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Leakage after Single Anastomotic Gastric Bypass Surgery

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Abstract: Background: Morbid obesity is one of the major health problems of the 21st century which has a steadily increasing incidence, representing approximately 10% of the world's population and considered as the second leading cause of preventable death after smoking. Annually, obesity-related diseases account for 400,000 of premature deaths. **Objective:** The aim of the present study is to evaluate causes, diagnosis and different lines of management of anastomotic leakage after gastric bypass surgery. **Methods:** This is a prospective study carried on 10 patients with morbid obesity. All patients consented to participate in this study. They have single anastomotic gastric bypass surgery and those cases are attendants of bariatric surgery department at Ain shams university hospitals and some other private hospitals. **Results:** In our study, there was no significant difference between patients concerning sex and its role in developing leakage with 40 % female and 60% male patients. Also, there was significant role for increasing age and BMI of the patients participated in the study. Patients with more co-morbidities are more reliable to incidence of leakage post lap mini gastric bypass. Most of the patients had intra operative complications like bleeding from anastomotic line (20%), intra operative leakage (20%), miss firing (10%) and thus increase percentage of leaking post operation, so surgeons experience and skills are so important in operation and management. Leakage happened in the 1st and 2nd days post operation. However, some authors reported that leakage may happened later on. Most of the patients had re exploration and refashioning of anastomotic line (60%), conservative treatment and close observation was done to (30%) of the cases and conversion to other operation was done to (10%) of the cases. **Conclusion:** Advanced laparoscopic skills, including two handed technique and laparoscopic stapling and suturing, are required. Both fundamentals of bariatric surgery and advanced laparoscopic surgery should be mastered before performing laparoscopic surgery, several intraoperative techniques have been implanted to prevent the anastomosis leak. These interventions include intraoperative pneumatic testing, the use of linear staplers with shorter stapler height, over sewing of staple line, use of omental wrap, and measures designed to reinforce staple line, such as fibrin glue, peristrips, seamguard, bovine pericardium and various other staple line reinforcement material.

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1. Introduction

Obesity has become one of the fastest-growing and greatest health problems in both developed and developing countries ***(Malik et al., 2013)***.

Morbid obesity (MO) leads to complications affecting nearly every organ system and a decrease in life expectancy as well ***(Guh et al., 2009)***.

Operative treatment is the most effective therapy available for MO. It enhances durable excess weight loss (EWL), eliminates (or ameliorates) comorbidities, improves quality of life (QoL), and lengthens life span ***(Buchwald et al., 2004).***

The increasing demand for bariatric surgery (BS) has encouraged many digestive surgeons and laparoscopic experts to enter the field.

Today, alternatives range from Bsimple^ restrictive models to Bcomplex^ operations that radically alter gastrointestinal (GI) structure and function. Laparoscopic mini-gastric bypass (MGB) was proposed as a simple and effective treatment for MO ***(Rutledge, 2001)***.

After two decades performing both open and laparoscopic BS, we adopted the MGB concept but developed adjustments to counteract its major criticism (namely alkaline reflux and its consequences). In our original publication ***(Carbajo et al., 2005),*** the term Bone-anastomosis gastric bypass (OAGB) was coined for this modified procedure.

This study aimed to evaluate experience and long-term follow-up (FU) in a large cohort of patients with MOin whom laparoscopic OAGB was performed at a single institution.

Bariatric surgery has proven to be the most effective treatment for morbid obesity with sustained

weight loss and improvement of weight related co-morbidities regardless of the type of procedures used ***(Colquitt et al., 2014)***.

Among bariatric procedures, laparoscopic Roux-Y-gastric bypass (RYGB) seems to offer the best outcomes but is technically challenging and associated with the highest morbidity and mortality ***(Colquitt et al., 2014)***.

Laparoscopic mini-gastric bypass (MGB) is a simple, safe and effective procedure with easier reversibility compared to the original Mason's loop ***(Rutledge, 2001)***.

This procedure has gained popularity because of its efficacy on weight loss and improvement of comorbidities that were find to be comparable to those obtained with RYGB and LSG ***(Kular and Manchanda, 2014)***.

However controversies exist concerning biliary reflux, risk of oesophageal and gastric malignancy, marginal ulcer and malnutrition after MGB ***(Georgiadou and Sergentanis, 2014).***

Leaks following bariatric procedures remain the most dreaded complications due to their high morbidity and mortality rate ***(Buchwald et al., 2007)***.

Leaks after MGB are rare events (0.1-1.9%) ***(Mahawar et al., 2013)*** with an incidence rate comparable or inferior to those occurring after RYGB (0.1-5.6%) or LSG (0-7%) ***(Jacobsen et al., 2014)***.

Nowadays A leak rate of 1.5% and 2.4 % after RYGB and LSG would be considered at the higher end of leak rates at experienced, high volume centers ***(Jacobsen et al., 2014)***.

This low incidence rate could explain why post-MGB leaks presentation are not as well defined as those occurring after other bariatric procedures.

Noun et al. (2012) identified different sites of leakages (gastric tube, gastrojejunal anastomosis and excluded stomach), however little is known about their clinical and imaging characteristics and appropriate management.

Aim of the work

The aim of the present study is to evaluate causes, diagnosis and different lines of management of anastomotic leakage after gastric bypass surgery.

Patients and Methods

This is a prospective study carried on 10 patients with morbid obesity. All patients consented to participate in this study. They have single anastomotic gastric bypass surgery and those cases are attendants of bariatric surgery department at Ain shams university hospitals and some other private hospitals.

Patients were recruited in the study according the following inclusion criteria: Patients with BMI more than 40 with co-morbidities, patients from age 25 to 60 years, and patients with normal hormonal profile.

Patients were excluded from the study according to the following criteria: Patients with BMI less than 40, patients not in range of age, and patients with abnormal hormonal profile.

Preoperative evaluation and measurement

1- Personal history (age, sex, marital status, occupation and address)

2- Complete Physical examination

3- Laboratory investigations

- Hormonal profile {t3 & t4 & tsh}.
- Pre-operative routine examination.

4- Ethical considerations and patient education.

5- Prophylactic antibiotics administration.

Operative data and technique includes date of surgery, intra-operative finding and intraoperative complications.

Single anastomotic gastric bypass surgery:

Postoperative management and follow up

- Clinical follow up post-operative
- Ultrasonography follow up.

Statistical analysis:

Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM SPSS) version 20 and the following were done: Qualitative data were presented as number and percentages while quantitative data were presented as mean, standard deviations and ranges.

Results

According to table (2), demographic data of the patients, it shows that the mean age was (46.00 ± 9.81) with range 27-56 and BMI was (54.97 ± 6.39) with range 44-64.5 thus It plays an important role in predisposing to leakage as increasing age and BMI > 40 increases the risk of developing intra or post-operative leakage. There was no significant difference between patients concerning sex and its role in developing leakage with 40 % female and 60% male patients.

Table 3: this table shows co-morbidities in patients participating in this study (80 % of patients DM, 60% of patients HTN, 60% hyperlipidemia and 20% osteoarthritis). According table 3: patients with co-morbidities or multiple co-morbidities are more reliable to leakage post single anastmotic gastric bypass.

Table 5: this table shows intra operative complications, there were intraoperative leakage 20 % of patients, bleeding of short gastric 20 % of patients, anastomotic line bleeding 10% and miss firing 10 %. According to table 5: patients with intra operative leakage, bleeding are more reliable to incidence of leakage post lap single anastmotic bypass

Table 6: this table shows intra operative management and how to deal with every complication

intra operative. control by sealing 20% of patients and control by stitches 40 % of patients according to the nature of complication happened.

Table 7: this table shows diagnosis of Leakage, day of leakage and management of Postoperative complication. According table 7: all patients in our study had pelvi abdominal ultrasound, CT pelvi abdominal with contrast with close observation to patients clinical data.

According to table 7: in our study all patients had leak in their first 2 days in hospital. According table 7: refashioning of the anastomotic leakage line is the best choice (60%) however, other lines of treatment like conservation and conversion to other operation has a main role (20%).

Table (1): Illustrating the demographic data of the patients in this study where age ranged from 25 -60 and BMI of participants more than 40.

		No. = 10
Age	Mean±SD	46.00 ± 9.81
	Range	27 – 56
Sex	Female	4 (40.0%)
	Male	6 (60.0%)
BMI	Mean±SD	54.97 ± 6.39
	Range	44 – 64.5

Table (2): Distribution of co-morbidities among patients participating in the study.

Co morbidities		**No.**	**%**
DM	No	2	20.0%
	Yes	8	80.0%
HTN	No	4	40.0%
	Yes	6	60.0%
Hyperlipidemia	No	4	40.0%
	Yes	6	60.0%
Osteoarthritis	No	8	80.0%
	Yes	2	20.0%

Table (3): Past surgical procedure for patient in our study.

Past surgical procedure	**No.**	**%**
Free	6	60.0%
Lap chole	1	10.0%
Open chole	1	10.0%
Appendicectomy	2	20.0%
Total	***10***	***100.0%***

Table (4): Intra operative complications.

Intra operative complications	**No.**	**%**
Free	4	40.0%
Intra operative leakage	2	20.0%
Bleeding of posterior gastric	2	20.0%
Anastomotic line bleeding	1	10.0%
Intra operative leakage, miss firing	1	10.0%
Total	***10***	***100.0%***

Table (5): Intra operative management

Intra operative management	**No.**	**%**
Free	4	40.0%
Control by sealing device	2	20.0%
Stitches done	4	40.0%
Total	***10***	***100.0%***

Table (6): Diagnosis of leakage, day of leakage and management of postoperative complication among studied

		No.	%
Diagnosis of leakage	Ultrasound, Pelvi abdominal CT with contrast, Clinical Data	10	100.0%
Day of leakage	1	6	60.0%
	2	4	40.0%
Management post operative	Refashioning	6	60.0%
	Conservative radiological leakage	2	20.0%
	Convert to r-en-y	1	10.0%
	Feeding jejunstomy, peritoneal lavage, Pig tail drain	1	10.0%

3. Discussion

Current study is to evaluate causes diagnosis and different lines of management of anastomotic leakage after gastric bypass surgery.

Leaks are the second most common cause of mortality after pulmonary embolism, and can be associated with significant morbidity. Prevention and early detection may limit both morbidity and mortality ***(Fullum et al., 2009).***

Our study is a prospective study carried on patients with morbid obesity. All patients had single anastomotic gastric bypass surgery and those cases had leakage post operation.

In our study, there was no significant difference between patients concerning sex and its role in developing leakage with 40 % female and 60% male patients.

In our study there was significant role for increasing age and BMI of the patients participated in the study.

Fernandez and his colleagues found that age older than 55 years and male sex were predictors of higher risk for GI tract leak.

Nguyen et al. (2010) studies have shown that older patients are more likely than younger patients to have surgical wound dehiscence and delayed healing.

Male patients often have android body habitus and increased intra-abdominal obesity, contributing to technical difficulty during the procedure that may lead to increased risk of GI tract leak**.**

Schwartz et al. (2003) studies showed that age and sex are not significant independent predictors of leakage.

In our study patients with more co-morbidities are more reliable to incidence of leakage post lap mini gastric bypass.

In ***Acott et al. (2009)*** studies Postoperative leakage are more common among those patients with poor glycemic control and high HbA1c levels (HbA1c>6%)**.**

In ***Moitra (2006)*** studies patients with diabetes undergoing an operation, morbidity is increased as a result of impaired myocardial and vascular function. Routine measurement of intraoperative blood glucose levels and appropriate insulin administration has been an integral part of our postoperative care routine and should be standard practice.

In our study most of the patients had intra operative complications like bleeding from anastomotic line (20%), intra operative leakage (20%), miss firing (10%) and thus increase percentage of leaking post operation. So surgeons experience and skills are so important in operation and management.

Surgeon experience and hospital volume are reportedly important variables that influence the frequency of complications in laparoscopic approaches ***(Nguyen et al., 2010).***

Studies have shown that surgeons with basic laparoscopic skills usually require a learning curve of approximately 100 cases in order to decrease the complication rate and operation time in laparoscopic gastric bypass ***(Lublin et al., 2005).***

Fullum et al. (2009) studies reported Ischemic leaks typically occur between 5-7 days postoperatively, and may result from interruption of blood supply during surgery, tension on the staple line or inadvertent use of staples too short for the thickness of the tissue.

Baker et al. (2004) revealed another error can occur when a loose staple is retained at the apex of the previously fired staple line. Firing the device across the loose staple can damage subsequent staples as they are deployed or the loose staple may damage the stapler firing mechanism leading to wedge-band bypass failure.

In our study leakage happened in the 1st and 2nd days post operation. However, some authors reported that leakage may happened later on.

Not all leaks appear the first 4 days after surgery, as has been reported in many surgical reports. On the contrary, only 28% are early and the great majority occur later, even when patients are ready to leave the hospital or appearing at home. The later a leak occurs, the easier the treatment and the better the prognosis. Therefore, it can be understood easily that the radiological control with liquid contrast performed the 1st day after surgery, according to the protocol of several surgeons, is useless because on the 1st day after surgery, only four out of 60 leaks occurred; therefore, this study will miss the great majority of

leaks. Perhaps the only use of this early control is to check the emptying of the small pouch ***(Csendes et al., 2012).***

In our study, most of the patients had re exploration and refashioning of anastomotic line (60%), conservative treatment and close observation was done to (30%) of the cases and conversion to other operation was done to (10%) of the cases.

Re exploration and revision of the anastomotic line as fast as possible is the solution of choice according to our study.

The key to management of a leak is early diagnosis and return to the operating room for exploration. Delay results in increased morbidity and mortality. While the procedure may be performed laparoscopically, exposure and visualization may require conversion to an open operation. In addition, the thickened, inflamed tissue and the dilated bowel increase the difficulty of manipulation with laparoscopic instruments ***(Melinek et al., 2008).***

Treatment often depends on the clinical situation present. If the leak is well contained and the patient is hemodynamically stable, the patient can be treated conservatively with nothing by mouth, percutaneous drainage, intravenous antibiotics, and intravenous nutrition. If the leak is not well contained and the patient is hemodynamically stable, laparoscopic exploration is warranted. If the patient is hemodynamically compromised, open exploration should be performed. During exploration, whether open or laparoscopic, there are 3 principles that must be addressed at the time of exploration: repair of the leak, drain placement, and placement of a gastrostomy tube in the bypassed stomach ***(Powell and Fernandez, 2011).***

The appearance of a postoperative leak is a major and serious complication. It can be classified according to the day of appearance, its severity and its location. Conservative or surgical treatment can be employed properly if these 3 parameters are carefully evaluated ***(Csendes et al., 2012).***

Conclusion

Advanced laparoscopic skills, including two handed technique and laparoscopic stapling and suturing, are required. Both fundamentals of bariatric surgery and advanced laparoscopic surgery should be mastered before performing laparoscopic surgery, several intraoperative techniques have been implanted to prevent the anastomosis leak. These interventions include intraoperative pneumatic testing, the use of linear staplers with shorter stapler height, over sewing of staple line, use of omental wrap, and measures designed to reinforce staple line, such as fibrin glue, peristrips, seamguard, bovine pericardium and various other staple line reinforcement material.

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