ranged from 1 to 15 manipulations. Single mortality was also in this LAGB group.[13] In one another study, LAGB is found significantly associated with more late complications, reoperations, less weight loss, less reduction of medical comorbidity and patient dissatisfaction compared with LRYGB.[14]

The following table shows the outcome of different types of bariatric operations (Table 1).[15]

RYGBP IS SAFE AS WELL AS EFFECTIVE PROCEDURE

The LRYGB has been shown to be safe and effective for the non superobese patient (BMI < 50) by Wittgrove et al.[16] Using same techniques, Nguyen et al were able to perform RYGBP on a patient with a BMI of 61.[17] Higa et al (2000) studied a case series of 400 morbidly obese and superobese individuals who underwent the LRYGB over a 22-month period. They observed that RYGBP can be safely and effectively performed in the community setting using advanced laparoscopic techniques.[18]

LRYGP IS A REDO PROCEDURE FOR FAILED RESTRICTIVE GASTRIC SURGERY

From the conclusion based on the various text, it can be assumed that restrictive surgery for morbidly obesity will certainly require many reoperations in the future. The standard operation of choice is LRYGBP. The study conducted by Van Dessel et al (2006), has shown this procedure a higher, but not significantly early morbidity rate when the indication for redo surgery was a technical complication of the initial procedure.[19]

EFFECT OF RYGBP ON THE LEVEL OF SERUM GHRELIN

Ghrelin, an acylated protein, is an orexigenic hormone, decreases after feeding and increases before meals, achieving concentrations sufficient to stimulate hunger and food intake. This hormone is basically produced from entero-endocrine cells of gastric mucosa and somewhat from the duodenum. RYGBP seems to achieve a very strong suppression of serum ghrelin level in contrast with gastric banding procedure. These findings are consistent with the assumption that by suppression of ghrelin, gastric bypass

Table 1: Outcomes of laparoscopic bariatric operations

	LAGB	*RYGB*	*BPD*	*DS*
Excess weight loss (%)	49-80	60-81	61-78	66-80
Mortality (%)	0-0.2	0-1.0	0.5-1.9	0.4-2.0
Overall morbidity (%)	8.5-25	9-25	22-28	12-20
Nutritional complications (%)	Rare	15-25	40-77	39-77
Poor long-term weight loss (%)	10-25	10-15	4-6	3-6
Avg. hospital LOS (days)	1-2	1.9-4	–	–
Anastomotic stenosis (%)	–	0.1-5	2-13	5-10
Marginal ulcer (%)	2-14	2-14	8-15	0
Hemorrhage (%)	0	0.66	0.2-0.5	0.2-0.5
Wound infection (%)	0	14	0.8	1.0
Leak (%)	1-3	1.3-3	1.2	4.1
Pulmonary embolism (%)	0	0.36-1.2	1-3.6	0.7-1.7
Incisional hernia (%)	0	4.5-14.6	–	–

VBG: Vertical banded gastroplasty; RYGB: Roux-en-Y gastric bypass; BPD: Biliopancreatic diversion; DS: Duodenal switch; LOS: Length of hospital stay

can reduce body weight in long-term, more than gastric banding. Still, the mechanism by which gastric bypass leads to reduction in ghrelin level is not completely understood. It was advanced by the hypothesis that a permanent absence of food in stomach resulting from gastric bypass could cause an uninterrupted stimulatory signal that ultimately decreases ghrelin production by overriding inhibition.[20]

RYGBP IS THE MOST EFFECTIVE TREATMENT FOR TYPE 2 DIABETES MELLITUS IN MORBIDLY OBESE PATIENTS

Many studies clearly demonstrated that LRYGBP is highly effective in achieving excellent control in patients with type 2 diabetes mellitus (T2DM). After 6 months of surgery, most patients easily withdraw there all antidiabetic medications, including insulin. Improvement in glucose metabolism occurs early after LRYGB and, therefore, is not entirely related to weight loss. A study by Alfonso et al (2005) suggests that central obesity negatively influences the likelihood of T2DM resolution after RYGB. They also suggest that RYGBP should be considered as standard treatment of T2DM in obese.[21] A resent research paper of Luigi (2007) also says that bariatric surgery appears to be an effective and beneficial intervention in selected obese (BMI >35 kg/m^2) patients with diabetes, when medical and nutritional approaches have failed to achieve the desired outcomes. This becomes especially true when metabolic control in these individuals has not been achieved despite aggressive medical therapy.[22]

LRYGBP AND EFFECT OF LEARNING CURVE

Studies conducted by Papasavas et al (2002) and Bal et al (2004) tells that it is a technically demanding procedure with significant morbidity during the learning curve. The learning curve soon overcomes, and reaches a rate plateau of complications after adequate training. The mean operating room time and the conversion rate improves with experience. Morbidly obese patients should be operated on in expert bariatric surgical laparoscopic units to obtain the best results.[23,24]

TOTALLY ROBOTIC ROUX-EN-Y GASTRIC BYPASS

In 2003, Muhlmann et al conducted a study to compare laparoscopic *vs* robotic bariatric procedures. The robotic aided procedure proved to be 30% faster than were even experienced laparoscopic surgeons.[25] Catherine et al (2005) study details the report and demonstrates the feasibility, safety and potential superiority of such a procedure. They say that learning curve may also be significantly shorter with the robotic procedure.[26]

COMPLICATIONS

Complications can be of two types, early and late.

Early

1. Anastomotic leak
2. Pulmonary embolism.

Late

1. Anastomotic stricture
2. Internal hernia (IH)
3. Dumping syndrome
4. Nutritional deficiencies.

Comparison with open and laparoscopic RYGBP is associated with reduction in frequency of iatrogenic splenectomy, wound infection, incisional hernia and mortality; however, there is an increase in the frequency of early and late intestinal obstruction, gastrointestinal tract bleed and stomal stenosis. There are no significant differences in the frequency of anastomotic leak, pulmonary embolism or pneumonia.[27]

Retrospective study of 400 consecutive RYGB patients (1999-2002) supports that, enteric leakage is an important complication of the RYGB. Leaks that are more insidious can be treated successfully with percutaneous drainage.[28] Leak after LRYGB may be difficult to detect. Evidence of respiratory distress and tachycardia exceeding 120 beats per minute may be the most useful clinical indicators of leak after LRYGP.[29]

Comeau et al (2003) documented 35 cases of internal hernia (overall incidence of 3.3%). The IH occurred in 6.0% of patients with retrocolic procedures and 3.3% of patients with antecolic procedures. Most were in the Petersen defect (55.9%) and at the enteroenterostomy site (35.3%). A bimodal presentation was observed, with 22.9% of patients with IH diagnosed in the early postoperative period (2-58 days) and 77.1% in a delayed fashion (187-1, 109 days). A laparoscopic approach to the repair of IH was possible in 60.0% of patients. Complications occurred in 18.8% of patients, including one death (2.9%).[30]

CONCLUSION

The selection of surgical technique for a particular patient must be decided by a surgeon who has all of the tools accessible to him in his surroundings. Decisions should be made depending on the individual clinical scenario. No single tool or procedure can be considered suitable for all patients. Assimilation of all the known data is essential for the surgeon to offer the correct procedure to the correct patient. The well-informed and well-trained individual will recognize that the best preference for most patients looking for surgical treatment of clinical severe obesity is RYGBP.

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ABOUT THE AUTHOR

Danish Javed

Clinical Registrar, Department of Surgery, Ch. Brahm Prakash Ayurved Charak Sansthan, Najafgarh, New Delhi, India
e-mail: danish_surgeon@rediffmail.com

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REVIEW ARTICLE

Laparoendoscopic Single-Site Surgery in Gynecologic Oncology

Mohammed Khairy Ali, Ahmed Yehia Abdelbadee, Ahmed Mohammed Abbas, Sherif Abdel-Karim Mohammed Shazly

ABSTRACT

Objective: To provide a review in the available literature in laparoendoscopic single site surgery in gynecological oncology, focusing on epidemiology of ovarian and endometrial cancer in reproductive age, role of minimally invasive surgery in the management of ovarian and endometrial cancer and laparoendoscopic single site surgery elective oophorectomy and risk-reducing oophorectomy. Finally, laparoendoscopic single-site surgery for ovarian and endometrial cancer.

Design: Literature survey.

Conclusion: Laparoscopy is a safe and effective approach for surgical staging and treatment of selected patients with endometrial and ovarian cancer. Further studies and analyses are required to determine if the use of robotics improves outcomes over standard laparoscopy and can extend the benefits of minimally invasive surgery to a larger proportion of patients with this common gynecologic malignancy.

Keywords: Single-port laparoscopy, Robotic surgery, Gynecologic oncology.

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INTRODUCTION

Minimally invasive surgery has become the gold standard treatment for many gynecologic diseases. In the past, numerous studies have demonstrated that laparoscopic surgery plays an important role in various gynecologic oncologies particularly for early-stage endometrial, ovarian and cervical cancers with shorter hospital stays, improved quality of life and comparable surgical and oncologic outcomes to laparotomy.[1] Recently, an even less invasive alternative to conventional laparoscopy has been developed: Laparoendoscopic single-site surgery (LESS) which is an attempt to further enhance the cosmetic benefits of minimally invasive surgery while minimizing the potential morbidity associated with multiple incisions. LESS is applied to urologic and gastrointestinal surgery firstly and demonstrates that the techniques are feasible.[2] In this review article, we review the available literature about role of LESS in management in gynecological malignancies, focusing on epidemiology of ovarian and endometrial cancer in reproductive age, role of minimally invasive surgery in the management of ovarian and endometrial cancer and LESS elective oophorectomy and risk-reducing oophorectomy. Finally, LESS for ovarian and endometrial cancer.

EPIDEMIOLOGY OF OVARIAN CANCER IN REPRODUCTIVE AGE

In gynecologic oncology, ovarian cancer leads to more deaths than all other gynecologic malignancies. Each year about 204,000 women are diagnosed with ovarian cancer but only 125,000 women die from this disease.[3] The incidence of ovarian cancer is about one in 78 American women (1.3%) that can develop ovarian cancer during her lifetime. But the incidence has been declining slowly since 1990. The epithelial ovarian carcinomas consider the most common one which represent about 90 to 95% of all cases. In general, the diagnosis of ovarian cancer is difficult because the symptoms of ovarian cancer are vague and related mainly to GIT system and there is no effective screening test for ovarian cancer, so most of the patients have advanced disease when they are diagnosed and need usually aggressive debulking surgery followed by chemotherapy which usually results in clinical remission, but about 80% of women will develop recurrence that leads to disease progression and death.

In 2007, there were 22,430 cases which estimated to develop in the United States. However, the early diagnosis is still strict only to a few cases, so the ovarian cancer is still the fifth leading cause of cancer-related death.[4]

Numerous risk factors are associated with the development of ovarian cancer including reproductive, environmental and genetic risk factors but the most important risk factor is a family history of ovarian cancer and breast cancer because there are about 5 to 10% of patients having an inherited genetic predisposition, but still 90 to 95% have no genetic link for ovarian cancer. Many risk factors are related to a pattern of ovarian cycles during the reproductive years, so repeated stimulation of the surface epithelium of the ovary will lead to malignant transformation later on. Also the parity of the female plays an important role in development of ovarian cancer because the nulliparity is usually associated with long periods of repetitive ovulation, and also women without children have double the risk of developing ovarian cancer.[5] Women who have long period of infertility have a higher risk for ovarian cancer. Although the genetic link of ovarian cancer is very high but also the iatrogenic effect of the drugs used in

induction of ovulation increases the risk of ovarian cancer.[6] The menstrual pattern of the female should be put in to consideration because early menarche and late menopause have been associated with an increased risk of ovarian cancer. On the other side, breast feeding has a protective effect as it prevent, the ovarian cancer, may be due to amenorrhea and an ovulation associated usually with lactation.[7] The combined oral contraceptive also reduces the risk of ovarian cancer by 50% by its effect in inhibition of ovulation.[8] In contrast, hormone replacement therapy by estrogen after the menopause elevate the risk.[9] The racial and ethnic factors can give some explanation for development of ovarian cancer. The incidence of ovarian cancer among white women is higher than black women.

Although exact reasons are unknown, but gynecologic surgery may have a role. Tubal ligation and hysterectomy have been associated with reduction in the risk of developing ovarian cancer.[10] The incidence of ovarian cancer rises with increasing age up to 70 years and then begins to decrease among women above 80 years.[11]

EPIDEMIOLOGY OF ENDOMETRIAL CANCER IN REPRODUCTIVE AGE

The incidence of endometrial cancer is about one in 38 American women (2.6%) during their lifetime. In 2007, 39,080 new cases are estimated to be developed in the United States, but only 7,400 deaths are expected. The endometrial cancer is considered less dangerous than ovarian cancer because the early diagnosis is easy and so the cure rate is high. All over the world, the endometrial cancer is the fourth leading cancer in incidence but only the eighth leading cause of cancer deaths among women.

Numerous risk factors have been described for developing endometrial cancer but the most important risk factor is related to excessive estrogen state. Obesity is considered as the most common cause of overproduction of endogenous estrogen because the excessive adipose tissue increases peripheral conversion of androstenedione to estrone. The estrogen replacement therapy is the next most important factor in development of endometrial cancer, so combined estrogen plus progesterone hormonal therapy should be prescribed for postmenopausal women to reduce their risk of endometrial cancer.

The reproductive factors play an important role in development of endometrial cancer whenever anovulation is present in women with polycystic ovarian syndrome and thus have an increased risk of developing endometrial cancer,[12] and also menstrual pattern especially when the duration of uninterrupted menstrual cycles is prolonged, so early menarche and late menopause both increase the risk of endometrial cancer.[13]

Family history is also linked to endometrial cancer and they are many genetic syndromes, such as Lynch syndrome which also known as nonpolyposis colorectal cancer (HNPCC), in which the endometrial cancer is considerd the most common extracolonic manifestation of this syndrome.[14]

Oral contraceptive use for at least 1 year decreases the risk of endometrial cancer by about 30 to 50% and risk reduction extends for 10 to 20 years.[15] The medical conditions play an important role in development of endometrial cancer. Cancer corpus triad include obesity, diabetes mellitus and hypertension which are commonly associated with endometrial cancer.[16]

ROLE OF MINIMALLY INVASIVE SURGERY IN THE MANAGEMENT OF OVARIAN CANCER

Minimally invasive surgery for patients with ovarian cancer plays an important role in different ways depending on the stage in which the diseasess is discovered and also the surgical aim of the procedure.[17]

In early-stage of the disease, laparoscopy may be used in staging instead of surgical staging, and also the second-look operation is one of its use to assess the progress of the disease after the patient completes the course of adjuvant chemotherapy.

In advanced stage of ovarian malignancy the laparoscopy in general can be used to confirm diagnosis by visualization of internal organs and also give picture about nature of the tumor and its respectability. Frozen section biopsy can be taken during the operation for histological testing. However, when the ovarian cancer has been confirmed through frozen section biopsies, the laparoscopy procedure is usually converted into laparotomy that enables removing the tumor without contact with the abdominal wall as well as performing infracolic omentectomy for tumor staging.[18]

The use of minimal invasive surgery to evaluate ovarian masses began approximately 10 years ago but it was only considered as a diagnostic method because laparoscopy could facilitate tumor spreading in the cavity. In addition, the omentectomy, which needed to complete staging, is difficult to be done by laparoscopy but nowadays the risk of tumor dissemination during laparoscopy was reduced by using of the endobag which consist of sheath placed around removed adnexal mass to eliminate tumor dissemination.[19]

ROLE OF MINIMALLY INVASIVE SURGERY IN THE MANAGEMENT OF ENDOMETRIAL CANCER

Endometrial cancer is the most common gynecologic malignancy in the United States. Surgical staging plays an

essential role in the treatment of this disease.[20] Minimally invasive surgical techniques have been utilized with increasing frequency in the management of endometrial cancer, minimally invasive surgery have demonstrated the safety and feasibility of laparoscopy in performing hysterectomy, bilateral salpingo-oophorectomy, and pelvic and periaortic lymphadenectomy for surgical staging in endometrial cancer.[21] The use of minimally invasive techniques does not appear to have an adverse impact on survival, and it improves quality of life in the postoperative period.

Some gynecologist find high incidence of positive peritoneal cytology for the endometrial cancer in patients after laparoscopy, this may be due to the retrograde dissemination of cancer cells into the peritoneal cavity during uterine manipulation, but the clinical significance of these findings is not clear yet. Many studies proved that obesity is not a contraindication to laparoscopic staging in endometrial cancer. This is an important consideration, as many patients with endometrial cancer are obese.[22]

However, minimally invasive surgical techniques which are used in management of endometrial cancer include instrumentation, and technology have improved significantly. The application of these techniques in treatment of endometrial cancer is safe and effective alternative to laparotomy and appears to provide similar result and survival rates. Patient benefit is demonstrated by faster recovery, decreased pain and improved quality of life.

LESS ELECTIVE OOPHORECTOMY

Definition of the Concept

This is the mean removal of the ovaries with another indicated surgical operation, it is always removed to prevent morbidity or mortality, which can occur later on if the ovaries are left.

Elective oophorectomy has a great benefit because we presently lack the ability to routinely recognize ovarian cancer in a premalignant form or even when it is confined as early invasive cancer to the ovary itself,[23] as a result most ovarian cancers are present as advanced stage of the disease and the cure rates are low.

Indications of Elective Oophorectomy

A number of surgeons have suggested that elective bilateral salpingo-oophorectomies in women over age 40 should routinely undergo at the time of hysterectomy. If a prophylactic oophorectomy was performed in all women over age 40 years, 2,200 women may subsequently avoid ovarian cancer per year. This concept of bilateral salpingo-oophorectomies of 99.75% women undergoing hysterectomies in order to avoid ovarian cancer in 0.25% need more further assessment.[24] However, there is a recent study in Japan, where the incidence of ovarian cancer is very low and failed to prove the significance of prophylactic oophorectomies to spare cancer ovary in all women over age 45 undergoing hysterectomy.[25]

There is another study which suggests that women who undergo a hysterectomy are actually at low risk for development of ovarian cancer. So the indications of prophylactic oophorectomy may include postmenopausal women, nulliparous women, women with long history of infertility, women with past history of breast, colon and uterine cancer and women with a genetic predisposition to developing ovarian cancer. However, we must remove the ovaries of the patients with a past history of breast, colon or uterine cancer if abdominal surgery will be performed because the ovaries are common sites for metastasis.

LESS RISK-REDUCING OOPHORECTOMY

Definition of the Concept

Risk reducing bilateral salpingo-oophorectomy (rrBSO) is a method for decreasing the risk of ovarian cancer in women with a genetic disposition for this malignancy. This procedure is done because of the efficacy of current modalities is limited for early detection and there is high mortality rate associated with ovarian cancer.

Indications of Risk-reducing Oophorectomy

Before performing rrBSO, it is important to differentiate between women with possible familial ovarian cancer syndromes, which is rare syndrome, and other women who have no familial ovarian cancer syndromes and no one in there family having it. The familial ovarian cancer syndromes account for approximately 10% of cases of epithelial ovarian cancer. The key for diagnosis of these hereditary syndromes is the presence of ovarian cancer in a family member at any age, or appearance of breast cancer in premenopausal women and the occurrence of cancers in multiple members of two to four generations.[26]

The familial cancer syndromes include:

- Site-specific ovarian cancer syndrome.
- Breast-ovarian cancer syndrome.
- Hereditary nonpolyposis colorectal cancer syndrome (HNPCC).

The first two groups are associated with gene mutations in the BRCA1 and BRCA2 genes but hereditary colon cancer syndrome (HNPCC) is associated with gene mutation in DNA mismatch repair (MMR) genes.

Most ovarian cancers associated with the BRCA mutations are diagnosed at a younger age and mostly are

serous carcinomas. Patients with a BRCA1 or BRCA2 mutation also have an increased risk of developing other rare gynecological cancer, like fallopian tube carcinoma. This indication leads to development of a risk reduction strategy that includes removal of the ovaries and tubes to prevent the development of carcinoma.

Many studies proved that prophylactic bilateral salpingo-oophorectomy reduces ovarian cancer risk in BRCA1 and BRCA2 mutation carriers by about 96%. Additionally, if the prophylactic bilateral salpingo-oophorectomy is done perimenopausally, the risk of development of cancer breast decrease up to 50 to 68%.[27]

Another inherited mutation include mutation which occur in certain genes like MSH2, MLH1, PMS2 and MSH6 which called DNA MMR genes, this mutation leads to Lynch syndrome or HNCC, in this syndrome the most common cancers which occur are colon, endometrial and ovarian cancer.[28]

However, the decision to perform prophylactic risk-reducing oophorectomy should be based on several patient factors and choices not only on the age, women undergoing prophylactic bilateral salpingo-oophorectomy should be counseled about the risks and benefits of hormone replacement therapy before surgery. So for women with BRCA1 mutations, risk-reducing prophylactic bilateral salpingo-oophorectomy should be done after the complete the child-bearing period, but for individuals with a personal or family history of breast and ovarian cancer who have not had genetic testing or who have undergone these testing and no mutations in BRCA1 or BRCA2 gene is detected, the risks and benefits of prophylactic bilateral salpingo-oophorectomy is not proved yet. So these individuals are best managed by strict follow-up by gynecologists, oncologists, and geneticists to detect any risk for cancer.

So risk-reducing oophorectomy should be done to select women when:

1. The women have a positive BRCA1 or BRCA 2 genetic test.
2. There is a first-degree family history of ovarian cancer.
3. There are two or more second-degree relatives with history of ovarian cancer or breast cancer.
4. When women will use estrogen as adjuvant therapy in treatment of breast cancer.
5. Bilateral salpingo-oophorectomy should be done with hysterectomy in HNPCC syndrome.

LESS SURGERY FOR OVARIAN CANCER

Laparoscopic surgery has become the preferred surgical approach for a variety of gynecologic oncology; single-port laparoscopy is not a new method in mangement of various gynecologic oncologies. Wheeless and Wheeless and Thompson reported in the 1960s that more than 4,000 women underwent rapid, inexpensive, effective surgical sterilization by using single-trocar laparoscopy. In 1991, Pelosi and Pelosi performed the first hysterectomy using a single-trocar technique.[29]

The ovarian cancer is responsible for more deaths than all other gynecologic malignancies combined. Each year in the United States, 204,000 women are diagnosed, and 125,000 women die from this disease.[30] The epithelial ovarian carcinomas comprise 90 to 95% of all cases, including the more indolent low malignant potential (borderline) tumors.[3]

The treatment of ovarian cancer is dependable on many factors; however, the most important factors are age of the patient, the parity, and the stage of disease when discovered. In stage I ovarian cancer, the LESS is used mainly in staging which consider being a primary treatment. In those with advanced disease, laparoscopy is used in visualization of abdominal organ and it gives a picture about the respect-ability of the tumor, so all the required procedures could be proceeded safely by laparoscopy.[31]

The treatment of the early stage ovarian cancer is simple hysterectomy and bilateral salpingo-oophorectomy, then bilateral pelvic lymph node dissection should be done through an incision in the retroperitoneal space. All these procedures were successfully performed via LESS by a single 2 to 3 cm incision and there were no conversions to multiport laparoscopy or open surgery.[32]

The epithelial ovarian cancers develop in about 10% in women younger than 40 years of age, so the fertility sparing surgery, which include unilateral adnexectomy, may be an option in selected patients when disease is present only in one ovary, this can be easily done by LESS.[33] Instrument crowding was noted in most cases done by LESS but if we use a laparoscope with a flexible tip (the 30° Viscera Endo Eye) or articulating instruments, this will be easy.

LESS gives better cosmesis due to hidden umbilical scar so it is psychologically more supportive due to good body image, and the risk of visceral and vascular injury during trocar placement is low, which decrease the morbidity rate and also there is decreased risk of postoperative wound infection, hernia formation, and also fewer incisions may result in faster recovery and so the administration of adjuvant therapies will be faster. Also, the use of LESS plays an important role in reduction of postoperative pain and narcotics use.

LESS SURGERY FOR ENDOMETRIAL CANCER

In the last years, many studies proved that laparoscopic approaches to various gynecologic oncology conditions

particularly for early-stage endometrial cancer where the tumor is limited to the uterus, become easy and feasible, also the patient will stay for short period in the hospital, so there is clear improvement in quality of life.[34]

The surgical staging of endometrial cancer is very important because it gives picture about the method of the treatment and prognosis, but an alternative method of surgically staging is a LESS approach. In general, this approach is limited to a selected group of women with stage I disease. However, laparoscopic pelvic and para-aortic lymph node dissection may also be done in women who are incompletely staged at their primary surgery.[35]

There is another minimally invasive alternative method for laparoscopy which is called robotic surgery, which is used nowadays in surgical treatment of endometrial cancer, the use of robotic procedures for treating gynecologic oncology diseases has increased alot nowadays as many studies have proved that.[36] This robotic surgery has great benefits, like improvement of surgeon movement, and allows 3-D optics. Recent reports demonstrate that endometrial cancer staging can be performed with a daVinci surgical system which is preferable over abdominal staging and also over the laparoscopic staging because it gives many advantages, like enhancement of lymph nod excision, decrease in the blood loss and decrease in operative time.[37]

However, the surgeons can nowadays perform easily hysterectomy easily with bilateral salpingo-oophorectomy to treat the endometrial cancer laparoscopically by LESS surgery via a single-site incision. This will be done by utilizing the newest generation of port systems that allow several laparoscopic instruments to be used in the same time through a single-operating trocar.

Absolute contraindications to the performance of LESS include cancer patients with evidence of metastatic disease, also patients with poor pulmonary function who cannot stay in the positioning required for LESS, but relative contraindications are dependent on surgeon experience and skillful level in LESS. Trials of the operations done by LESS in gynecology are given in the Table 1.

DISCUSSION

The treatment of gynecological oncology diseases has been developed nowadays. The old concept for treatment of gynecological tumors is radical surgery by laparotomy to give a good field to manipulate the tumor as in endometrial cancer or ovarian cancer but nowadays this method has been changed as minimally invasive surgery for patients with gynecologic malignancies has progressively increase.

Numerous studies have proved that laparoscopic approaches to various gynecologic oncology conditions

Table 1: Summary of trials of the operations done by LESS in gynecology

References (years)	*Type of study*	*No. of patient*	*Type of operation*	*Duration of the surgery (min)*	*Blood loss (CC)*	*Hospital stay (day)*	*Complications rate (%)*	*Conversion to other method (%)*
Ghezzi, Cromi et al (2005)	Prospective	10	SPL salpingectomy	27	-	1	0	0
Kim, Lee et al (2008)	Prospective	24	SPA-LAVH	199	400	3	-	3
Lim, Kim et al (2009)	-	12	Adnexectomy	73	10	1	0	0
Fader and Escobar (2009)	-	13	Adnexectomy	65	-	1	0	0
Kim, Lee et al (2009)	Prospective	24	Salpingo-oophorectomy	70	10	1	0	12
Yoon, Park et al (2009)	Prospective	20	SPL salpingectomy	55	Minimal	2	2	
Yoon, Kim et al (2009)	Prospective	7	Hysterectomy	157	200	4	0	0
Langebrekke and Qvigstad (2009)	-	1	Total laparoscopic hysterectomy with single-port access without vaginal surgery	60	Minimal	5 hrs	0	0
Fader and Escobar (2009)	Retrospective	30	Endometrial ovarian cancer staging hysterectomy/ bilateral salpingo-oophorectomy	65	Minimal	1	0	0
Escobar, Bedaiwy et al (2010)	Cohort	7	LESS surgery for benign adnexal disease	-	75	>24 hrs	0	14

particularly for early stage endometrial, cervical cancers and select pelvic masses is feasible and results in shorter hospital stays, improved quality of life and gives the same result in comparison to surgical approach.

The surgeon preferred LESS surgery because it gives better cosmesis and decrease the morbidity of the patient and also it decreases risk of postoperative wound infection, hernia formation. LESS in gynecological oncology has many advantages, the staging which has very important role in treatment of the tumor and need laparotomy to be done, nowadays can be done easily by LESS. Hysterectomy with bilateral salpingo-oophorectomy, which is the main management of most of gynecological oncology diseases, become feasible to be done by LESS by utilizing the newest generation of port systems that allow several laparoscopic instruments to be used in the same time through a single-operating trocar.

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ABOUT THE AUTHORS

Mohammed Khairy Ali (Corresponding Author)

Assistant Lecturer, Department of Obstetrics and Gynecology, Women Health Hospital, Assiut, Egypt, e-mail: m_khairy2001@yahoo.com

Ahmed Yehia Abdelbadee

Assistant Lecturer, Department of Obstetrics and Gynecology, Women Health Hospital, Assiut, Egypt

Ahmed Mohammed Abbas

Assistant Lecturer, Department of Obstetrics and Gynecology, Women Health Hospital, Assiut, Egypt

Sherif Abdel-Karim Mohammed Shazly

Assistant Lecturer, Department of Obstetrics and Gynecology, Women Health Hospital, Assiut, Egypt

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REVIEW ARTICLE

Laparoscopic assisted *vs* Open Surgery for Colon Cancer

Hana Alhomoud, Oscar Manuel Torres Falcon

ABSTRACT

Purpose: A review article to evaluate and compare the short- and long-term results of laparoscopic-assisted colectomy (LAC) and open colectomy (OC) for colon cancer.

Materials and methods: Relevant papers were searched using MEDLINE,Science Citation Index and Cochrane Controlled Trial Register, by using the search terms 'laparoscopy', 'surgery', 'colectomy' and 'colon cancer'.

Conclusion: LAC has the benefits of reducing intraoperative blood loss, earlier resumption of oral intake and shorter duration of hospital stay.

Keywords: Laparoscopy-assisted colorectal surgery, Colorectal cancer, Open colorectal surgery, Randomized controlled trials.

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INTRODUCTION

Colorectal cancer (CRC) is the fourth leading cause of cancer-specific mortality worldwide, with 610,000 related deaths each year.[1] CRC is the fourth most common form of cancer in the United States[2] and the third leading cause of cancer-related death in Western world.[3] Because surgery remains the primary treatment modality in colorectal cancer, the introduction of rapidly evolving laparoscopic techniques in the treatment of patients with colon and rectal cancer has been met with appropriate concern and resistance. Laparoscopic resection for CRC was first described in 1991,[4] and the enthusian for laparoscopic colectomy grew when recovery benefits for patients became more apparent. Numerous randomized controlled trials (RCT) comparing laparoscopic to open surgery for colon cancer were published, clearly demonstrating that in experienced hands, appropriate oncologic resection can be performed and produce results equivalent to the open techniques.[5-8] The aim of this paper is to review the published literature regarding the evolution of laparoscopic surgery for colorectal cancer.

MATERIALS AND METHODS

Searched through the major medical database done, such as MEDLINE, EMBASE, Science Citation Index and Cochrane Controlled Trial the following search terms were used: 'Laparoscopy', 'laparoscopy-assisted', 'surgery', 'colorectal cancer'.

RESULTS

Twelve RCT that compared LAC and OC for colon cancer were identified.[9-28] The results of the outcomes over short- and long-term periods are reported below.

Short-term Outcomes

Of the 12 RCTs, five reported the operative duration, in all five reports, the operative duration was significantly longer for LAC than OC. Blood loss in patients who underwent LAC was significantly lower than that in patients who underwent OC, by an average volume of 103.9 ml. There was no significant difference in the number of transfused patients. The duration of hospital stay and the time of oral diet were significantly shorter with LAC than with OC. The incision length was significantly shorter by 11.77 cm in LAC than in OC. The rate of the overall postoperative complication was significantly lower in LAC than OC. The rate of ileus was significantly lower in LAC than OC. The rate of anastomosis leakage between the two groups was insignificant. There were no significant differences in perioperative mortality between the two groups.

Long-term Outcomes

With respect to overall recurrence, local recurrence, distal metastasis and peritoneal dissemination, the differences between the two groups were insignificant. The analysis of the wound site recurrence between LAC and OC groups indicated no significant difference. There was also no significant difference in the overall and cancer-related mortality between the two groups.

DISCUSSION

In short-term periods, laparoscopic surgery for colon cancer is associated with significantly longer operation times but significantly less intraoperative blood loss compared with conventional open surgery. Patients who underwent LAC resumed oral intake significantly earlier and had significantly shorter hospital stays than did patients who underwent OC; this finding suggests that LAC leads to faster recovery. The rate of postoperative complications was significantly lower in LAC than in OC. The rate of ileus is

significantly lower in LAC than in OC. Gutt et al describe that laparoscopic surgery reduces adhesion formation compared with open surgery, because laparoscopic procedures reduce the overall degree of trauma to the abdominal wall, intra-abdominal operative site and distant intra-abdominal organs, they potentially have an advantage in reducing the formation of postoperative adhesions.[29] In the long-term period, there is no significant difference in overall recurrence, local recurrence, distant metastasis and peritoneal dissemination between the two surgery groups. There was also no significant difference in wound site recurrence between the two groups.

CONCLUSION

Minimally access surgery for colorectal cancer has been subjected to rigorous scientific evaluation, and due to positive outcomes when done by experienced surgeons, this approach has become the standard worldwide. Laparoscopic surgery for colon cancer is associated with a reduction in intraoperative blood loss, earlier resumption of oral intake and shorter duration of hospital stay. General and colorectal surgeons must remain fully engaged in the development and application of new technologies and procedures so that surgeons can lead the way into the future while maintaining the patient's interest first.

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ABOUT THE AUTHORS

Hana Alhomoud (Corresponding Author)

Senior Resident, Department of Colorectal Surgery, Al-Sabah Hospital Kuwait, e-mail: hana-alhomoud@hotmail.com

Oscar Manuel Torres Falcon

Senior Resident, Department of Laparoscopic Surgery, Juan I Menchaca Hospital, Jalisco, Mexico

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REVIEW ARTICLE

Currents and Trends in Bariatric Surgery

Oscar Manuel Torres Falcon

ABSTRACT

Introduction: Bariatric surgery has been shown to be more effective than medical treatment to control overweight. Many techniques have been described in recent years depending on the mechanism involved. Restrictive, malabsorptive and mixed techniques being the first the most commonly practiced by surgeons.

Materials and methods: Review article of the restrictive techniques in bariatric surgery searched the databases PubMed and Cochrane.

Results: Gastroplasty: This consisted of creating a gastric pocket vertically, the short-term results were good, with low excess weight over 60% the first year.

Adjustable gastric banding: The technique consists of a silicone band fitted with an adjustable ball, which is implanted laparoscopically at the gastroesophageal junction; the low weight is lower and slower when compared to the gastric bypass, but can reduce over 60% of excess weight.

Tubular gastrectomy: The surgical technique involves determining a vertical gastrectomy determined by a narrow gastric tube at the expense of the lesser curvature of the stomach and preserving 3 to 4 cm wide, regarding the results in weight loss, a systematic review reported low rates of overweight between 33 and 85%, averaging 55.4%.

Gastric plication: Its principle is basically the dissection of the greater curvature and its plication or invagination into the gastric lumen and lesser curvature, where one or more fixed suture lines, leaving a large intraluminal fold, the percentage of excess weight loss is progressive, stabilizing at 1 year of follow-up in about 60% loss of excess weight, keeping this results at 2 and 3 years of follow-up.

Discussion: The prevalence of obesity is increasing in the recent decade, and now is one of the leading public health problem on a worldwide scale, bariatric surgery is currently the most efficacious and enduring treatment for clinically severe obesity, certainly the training and the bariatric surgeon's experience are important factors that must be improved for the benefit of the patient.

Conclusion: The restrictive bariatric surgery techniques have evolved over the last time, with the help of technological advances that have made possible, allowing improved results. The choice of technique should be very careful, because all have potential complications and risks.

Keywords: Bariatric surgery, Gastroplasty, Adjustable gastric banding, Tubular gastrectomy, Restrictive techniques.

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INTRODUCTION

Actually, bariatric surgery has been shown to be more effective than medical treatment to control overweight and the diseases associated with it.[1] Furthermore, many techniques have been described in recent years, which have been refined due to technological advances and the complete knowledge of the pathophysiological mechanisms involved in weight loss.

This is how we distinguish the different techniques depending on the mechanism involved. There are purely restrictive techniques, in which the main objective is to limit food intake; malabsorptive techniques, in which the weight loss is achieved mainly by decreasing the absorption of nutrients into the intestine and finally, mixed techniques, involving a combination of these effects to attain the ultimate goal.

This article reviews the restrictive techniques in bariatric surgery.

MATERIALS AND METHODS

For this review, we searched the databases PubMed and Cochrane. We used the MeSH term 'bariatric surgery', in addition to the terms 'gastroplasty', 'restrictive surgery', 'sleeve gastrectomy', 'gastric plication' and 'adjustable gastric band'. Articles were selected for meta-analyses, systematic reviews, randomized clinical trials and, if necessary, cohort studies and case reports were included.

RESULTS

Restrictive Techniques

Gastroplasty

This surgical procedures altera the stomach anatomy due to reduced calorie intake or induced early satiety. The first reports date back since 1973[2] and consisted of a horizontal division of upper stomach—horizontally gastroplasty, creating a small gastric pocket connected to the rest of the stomach through a small channel in the greater curvature. Due to the failure of this procedure, both suture dehiscence and channel expansion, changes were performed by various authors, such as stapling reinforcements, use of prosthetic materials, meshes or use silicone rings, nonreabsorbible.[3-6] However, despite these changes, poor performance persisted with a low drop of weight loss or weight gain.

In the search for any effective procedure, safe and free of undesirable side effects, reversible and based on gastric restriction, which does not alter the digestion and absorption, Mason in 1980,[7] developed the calibrated vertical gastroplasty. This consisted of creating a gastric pocket

vertically, next to the lesser curvature of the gastric fundus separated with a stapler.

This reservoir was calibrated with a plug 32 F with a polypropylene mesh reinforcement shaped ring placed at the output, thus commanding the desired gauge. This technique proved to be less technically demanding than the gastric bypass and avoiding complications, such as dumping, ulcers and anemia.

The short-term results were good, with low excess weight over 60% in the first year. However, the percentage of overweight decreased in monitoring and was decreasing in 5 to 10 years, mainly due to dehiscence of the suture line in 48% of patients.[8,9]

The development of technology allowed this procedure laparoscopically. However, due to poor long-term results, this technique was gradually abandoned and replaced by the gastric bypass as we know it today.

Adjustable Gastric Banding

Subsequently, the exploration of a restrictive procedure to achieve weight loss without the need to divide the stomach continued. Despite previous reports with no adjustable bands, Szinicz in 1980,[10] first implemented in animal models an adjustable gastric band. In 1986, Kuzmak,[11] implanted the first adjustable gastric band in humans by open surgery, achieving an adequate weight loss and a low rate of complications. After some modifications and the advent of laparoscopic surgery, gastric band implanted by this approach was first reported by Belachew in 1993,[12] and this method was consolidated as a technique in bariatric surgery, being known as Lap-Band.

The technique consists of a silicone band fitted with an adjustable ball, which is implanted laparoscopically at the gastroesophageal junction. This band is communicated to the outside via a subcutaneous reservoir, which can adjust to demand and loosen by injecting saline solution. This makes possible to regulate the size of the stomach and thus achieve different levels of constraint.

Following international approval, Lap-Band, the most common surgical procedure in European countries, and after approval by the Food and Drug Administration in 2001 began implementation in United States.[13] Initially indicated for patients with body mass index (BMI) over 40 kg/m^2 without comorbidities or BMI greater than 35 kg/m^2, associated comorbidities such as DM2, hypertension, obstructive sleep apnea and degenerative arthropathy. Recently, in 2010 was approved for use in obese patients with BMI between 30 and 35 kg/m^2 with comorbidities associated.[14]

Regarding the results, the low weight is lower and slower when compared to the gastric bypass, but can reduce over 60% of excess weight. This weight loss is gradual and there is proper setting and continous monitoring.[15] A recent systematic review noted a failure to lose weight as an issue to consider, since this technique has been reported between 31 and 54% of excess weight loss in the first year.[16] Angrisani, in a prospective study, compared the weight loss of the adjustable gastric band *vs* the gastric bypass after 5 years of follow-up, demonstrating a failure to lose weight, defined as a BMI greater than 35 kg/m^2, at 34.6% in the adjustable gastric band group compared with 4.2% of the gastric bypass group.[17] This high rate of treatment failure has resulted in a conversion to author procedure at 58% at 7 years of follow-up.[18]

While this technique is presented as a safe, with low morbidity and almost no mortality, Dixon and O'Brien,[19] reported a perioperative complication rate of 1.5%. The complications described, from the drilling of the band until the failure to lose weight, will increase to the extent that the adjustable gastric band remains in time. It has been suggested that the rate of complications increases between 3 and 4% per year which remains *in situ*, leading to a rate of 40% up to 10 years.[20]

Within intraoperative complications, gastric perforation and the splenic lesion can be pointed, which are dependent on the insertion technique. Also can occur outflow tract obstruction of the esophagus, which is checked within 24 hours of running the strip; complications or disconnection of the connector as drilling and reservoir subcutaneous infection, filtration, cutaneous fistula and persistent pain can be mentioned. Slippage or prolapse of the band has been reported in the literature from 0.5 to 36%. This variability is given by different criteria and techniques used in the different series. When this complication occurs it is necessary to loosen the band and recommended his retirement. Erosion or migration of the band is a dreaded complication, reporting from 0.6 to 3% depending on the series and the risk increases as this foreign body remain in contact with the stomach, treatment involves removal of the band.[21]

Gastroesophageal reflux may exacerbate or reappear in one-third of patients. It may also occur in esophageal dilatation, although it is reversible in most cases deflating the balloon, can persist up to 13% of patients.[22]

The adjustable gastric band has been shown to produce a low excess weight with few short-term complications. While not always is possible to achieve the desired weight loss may be an alternative for patients who prefer or feel more comfortable with a reversible procedure, less invasive and less perioperative complications. Note that there is no certainty that this low rate of complications last beyond 3 years, which opens the possibility of increased

complications related to gastric banding (erosion, slippage) requiring reoperation.

Tubular Gastrectomy

The tubular gastrectomy was done initially as the duodenal switch restrictive component where its usefulness lay in reducing gastric capacity and produce weight loss in the short term, while the malabsorptive component of the operation (BPD) determined the lower long-term weight. While performing this technique, some patients could not complete the intestinal bypass. Research studies have documented that the tubular gastrectomy alone produced a significant weight loss. Eventually, it became the first time method for high-risk patients, in whom tubular vertical gastrectomy was first performed after weight loss and decrease surgical risk, and then in the process with the gastric bypass was completed.

Early reports from both prospective and retrospective studies have been encouraging the potential benefits of the procedure. Among these include excellent results in weight loss, resolution of comorbidities, relative ease of the technique, avoiding a foreign body or adjustments, shortened operative time and restriction of caloric intake inmediata.[23]

The surgical technique involves determining a vertical gastrectomy determintaed by a narrow gastric tube at the expense of the lesser curvature of the stomach and preserving 3 to 4 cm wide.

The concept is simple, but there are some important points in surgical technique, if is done incorrectly, as it can lead to serious complications. Traditionally it is performed laparoscopically with five ports. For the preparation of gastric tube calibration requires a probe or plug 38 F. Initially, skeletonization of greater curvature of the stomach is performed, severing the vessels at this level inside the gastro-omental arcade, exposing the greater curvature to relieve gastroesophageal junction (angle of His). In the upper segment of the stomach, by sectioning the short vessels, care must be taken to avoid spleen injury, as the bleeding can be substantial and can determine an unplanned splenectomy. Another relevant point during surgery is to release the adhesions of the gastric fundus to the retroperitoneum fundus, as remnant gastric volume may be important, affecting the restriction. Subsequently, calibrated with the spark plug and proceed to the gastric section vertically with endostaplers, which starts between 3 and 4 cm from the pylorus, moving vertically to complete the gastrectomy at the gastric fundus level near the gastroesophageal junction. It is essential that the staple is uniform, symmetrical shaped covering both anterior and posterior, always adjusted to the plug, allowing the tissue to be present without tension. Some authors recommend suture reinforcement to cover the staple line or simply to reinforce these unions. However, the latter has not shown as a clear advantage over reduce leakage of the suture line.

Regarding comorbidities, it has been observed that a high percentage of their patients improve or have a remission of type 2 diabetes mellitus in a monitoring of 1 to 5 years. In addition, a significant improvement in hypertension and hyperlipidemia, as well as sleep apnea and articular pain has also been observed.[24] The results are weight loss and a systematic review reported low rates of overweight between 33 and 85%, averaging 55.4%. In conducting the analysis among patients undergoing gastrectomy as a bridge of tubular gastric bypass and those in which the tubular gastrectomy was performed as a primary single procedure, there was a trend to loss top overweight in the last group (46.9 *vs* 60.4%). However, this difference is not statistically significative. Studies by imaging have demonstrated a significant dilation of the stomach tubulized at 2 or 3 years period. Still, this is not determined as a failure in the weight loss of the patients.[25]

Postoperative complications are described from 0 to 15.3% of cases.[26] Filtration is the most common complication (2.2-3.3%), in which medical management by interventional radiology or surgery should be evaluated depending on the time of onset, location and severity.[27] Other commonly reported complications include gastrointestinal bleeding requiring reoperation or transfusion, and stenosis, which requires surgery or endoscopic, by 1.2 and 0.6% respectively.

The anatomical alteration of the esophagogastric junction may influence the development of gastroesophageal reflux, with a prevalence of 27.5% and endoscopic esophagitis in 15.5%. Postoperative manometric studies have shown an incompetent lower esophageal sphincter in 73% of patients studied by gastroesophageal reflux symptoms.[28] Another postoperative changes attributable to the change in gastric anatomy is accelerated gastric emptying in patients with tubular gastrectomy, fact that should be considered to indicate the diet and monitoring of these patients.[29] Himpens compared in a prospective randomized study gastric banding with tubular gastrectomy. This study concludes that loss of overweight is higher in the tubular gastrectomy, both the first and the third year of follow-up (41 *vs* 57.7%) and loss of appetite is higher in the tubular vertical gastrectomy (42.5 *vs* 75% the first year, 2.9 *vs* 46.7% at 3 years). Gastroesophageal reflux is most common in the first year post tubular gastrectomy (21.8 *vs* 8.8%), but then decreased in the third year, increasing significantly with the adjustable gastric band (3.1 *vs* 20.5%).[30] Karamanakos, in a prospective randomized study, compares the tubular gastrectomy and gastric bypass, which reported better

weight loss rate in the tubular gastrectomy at 1 year of follow-up. This result is attributed to a hormonal effect in appetite suppression, plus gastric restriction properly.[31]

The classic indications for tubular gastrectomy are morbidly obese (BMI > 40 kg/m^2) and patients with BMI > 35 kg/m^2 associated comorbidities. Moreover, according to the latest consensus of experts published in 2012, is accepted tubular gastrectomy as a single procedure in the treatment of obesity as a valid option in adolescent patients, elderly, high-risk surgical candidates for transplant (kidney and liver) and with inflammatory bowel disease. It is accepted in patients with morbid obesity and metabolic syndrome in patients with BMI 30 to 35 kg/m^2 with comorbidities. It is considered an absolute contraindication for the presence of Barrett's esophagus for tubular gastrectomy.[32]

Gastric Plication

This technique, first described by Amoli and Talebpour, decreases the gastric lumen at the expense of greater curvature. Similar to a gastric sleeve, but without partial gastric resection or implant use. Multiple techniques have been described; its principle is basically the dissection of the greater curvature and its plication or invagination into the gastric lumen and lesser curvature, where one or more fixed suture lines, leaving a large intraluminal fold. The end of the gastric lumen diameter is calibrated with a spark plug. The results published by the original authors report a prospective series of 100 cases with an average BMI of 47 (range, 36-58 and 30-35 kg/m^2), where the percentage of excess weight loss was progressive, stabilizing at 1 year of follow-up in about 60% loss of excess weight, keeping this results at 2 and 3 years of follow-up.[33]

Ramos, reports in a prospective series that included 42 patients with BMI > 40 or BMI > 35 kg/m^2 associated with any comorbidity, where plication was performed laparoscopically with in 24 months of follow-up. This monitoring shows that already in the first month there is a decrease of excess weight of 20%, with a gradual downward trend and the rate of overweight decreased from 62% at 18 months follow-up. It has been found that patients with BMI > 45 kg/m^2 have a less percentage of weight loss compared with the patients that have a lower BMI, reason why most authors do not indicated this technique for BMI > 50 kg/m^2.[34]

In terms of technique and postoperative complications, Ramos, describes an average of 50 minutes operative time, with no intraoperative complications or conversion to open surgery, which is consistent with other authors. In this series the most common early complications were nausea, vomiting and drooling, which were transient and disappeared within 2 weeks postoperatively. Major complications have been described as suture dehiscence, secondary filtration repeated vomiting, gastrointestinal bleeding, perforated gastric ulcer, gastric obstruction and thrombosis portomesentéric.[33-35] The overall complication rate is around 8.8%.

This practice has emerged as a new alternative in restraint techniques, with promising short-term results in terms of weight loss and complication rate, in addition to being a potentially reversible technique. However, no studies show its effectiveness in long-term monitoring.

DISCUSSION

The prevalence of obesity is increasing in the recent decade, and now is one of the leading public health on a worldwide scale. Bariatric surgery is currently the most efficacious and enduring treatment for clinically severe obesity, and as a result, the number of bariatric surgery procedures performed has risen dramatically in the last years.[36,37]

There are two well-design prospective and observational studies of bariatric surgery patients and matched morbidly obese controls with long-term follow-up (>10 years); the Swedish Obese Subjects (SOS) study and a 2-cohort study conducted at the McGill University Health Center. The SOS authors report that at the 10-year follow-up, weight loss was 25% of total body weight for gastric bypass patients, 16.5% for vertical banded gastroplasty, and 13.2% in the fixed gastric banding subgroup, while the matched controls experienced a 1% weight gain.[38]

A meta-analysis of total surgical mortality in 85,048 patients undergoing a spectrum of bariatric procedures reports that the early total mortality was 0.28%, whereas the late total mortality (30 days and 2 years) was 0.35%. In another systematic review, the mortality rate at the first 30 days was 0.19%.[39,40] Recently, DeMaria et al developed a clinically relevant 5-point scoring system, with the aid of this tool, the mortality risk of patients is defined as low-(0-1p), intermediate-(2-3p) and high-risk (4-5p). Certainly, the training and the bariatric surgeon's experience are important factors that must be improved for the benefit of the patient.[41] One of the most problematic issues is not meeting the patients expectation, as regards with weight loss. Reoperations are technically more difficult than primary procedures and have high perioperative complication. In the SOS study among 1,338 subjects with following at least of 10 years, the frequency of reoperation was 31% for gastric banding and 17% for gastric bypass.[42]

A recent survey reported that 90% of world bariatric surgery was performed laparoscopically. More specifically,

laparoscopic adjustable gastric band (LAGB) was performed in 42.3% worldwide, Laparoscopic standard Roux-en-Y gastric by-pass (LRYGB) in 39.7%, open standard Roux-en-Y gastric by-pass (ORYGB) in 5.7%, and laparoscopic sleeve gastrectomy (LSG) in 5.1%.[43]

CONCLUSION

Bariatric surgery is an invasive treatment for obesity and is often viewed as the 'last chance' for patients, research focused on improving outcome for patients who fail to achieve or maintain weight loss following surgery is a priority. The restrictive bariatric surgery techniques have evolved over the last time, with the help of technological advances that have made possible, allowing improved results. The choice of technique should be very careful, because all have potential complications and risks. Moreover, patient selection also candidate for these procedures must be rigorous and based on medical criteria, backed by scientific evidence and with the support of a multidisciplinary team.

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ABOUT THE AUTHOR

Oscar Manuel Torres Falcon

Senior Resident, Department of Laparoscopic Surgery, Juan I Menchaca Hospital, Jalisco, Mexico, e-mail: osmatofa@gmail.com

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REVIEW ARTICLE

Laparoscopic and Robotic-assisted Simple Prostatectomy

Krishna Raghavendra Rao

ABSTRACT

Laparoscopic and robotic-assisted techniques are now established in the surgical treatment of prostate cancer. The use of these new technologies in the area of benign prostatic disease is surprisingly recent. Where endoscopic resection is precluded because of large volume gland enlargement, open prostatectomy is still a preferred method. Holmium laser enucleation and transurethral electroresection-enucleation are other modalities that are in use in selected centers. This review is to evaluate the current position of laparoscopic and robot-assisted simple prostatectomy, explore advantages and disadvantages and assess the impact of these technologies in the future management of benign prostatic hyperplasia.

Keywords: Benign prostatic hyperplasia, Prostatectomy, Laparoscopy, Robot assisted.

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INTRODUCTION

Benign prostatic hyperplasia (BPH) is estimated to afflict 60% of 60-year-old and 90% of 90-year-old men. In spite of advances in medical therapy using α1 blockers and 5α reductase inhibitors (5 ARI) up to 10% of these men will require surgical relief of bladder outlet obstruction (BOO) caused by the enlarged gland. With advancing age and prolonged medical therapy there is likely to be a significant number of patients with larger glands requiring enucleation rather than transurethral resection. Similarly, comorbidities are on the increase and the invasiveness of open surgery combined with blood loss and the metabolic response to trauma, traditional open prostatectomy is giving way to less invasive methods via the transurethral route, such as holmium laser enucleation (HOLEP) and electroresection and enucleation (TUERP). Recent applications of laparoscopic and robotic-assisted techniques to replicate open prostatectomy have aroused considerable interest.

OBJECTIVE

The objective of this review article is to assess safety and outcome between laparoscopic and robotic-assisted simple prostatectomy for BPH and compare these with the more established open and transurethral prostatectomy (including HOLEP and TUERP).

The main parameters assessed were the feasibility and ease with which the procedure could be performed and the advantages and disadvantages when compared with the other methods in use.

This involved the review of related articles to epidemiology of BPH, open prostatectomy, HOLEP, TUERP as well as laparoscopic and robot-assisted simple prostatectomy, with the aim of realizing the objectives of the study. This was achieved using internet search engines and then reviewing the relevant articles through the Royal Australasion College of Surgeons (RACS) library, eMedicine and Uptodate from the Queensland Health website and from resources at World Laparoscopy Hospital. The original articles were obtained from the RACS library in the majority of cases.

REVIEW OF ARTICLE

Epidemiological studies of BPH are fraught with difficulty because of controversy over diagnostic criteria. Nevertheless BPH is a growing public health concern.[1,2]

Open prostatectomy remains the 'gold standard' in terms of symptom relief but the associated morbidity and complication rates are high.[3,4]

Transurethral resection of prostate (TURP) is ideal for moderate-sized glands. Attempts to reduce associated morbidity include saline TURP and laser techniques with resection and nucleation. Holmium enucleation is an established technique and newer lasers, such as thulium are yet to show any marked advantages.[5]

Transurethral enucleation and resection using saline as irrigant and bipolar energy (TUERP, TUEB) is a novel technique for removal of the larger gland.[6] Both this and HOLEP require mechanical morcellation of the gland prior to removal.

Porpiglia[7] in 2006 reported laparoscopic Millin's prostatectomy and Desai et al[8] followed with robot-assisted single port transvesical prostatectomy. A large review of 450 cases was reported from Turkey in 2010.[9]

TECHNIQUES AND RESULTS

Laparoscopic simple prostatectomy is performed through an extraperitoneal or transvesical approach. A subumbilical 2 to 2.5 cm incision permits the insertion of a SILS or multiport and the preperitoneal space developed by balloon or insufflation and dissection. The prostate is approached either through the bladder or by a capsular incision as in Millin's technique. The remainder of the operation follows closely the steps of open prostatectomy. Hemostasis is

achieved by direct electrocoagulation, trigonization and closure of the incision done with continuous sutures. The specimen cut into strips and removed through the port site. Operative time has varied between 108 minutes to 6 hours and there have been documented injuries to the adjacent bowel. Finger assistance has been described both through the rectum and through the port site.[10]

The reported robotic technique has been done with a single port inserted directly into the bladder.

The procedures have been uniformly considered feasible, safe and relatively complication free. A stated advantage is the significantly lower blood loss.

DISCUSSION

With ageing populations worldwide resulting from increasing longevity, BPH requiring surgical intervention is becoming a significant public health challenge. It is estimated that the incidence of BPH is as high as 38 per 1,000 man-years at age 75 to 79, rising exponentially from 3 per 1,000 man-years at age 45 to 49 years. Associated comorbidities and treatment thereof especially with antiplatelet and anticoagulant drugs add to perioperative morbidity and mortality thereby limiting the surgical options especially that of open prostatectomy, which already has higher complication rates.

HOLEP and TUERP have been developed to safely perform enucleation even in patients on anticoagulant therapy. These are not universally available and the learning curve is steep so that the procedures are limited to few centres where enthusiasts have gained the requisite skills.

The advent of laparoscopy and robotics is, therefore, an area that has tremendous potential. Most modern surgeons are being trained in laparoscopic techniques and many urology residents are acquiring skills with the da Vinci robot. Instrumentation is now ergonomically designed, the only limiting factor being the high associated costs.[11]

CONCLUSION

It is obvious that the new technologies are here to stay and will make inroads into the traditional management of all manner of surgically correctible conditions.

It remains to be seen whether the potential benefits are translated into practical applications. More studies will be needed to define the place of laparoscopy and robotics in the surgical treatment of BPH.

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ABOUT THE AUTHOR

Krishna Raghavendra Rao

Clinical Director, Department of Surgery, Gladstone Hospital Queensland, Australia, e-mail: dad.rao@gmail.com

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REVIEW ARTICLE

Endoscopic Stenting for Treatment of Leaks Following Sleeve Gastrectomy

Brendan Marr, Bradley Needleman, Dean Mikami

ABSTRACT

Background: Sleeve gastrectomy has become a valuable and effective option in the treatment of morbid obesity. Although a safe procedure overall, the operation does have a significant potential complication in the form of staple line leak. One of the strategies described to treat this complication is the placement of esophageal stents. We describe our experience with the placement of covered esophageal stents as a first -line treatment of staple line leakage after sleeve gastrectomy.

Methods: A retrospective review of all patients undergoing sleeve gastrectomy at our institution from 28th June 2004 to 31st Oct 2011 was performed. Patients presenting with staple line leak were identified. Also included were patients transferred from outside institutions with this diagnosis. In all cases, the leak was treated with esophageal stent placement. Outcomes of interest included rate of resolution, body mass index (BMI) and time at presentation.

Results: Four patients were identified with a diagnosis of staple line leak after laparoscopic sleeve gastrectomy. Time at presentation was 35 ± 47.7 weeks postoperatively. BMI was 45 ± 2.25. In all cases, the leak was successfully managed with endoscopic placement of covered esophageal stent. In two cases, the patients required multiple stent placements.

Conclusion: Staple line leaks after sleeve gastrectomy can be successfully and safely managed with endoscopic placement of covered metal stents. Stenting should be considered as first-line treatment of these complications. Optimal duration of stent therapy is 6 to 8 weeks although repeat stent placement may be required.

Keywords: Laparoscopic, Bariatric, Endoscopic, Sleeve gastrectomy.

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INTRODUCTION

The sleeve gastrectomy was initially described as part of the duodenal switch procedure in 1988.[1] This procedure was first performed laparoscopically by Gagner et al in 1999.[2] The technique was later described as a first step in a staged bariatric procedure for the superobese in 2003.[3] Since then, the laparoscopic sleeve gastrectomy has become an important stand-alone option in the treatment of morbid obesity and its subsequent comorbidities. The number of sleeve gastrectomies performed in the United States has steadily increased. Potential advantages of this procedure include good weight loss results, no mesenteric defects, no required adjustments, fewer nutritional deficiencies and the elimination of dumping as the pylorus remains intact. While sleeve gastrectomy has been established as a safe procedure, it does have its share of complications. One of the more troublesome complications is staple line leak. The complication occurs from 1 to 3%.[4] Management of a staple line leak can vary considerably and includes reoperation with closure of the defect, drainage (either laparoscopically or percutaneously), parenteral nutrition, stenting, biological glues or some combination of these options. Individual management of the complication should depend on the overall clinical state of the patient and should take into account length of time the leak has been present, presence of abscess and the development of peritonitis. The aim of our study was to determine the safety and efficacy of endoscopic stenting of staple line leaks after laparoscopic sleeve gastrectomy in the hemodynamically stable patient.

METHODS

Four patients who underwent laparoscopic sleeve gastrectomy with a diagnosis of staple line leak were identified at our institution. Of these three patients had their procedures performed at an outside institution. Their charts were reviewed for patient characteristics, postoperative time at presentation and outcomes. This retrospective chart review was approved by the Institutional Review Board of Ohio State University Medical Center.

Stent Placement Technique

An upper endoscopy was performed in each case to evaluate the site and extent of the leak. Once the leak was found, a radiopaque marker was placed at the site. A guidewire was then placed through the scope into the pylorus. Its placement was confirmed under fluoroscopy. The scope was then withdrawn, leaving the guidewire in place. A 23 × 155 mm covered esophageal stent (Wallflex®, Boston Scientific Corporation, Natick, MA) was advanced to cover the defect using fluoroscopic guidance. The stent was then deployed and a completion endoscopy was performed. The day after stent placement an upper gastrointestinal contrast study was performed. If the study was negative for leak, the patients were started on clear liquid diet.

RESULTS

The patient characteristics and outcomes are summarized in Table 1. The mean age of the patients was 44 ± 9.3 years. The mean preoperative BMI was 45 ± 2.25. The mean time to presentation was 35 ± 47.7 weeks. This was highly variable as the patients were presented between 2 and 104 weeks postoperatively. The patients consisted of four women. Of the four patients, three had sleeve gastrectomy performed at an outside hospital. Presenting symptoms included abdominal pain, nausea and vomiting. Leukocytosis was present in two patients. The leaks were diagnosed with upper GI studies as well as abdominal CT scans. One of the patients was presented with a gastropleural fistula and required decortication of the left lung. Two of the patients had initial stent therapy failures requiring additional stent placement (Figs 1 and 2). One patient had stent migration requiring replacement. Treatment for staple line leaks consisted of covered stent placement and laparoscopic drain placement with abscess evacuation if present. In two patients, a drain was already in place, however, the remaining cases required laparoscopic drain placement.

DISCUSSION

Laparoscopic sleeve gastrectomy has become a valuable tool in the treatment of morbid obesity. While the procedure has been proven to be safe and well-tolerated as well as effective at achieving long-term weight loss, it does have its share of potential complications. One of the more notoriously difficult complications to manage is that of staple line leak. Typically, the area of the staple line leak is inflamed and the surrounding tissue is friable making placement of primary sutures difficult and the risk of recurrence substantial. Many techniques have been attempted for control of these complications, including placement of esophageal stents at the leak site, biological glue injection, percutaneous and laparoscopically placed drains, primary closure of the defect or some combination of these methods.

The use of endoscopically placed esophageal stents to manage staple line leaks after laparoscopic sleeve gastrectomy has been described by several authors in small case series with varying results. Their results have been summarized in Table 2.[5-10] In an attempt to add to the body of knowledge regarding this technique, we present our experience. In our practice, we have managed four patients with staple line leaks. One of the initial surgeries was performed at our institution. The other four were transferred from outside facilities for definitive treatment, including one surgery performed in Mexico. All of the leaks were located adjacent to the gastroesophageal junction. The time of presentation of symptoms from the initial surgery in our patient group varied tremendously. One of the patient's presented 2 weeks postoperatively, whereas another one presented over 2 years postoperatively. In all cases, an attempt was made at management of the staple line leaks

Fig. 1: Patient no. 1 after placement of stent with laparoscopic drain placement (note clip at leak site)

Fig. 2: Patient no. 1 after stent removal with persistent leak

Table 1: Patient characteristics

Patient number	*Age*	*Gender*	*Time at presentation*	*Treatment*
1	37	F	2 weeks	Stent with laparoscopic abscess evacuation and drain
2	51	F	4 weeks	Stent with laparoscopic drain
3	35	F	7.5 months	Stent × 2, percutaneous drain
4	53	F	25 months	Stent × 2, laparoscopic drain

Table 2: Use of esophageal stents for sleeve gastrectomy leaks

Study	*No. of leaks*	*Leak rate (%)*	*No. of patient receiving stents*	*Resolution*
Oshira (2009)	2	-	2	2/2
Casella (2009)	6/200	3.0	3	3/3
Tan (2009)	8		8	4/8
Nguyen (2010)	3		3	3/3
Jurowich (2010)	4		3	3/3
deAretxabala (2011)	8		4	4/4
Own data (2011)	5		5	5/5*

*Two patients requiring two stent interventions

with placement of endoscopic covered stent. However, we found that, in two cases, multiple placements of stents were required as the first attempt failed. These leaks were discovered on UGI studies performed immediately after stent removal. In all cases, drainage was utilized either by preexisting drain or by laparoscopic placement. Using the combination of these two techniques, we were able to achieve resolution in all patients.

The primary method of diagnosis for our patients was abdominal CT scan (Fig. 3). Patients presented with nausea and abdominal pain. Upper GI studies were used after stents were placed to evaluate for resolution of leak. These were performed 2 to 4 weeks after stent placement. Stents were withdrawn after 6 to 8 weeks.

Stent migration was a notable problem in one patient. The stent was noted to have migrated distally toward the gastric antrum on follow-up X-ray. The stent was removed and replaced. In general, we noted that the esophageal stents can be uncomfortable but tolerable for patients producing substernal chest pain, nausea and reflux symptoms.

All the patients in our series were clinically stable at presentation. The endoscopic placement of a covered esophageal stent or other minimally invasive techniques for the complication of staple line leak should only be performed in hemodynamically stable patients. In patients with hemodynamic instability or peritonitis surgical reexploration is mandatory.

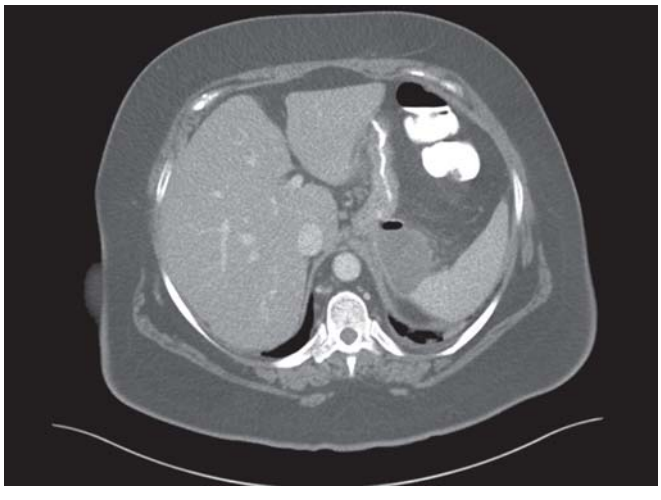

Fig. 3: Patient no. 2 with postoperative air-fluid collection adjacent to GE junction consistent with staple line leak

CONCLUSION

Any patient who, after laparoscopic sleeve gastrectomy, presents with abdominal pain, leukocytosis, nausea or vomiting should be immediately evaluated for staple line leak regardless of how far out from surgery they are. Abdominal CT scan and upper GI studies are essential for proper diagnosis of this complication. Patients who are hemodynamically unstable or display signs of peritonitis should be taken immediately to the operating room for exploration. However, in stable patients, a minimally invasive technique should be considered. The endoscopic placement of covered esophageal stents has been demonstrated to have acceptable success rates in managing this complication. The addition of laparoscopic or percutaneous drain placement may be required. Complications, such as stent migration and failure of the leak to resolve may require repeated endoscopy with removal and replacement of the stent. Nevertheless, the endoscopically placed covered esophageal stent represents an invaluable tool for the management of staple line leaks after laparoscopic sleeve gastrectomy.

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ABOUT THE AUTHORS

Brendan Marr (Corresponding Author)

Assistant Professor, Department of Surgery, West Virginia University West Virginia, USA, e-mail: marr.brendan@gmail.com

Bradley Needleman

Associate Professor, Department of Surgery, Ohio State University Ohio, USA

Dean Mikami

Assistant Professor, Department of Surgery, Ohio State University Ohio, USA

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REVIEW ARTICLE

Human Fibrin Glue in Laparoscopic Inguinal Hernia Repair: An Alternative to Invasive Mesh Fixation: A Review of Literature

Sohail Y Bakkar, RK Mishra

ABSTRACT

The popularity of laparoscopic inguinal herniorrhaphy has been growing. It has become the method of choice for bilateral and recurrent inguinal hernias. Mesh and its fixation have contributed profoundly to the effectiveness of repair. However, the conventional invasive methods of mesh fixation have been a major source of morbidity. Therefore, noninvasive alternatives have been sought. One such alternative is the use of human fibrin glue (Tissucol).

Objective: The aim of this review was to compare the effectiveness of noninvasive mesh fixation using human fibrin glue (Tissucol) to the conventional invasive method (stapled fixation) in laparoscopic inguinal hernia repair and point out any additional advantages of this atraumatic method.

Materials and methods: A literature search was conducted using SpringerLink journal electronic library, Highwire press and the search engine Google. The following terms were used: Human fibrin glue, Tissucol, laparoscopic inguinal hernia repair and mesh fixation. Of the retrieved citations, 24 were selected for further referencing.

Keywords: Human fibrin glue, Tissucol, Laparoscopic inguinal hernia repair, Mesh fixation.

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INTRODUCTION

Inguinal herniorrhaphy is among the commonest procedures performed in surgical practice. The lifetime risk of developing an inguinal hernia is 27 and 3% in men and women respectively.[1]

SIGNIFICANCE OF PROSTHESIS IN INGUINAL HERNIA REPAIR

The use of prosthetic material has revolutionized surgical procedures performed for inguinal hernias. Repair using prostheses has significantly reduced failure rates (recurrences) by eliminating what all previous repair techniques had in common: Suture line tension, (i.e. suturing together, under tension, structures that are not normally anatomically in opposition), the main etiologic factor for the majority of recurrences. Tension free or tension-eliminating mesh repair can be achieved via open posterior (first described by Stoppa in 1975),[2] open anterior (first described by Lichtenstein in 1989)[3] approaches and laparoscopically.

LAPAROSCOPIC INGUINAL HERNIA REPAIR

The first laparoscopic hernia repair was reported by Ralph Ger in 1982. Mesh was not used. Instead, simple closure of the peritoneal opening of the hernia sac using interrupted stainless steel clips was performed.[4] Since the early 1990s, laparoscopic herniorrhaphy has been performed via the transabdominal preperitoneal (TAPP) or totally extraperitoneal (TEP) approaches.[5,6] Both can be looked at as Stoppa's repair performed laparoscopically. As they follow the same principle of placing, a large mesh in the preperitoneal space (posterior repair) that would cover the entire myopectineal orifice of Fruchaud.

Compared to conventional open repair, laparoscopic repair is associated with fewer recurrences and reduced chronic inguinal pain.[7] For these reasons, laparoscopic inguinal herniorrhaphy has been gaining popularity. It has become the method of choice for bilateral and recurrent inguinal hernias.[8,9] Both techniques (TAPP and TEP) are safe and have the same advantages, but TAPP is easier; a better view of the anatomy is achieved, shortening the learning curve.[10] Furthermore, TAPP allows visualization of both sides and, in case of a large hernia sac, continuous visualization of sac contents.[11]

SIGNIFICANCE OF MESH FIXATION AND AN ALTERNATIVE TO INVASIVE FIXATION

The key to a successful preperitoneal mesh repair is proper dissection and exposure of the myopectineal orifice, adequate mesh size achieving adequate overlap with the defect and proper mesh fixation. Hematoma mesh lifting and mesh migration are the most common causes of repair failure (hernia recurrence).[12,13] In conventional laparoscopic inguinal hernia, repair mesh fixation is accomplished using staples. Such invasive fixation carries with it the risk of misplacement of staples and subsequently damaging nearby nerves and vessels leading to complications, such as postoperative neuralgia, bleeding and hematoma formation.[14] The effectiveness and safety of nonfixation as an alternative to invasive fixation for small and medium sized defects, and where there was adequate overlap of the

defect by the mesh has been reported in the literature. It has been demonstrated that nonfixation in this selected group of patients is negatively associated with an increased risk of recurrence and positively associated with reduced risk of some of the complications related to invasive fixation as well as reduced operative cost.[15-18] However, additional studies with larger numbers of patients and longer periods of follow-up are required for unequivocal confirmation. Furthermore, eliminating the requirement for mesh fixation in patients with large defects (>4 cm) has not been demonstrated. Because of all what was mentioned earlier, the ideal solution would be to seek a noninvasive method of mesh anchoring. One such method often referred to as 'biologic soft fixation' involves the use of human fibrin glue also known as Tissucol[19] (Fig. 1).

HUMAN FIBRIN GLUE (TISSUCOL)

The use of fibrin as a surgical sealant goes back to more than a 100 years ago. Tissucol (Fig. 2) is composed of two components contained in separate vials: The first component is the sealant which is a freeze dried concentrate of mainly fibrinogen, transglutaminase (factor XIII) and fibronectin reconstituted in a natural antiproteasic substance (aprotinin) that inhibits tissue fibrinolysis. The second component is the catalyst, which is thrombin, dissolved with calcium chloride. Therefore, Tissucol in its composition mimics the final step of the coagulation cascade conferring hemostatic and sealing properties as well as promoting the formation of granulation tissue (biostimulation) independent of the patient's coagulation status.[20]

Human fibrin glue has been used effectively in the various fields of surgery, including general surgery, cardiac, vascular, thoracic, urological and plastic surgeries. And, in order to ease its application in its limitless indications, special devices have been designed that meet that purpose, but, are beyond the scope of this discussion.

STAPLED FIXATION *VS* FIXATION WITH TISSUCOL IN INGUINAL HERNIA REPAIR

Stapled fixation and biologic soft fixation have been compared in many regards, including mesh migration, the tensile strength achieved between the mesh and surrounding tissues, tissue incorporation (the ability to promote granulation tissue formation), postoperative hemorrhagic complications and postoperative neuralgia as well as cost. In terms of mesh migration and the tensile strength achieved between the mesh and surrounding tissues both methods of fixation were equally effective. However, regarding tissue incorporation, Tissucol demonstrated improved ability to promote granulation tissue formation.[21] Tissucol also proved to be superior regarding postoperative morbidity as postoperative hemorrhagic complications and neuralgia were significantly reduced by its use and earlier return to physical and social activities achieved.[20-24] Tissucol even proved effective in preventing local hemorrhagic complications after inguinal hernia repair in patients with coagulopathies.[20] The effectiveness of fibrin glue as a mesh fixating method was also demonstrated by Ceccarelli et al[25] who reported a recurrence rate similar to that of stapled

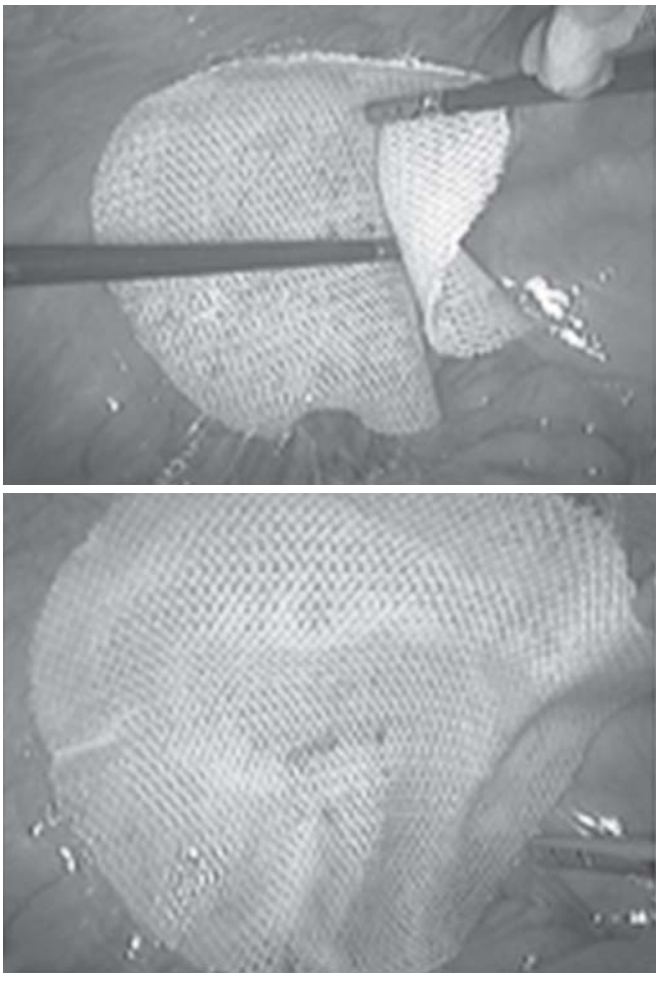

Fig. 1: Mesh fixed using tissucol

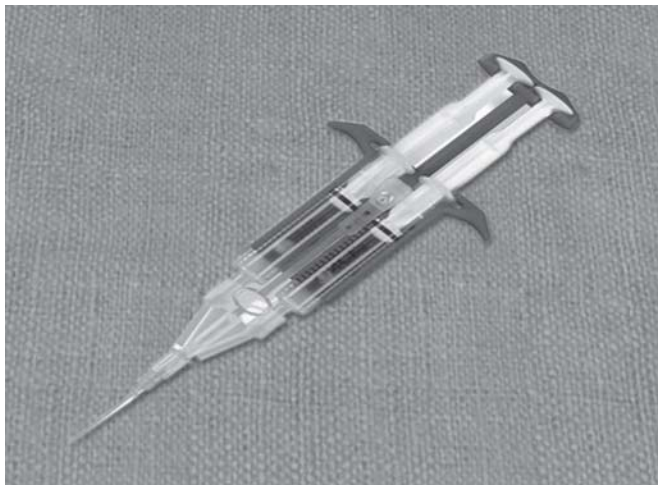

Fig. 2: Tissucol

fixation. They also reported reduced intraoperative bleeding, postoperative trocar site pain as well as incisional hernias. These observations were related to the use of a 5 mm trocar instead of a 10 mm trocar when fixating using tissuol. Biologic soft fixation does not bring additional cost as when compared to stapled fixation. It may even be financially beneficial by saving the cost of staple-related complications and reducing the length of hospital stay.[21,22]

CONCLUSION

Mesh fixation is a key to a successful laparoscopic inguinal hernia repair. Noninvasive fixation using Tissucol has always been confirmed by the literature to be as effective as its invasive counterpart with additional advantages over the latter related to its sealing, hemostatic and biostimulatory properties mainly in the form of significantly reducing the morbidity associated with the use of traumatic fixation.

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ABOUT THE AUTHORS

Sohail Y Bakkar (Corresponding Author)

Distinguished Member of WALS, Department of General Surgery King Abdullah University Hospital, Jordan University of Science and Technology, Jordan, e-mail: sohail.bakkar@gmail.com

RK Mishra

Senior Consultant, Laparoscopic Surgeon, Professor in Minimal Access Surgery, Chairman and Director, World Laparoscopic Hospital Pvt. Ltd., DLF Cyber City, Gurgaon, Haryana, India

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REVIEW ARTICLE

Two Port Laparoscopic Placement of Peritoneal Dialysis Catheter: Effective Technique

Najeeb H Mir

ABSTRACT

Aim: Two port laparoscopic placement of peritoneal dialysis (PD) catheter is a new and promising technique which is reliable, efficient and with less complications.

Materials and methods: Data collection was done using the internet via Google search engine, Medscape, PubMed, SAGES, Springer, NCBI, Nefrolgia and International journal of peritoneal dialysis. At least five study groups were analyzed who used two ports laparoscopy for PD catheter placement from 2004 to 2010.

Results: Mean operating time was between 32 and 52 minutes. No other technical intra or early postoperative complications related to technique were reported. Surgical revision was required in 6%, catheter survival was 94, 87 and 72% after 6 months, 1 and 2 years survival, catheter leakage was between 0 and 22.2%, catheter outflow failure was between 0 and 7.6%, catheter migration was between 2.6 and 4%, no life-threatening bleeding was noted, peritonitis was between 6.5 and 13% and exit site infection was seen in 3% of the patients. Mean follow-up was between 17 months and 2 years.

Conclusion: Two port laparoscopic PD catheter insertion is a safe, reproducible, and effective technique. It allows inspection of the abdominal cavity and adhesiolysis, omentectomy, or omentopexy when necessary. Due to its reliability, offers good catheter function outcome.

Keywords: Laparoscopy, Peritoneal dialysis, Catheter, Surgical revision, Catheter migration.

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INTRODUCTION

In 1959, peritoneal dialysis (PD) was used for the management of end-stage renal disease (ESRD).[1] Henry Tenckhoff developed the first indwelling peritoneal catheter in 1968, which was used for dialysis by an open surgical technique.[2]

Laparoscopic insertion (keyhole surgery)–is a way of inserting the catheter using a fine telescope to guide the catheter into the abdominal cavity. Laparoscopy is minimally-invasive, and also allows inspection of the peritoneal cavity with the feasibility of correcting any pathology inside the abdomen. Hence, diagnostic accuracy is improved.

Peritoneal dialysis is a good alternative for ESRD patients who are on hemodialysis. It involves infusing dialysis fluid into the peritoneal cavity through PD catheter and leaving it inside the abdomen to allow exchange of metabolic waste products between the body fluid and the dialysis fluid through the peritoneal membrane. In continuous ambulatory peritoneal dialysis (CAPD), the patient manually drains and replaces the dialysis fluid several times a day.

A PD catheter is conventionally placed through a small open incision, which may be carried out under local or general anesthesia. PD catheters according to Tenckhoff are traditionally implanted by a transrectus laparotomy. A small incision is made in the abdomen and peritoneal cavity is entered and the catheter is placed into the pelvic cavity. A tight purse-string suture is passed through the peritoneum and rectus sheath around the catheter. The other end of the catheter is taken out on to the abdomen after making a subcutaneous tunnel.

PD catheter can be placed via percutaneous techniques as well.

MATERIALS AND METHODS

Data collection was done using the internet via Google search engine, Medscape, PubMed, SAGES, Springer, NCBI, Nefrolgia and International journal of peritoneal dialysis.

Laparoscopic PD catheter insertion is usually performed under general anesthesia. After the insufflation of abdomen small incisions are made. The catheter-tip is advanced through the abdominal cavity into the pelvic cavity. After making a subcutaneous tunnel, the other end of the catheter is taken out via an exit site incision in the abdomen. Laparoscopy allows complete visualization of the catheter's configuration, location, and facilitates more accurate placement of PD catheter within the pelvis.

TECHNIQUE

Patient is kept in supine position and a 1 to 1.5 cm supra-umbilical incision is made and pneumoperitoneum created using a Veress needle and insufflation of carbon dioxide is put at pressure of 12 to 14 mm Hg. A 10 mm port is then inserted, a laparoscopic camera is introduced and exploration carried out. A 5 mm port is then inserted through

an incision in the mid-clavicular line at the level of the umbilicus and passed toward a point 2 cm lateral to the midline, midway between the umbilicus and the pubic symphysis, to create a subcutaneous tunnel (Fig. 1). The patient is then placed in the in a 30º Trendlenburg position. PD catheter is then passed into the abdominal cavity through the supraumbilical 10 mm port after removal of the camera. The pig tail of the catheter is directed into the pouch of Douglas in females and the rectovesical pouch in male patients assisted by a Maryland forceps placed through the 5 mm port. The external end of the catheter is grasped and brought out through the 5 mm port up to the inner Teflon cuff, this step is done under laparoscopic guidance. The 10 mm port is closed with a purse-string suture using non-absorbable material such as 0-0 nylon. The catheter is then secured in the proper place with a 0-0 nylon stitch. The PD catheter is tested on table using normal saline.[3]

There are other methods like Quinton percutaneous catheter placement,[4] the Moncrief-Popovich catheter technique and extended dialysis catheters.[5]

COMPLICATIONS

The complications of PD catheter are divided into early (within <30 days) and late (within >30 days).[6]

Early: Bowel perforation, bleeding, wound infection, outflow failure, leakage and peritonitis.

Late: Exit-site infection, tunnel infection, cuff-protrusion, catheter migration, outflow failure and dialysate leaks or hernias.

AIMS AND OBJECTIVES

Two port laparoscopic placement of PD catheter is a new and promising technique which is reliable, efficient and with less complications.

REVIEW OF LITERATURE

Rapid review of literature was done using the abstracts and at times full review of the article was done.

1. Eduard García-cruz1 et al evaluated about 51 patients for PD catheter insertion. Mean operating time was 32 minutes (range 15-55 minutes). One patient suffered an immediate postoperative catheter obstruction that required surgical repositioning. No other technical intra or early postoperative complications related to technique were reported. Mean time to discharge 1.02 ± 2.2 days. Catheter outflow failure rate was 7.6%. Conversion to hemodialysis due to peritonitis was 13%. Peritonitis per patient/year was 0.27. Catheter 6 months, 1 and 2 years survival rate was 94, 87 and 72%. Catheter migration rate was 4%. There was no peritoneal dialysis liquid leakage. The two ports technique described is an easy and rapid procedure, with few complications and early discharge. Due to its reliability, offers good catheter function outcome.[7]
2. Jincheul KO et al evaluated about 38 patients. After follow-up of 21.5 months (range 6-34), all catheters were working properly, although tip migrations were found in the iliac fossa in three patients and in the right upper quadrant in one patient. A port site hernia developed in one patient and peritonitis developed in two patients. Only one remote migration (2.6%) occurred during the study period. Thus, our method of laparoscopic catheter insertion might be a feasible option.[8]
3. Arnoud Peppelenbosch et al despite the similar outcomes of open surgical *vs* laparoscopic techniques from randomized studies, the laparoscopic insertion has the major advantage of correct catheter positioning in the lower abdomen, with the possibility of adhesiolysis. The minimal invasive percutaneous insertion bears the risk of bowel perforation and catheter malpositioning, and the outcome of this technique is strongly related to the experience of the surgeon. The major complications of these implantation techniques, like bleeding, dialysate leakage and catheter malpositioning, and their management are discussed in our study. Late peritonitis remains the major drawback of PD treatment, with the need of temporary or permanent change over to the HD treatment in 10% of the patients. Enrichment of the physician's interest and experience, along with a multidisciplinary approach to outline the optimal strategy of PD-catheter insertion and complication of the treatment, may improve the patients' survival and decrease the morbidity.[6]
4. Stephen P Haggerty et al evaluated about 31 patients. The mean operating time was 52 minutes. Adhesiolysis was required in 9 (29%) and omentectomy or

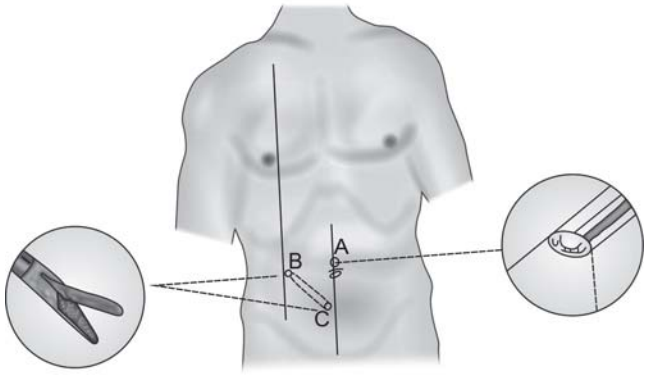

Fig. 1: Two ports laparoscopic catheter placement with a subcutaneous tunnel

omentopexy in 3 (10%) cases. Late complications included catheter dysfunction in two patients (6.5%), debilitating abdominal pain requiring catheter removal in one patient, and one trocar-site hernia. The mean follow-up was 17 months. Laparoscopic PD catheter insertion is safe, reproducible and effective. It facilitates placement of the catheter tip into the pelvis and allows adhesiolysis, omentectomy or omentopexy when necessary. Utilization of this technique results in a low rate of PD catheter dysfunction.[4]

5. Ahmed M Al-Hashemy et al evaluated nine patients. The mean operating time was 41 minutes (range 30-75 min). The mean postoperative hospital stay was 4.5 days (range 2-15 days). Two patients (22.2%) developed leakage of dialysate from the 5 mm port and one patient (11.1%) had migration of the PDC. Our study suggests that this new modified technique appears to be safe and simple and is associated with rapid postoperative recovery.[3]

RESULTS

1. *Mean operative time:* In three of our study groups the mean operative time was ranging from 32 to 52 minute.[3,4,7]
2. *Surgical revision:* The conversion to laparotomy was about 6% (2/33) in one of the trials.[6]
3. *Catheter survival:* In one of the randomized controlled trials catheter 6 months, 1 and 2 years survival rate was 94, 87 and 72%.[7]
4. *Catheter leakage:* Four studies reported the rate of catheter leakage ranging from 0% (0/51) to 22.2% (2/9).[3,7,8]
5. *Catheter outflow failure:* Two studies reported catheter outflow failure rates between 0% (0/38) and 7.6% (4/51) of procedures.[7,8]

   Another study showed malfunction of catheter in 6.5% (2/31) of patients after a mean follow-up of 17 months.[4]
6. *Catheter migration:* The three randomized controlled trials reported that the catheter migration occurred between 2.6% (1/38) and 4% (2/51) of the patients.[7,8]
7. *Hemorrhage:* All the studies did not report any catastrophic bleeding related to the two ports laparoscopic procedure.[1-8]
8. *Infection:* Two randomized controlled trials reported that peritonitis occurred between 6.5% (2/33) and 13% (7/51) of patients.[4,7]

   One nonrandomized controlled trial reported exit site infection in 3% (1/33) of laparoscopic procedures.[4]
9. *Mean follow-up:* In three of our study groups the mean follow-up was between 17 months and 2 years.[4,7,8]

DISCUSSION

Peritoneal dialysis is a safe and effective alternative for the patients with ESRD, especially children.[9] The preservation of residual renal function when compared with hemodialysis is much better with PD.[10,11] The laparoscopic approach has been widely accepted as an effective alternative to open surgery.[12-14] The open method requires a painful incision followed by blind insertion and carries a high potential for adhesions, incisional hernia and delay in instituting full volume peritoneal dialysis.[15] The technique of two port laparoscopic placement of PD catheter is gaining wide acceptance in terms of reliability, efficacy and long-term usage, with minimal complications. The conversion to open in 6% of patients compares favorably with a 5.2% conversion rate for laparoscopic cholecystectomy and 21% conversion rate for laparoscopic colectomy.[16,17] Catheter malfunction can be caused by kinking, catheter displacement, omental wrapping, catheter-fibrin coating and adhesions caused by abdominal infections. Besides exit-site and subcutaneous tract infections, peritonitis is a feared complication responsible for the catheter failures. Peritonitis can be recurrent, with a rate of relapse of ± 0.27 episodes/patient/year.[7]

Catheter migration is a common complication associated with all techniques of catheter placement.[18] In one of the series, one patient required laparoscopic insertion of a new catheter due to migration. Dialysate leak remains a problem with catheter placement for continuous ambulatory peritoneal dialysis. The leakage rate following placement of the PD catheter through an abdominal incision has been reported to be between 13 and 27%, especially with institution of early peritoneal dialysis.[15,19,20]

None of the patients in our series had any catastrophic hemorrhage.

CONCLUSION

Two port laparoscopic PD catheter insertion is a safe, reproducible, and effective technique. It allows inspection of the abdominal cavity and adhesiolysis, omentectomy, or omentopexy when necessary. It facilitates exact placement of the catheter tip into the pelvis where it functions best. This technique is a simple and rapid procedure with few complications due to its reliability and excellent results in terms of catheter function.

A successful PD program depends on the knowledge of the placement techniques and complications. A multi-disciplinary approach with great enthusiasm from the health care team will improve the catheter outcome and long-term results.

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ABOUT THE AUTHOR

Najeeb H Mir

Senior Registrar, Department of General and Laparoscopic Surgery, Armed Forces Hospital, Khamis Mushayt, Saudi Arabia
e-mail: naj5620@yahoo.com

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CASE REPORT

Laparoscopic Management of Renal Hydatid Cyst

Abhiijit Sharadchandra Joshi

ABSTRACT

I submit herewith, a case report of a 55-year-old male farmer, who developed a large left renal lower pole hydatid cyst. He was successfully treated laparoscopically in April 2007, via the transperitoneal access. There were no intraoperative complications and over a 2.5 years follow-up period. He was essentially asymptomatic and disease free. To the best of my knowledge, this is only the fourth reported case of laparoscopic treatment of renal hydatid cyst.

Keywords: Renal hydatid, Laparoscopically transperitoneal.

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INTRODUCTION

Hydatid disease is endemic in cattle and sheep-raising regions of the world. The treatment of hydatid cysts is principally surgical. With advances in laparoscopic techniques and equipment, hydatid disease has become manageable by the same.

CASE REPORT

A 55-year-old farmer presented to our hospital in March 2007 with left-sided abdominal pain and lump in left side of abdomen. Ultrasonography (USG) and computed tomographic (CT) scan of the abdomen revealed a large hydatid cyst, 15 cm in diameter, arising from the lower pole of left kidney (Figs 1 and 2). He was given albendazole 600 mg OD for 2 weeks preoperatively. The surgery was performed under general anesthesia, with the patient in supine position with a left side elevation of 15º. After establishing pneumoperitoneum with the closed method, using Veress' needle and CO_2 insufflation, the trocars were inserted. Two 10 mm and two 5 mm trocars were used. Dissection was commenced (Fig. 3) by reflecting the descending colon medially after incising the lateral peritoneal fold so as to enter the retroperitoneal space. The cyst wall was well demarcated. The cyst was then surrounded from all sides by hypertonic saline-soaked gauze pieces to avoid contamination of the peritoneal cavity in the event of spillage of the contents of the cyst. The second 10 mm trocar was then introduced under laparoscopic vision directly into the cyst (Fig. 4). No spillage occurred at the trocar entry site during or after the entry. A 10 mm suction cannula was then inserted into the cyst and the contents were sucked out (Fig. 5). Hypertonic saline was then instilled into the cyst through the second channel on the suction cannula, was kept *in situ* for 10 minutes and was then sucked out. Then the laparoscope was passed into the cyst to directly visualize and confirm complete evacuation (Fig. 6). After this the scope was reinserted through the subumbilical 10 mm trocar and the intracystic 10 mm trocar was withdrawn out of the cyst. A cystotomy was then performed to gain access into the cyst after which the endocyst was removed in toto and placed in endo bag. The remnant ectocyst was deroofed (Fig. 7) at multiple places where it was bare, taking care not to injure the descending mesocolon. These chunks of ectocyst were all extracted with the endocyst using the endobag. After confirming hemostasis at the edges, the resulting cavity was packed with greater omentum held in position with 4-5 silk stitches. A 28 Fr tube drain was passed through the lateral trocar site

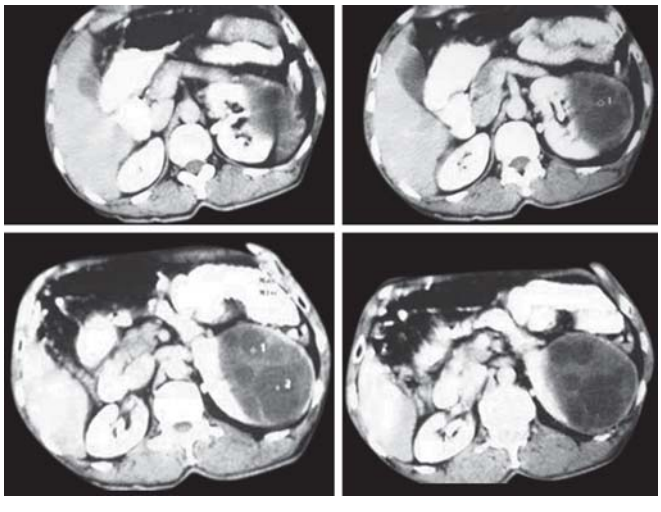

Fig. 1: CT image of LT renal hydatid 1

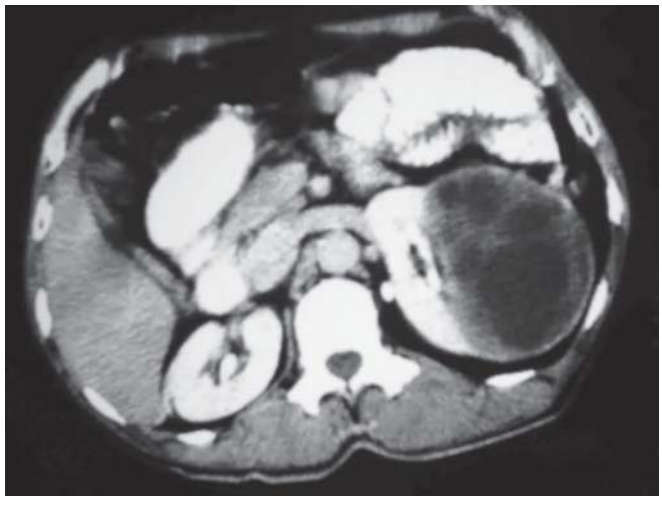

Fig. 2: CT image of LT renal hydatid 2

Fig. 3: Cyst seen through descending mesocolon

Fig. 6: Intracystic view

Fig. 4: Sharp 10 mm trocar entry into cyst

Fig. 7: Deroofing of ectocyst

Fig. 5: Sucked out scolices and hydatid sand

and left *in situ* in the left paracolic gutter. The procedure lasted for 120 minutes. There were no complications, the drain was removed on postoperative day 3 and the patient was discharged on the fourth postoperative day. Albendazole was continued for 6 weeks postoperatively.

DISCUSSION

Isolated kidney involvement in echinococcosis is extremely rare (2-3% of cases).[2] There are no diagnostic clinical signs and symptoms except cystic rupture into the collecting system, which leads to acute renal colic and hydatiduria.[3,4] Diagnosis is made on radiological imaging. Surgery is the treatment of choice in renal hydatid cyst. Removal of hydatid cyst is possible in most cases (75%). Nephrectomy (25% of cases) must be reserved for destroyed kidney. Maximum care should be taken during the surgery to avoid spillage of contents. During kidney-sparing surgery a scolicidal solution should be used before opening the cyst to kill the daughter cysts and therefore prevent further spread or anaphylactic reaction.[1,5] I conclude that it is safely possible to laparoscopically manage this rare entity without compromising on the basic principles of operative treatment of hydatid cyst, namely controlled evacuation of cyst contents, instillation of appropriate scolicidal agent for optimum contact time, meticulous prevention of spillage of cyst contents and removal of germinal membrane of the cyst.

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ABOUT THE AUTHOR

Abhiijit Sharadchandra Joshi

Consultant, Department of General Surgery, Dr LH Hiranandani Hospital, Mumbai, Maharashtra, India
e-mail: abhiijit.joshi@hiranandanihospital.org