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Evaluation of laparoscopic sleeve gastrectomy on weight loss and co-morbidity

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ABSTRACT

Background: The sleeve gastrectomy is a surgical technique to treat morbid obesity by both restrictive and probably hormonal action. Originally developed as a first stage to gastric bypass, it is more and more performed as a sole procedure. Therefore it is important to report results on weight loss and reduction in co-morbidity.

Methods: A consecutive series of 74 morbid obese patients were evaluated. Parameters were operative variables, complications, weight loss and the need for medication for co-morbidity at least six months postoperatively.

Results: Six procedures included the removal of a band and twice a vertical banded gastroplasty was performed previously. Median operating time diminished over time to 71 min. Three procedures were converted into open approach. Major complications were rhabdomyolysis (2), bleeding (2) and leakage (4). Four days was the mean hospital stay. The median follow-up was 12 months (range 6–33). The median percentage of excess weight loss was 49.6% (range 22–96%EWL). The median loss in BMI points was 23.1% (range 9–50%BMIL). Three quarters of the patients were able to diminish or stop their medication for diabetes, hypertension and hyperlipedemia.

Conclusion: The laparoscopic gastric sleeve is effective in reduction of both weight and co-morbidity and has potential as a sole procedure. Patient's selection is, however, recommendable for initial surgical experience and longer follow-up will be necessary.

1. Introduction

The sleeve gastrectomy is a surgical technique to treat morbid obesity.[1] This technique is a mainly restrictive procedure designed to decrease appetite by reducing the ability of the stomach to distend and producing the sensation of fullness with minimal oral intake. The surplus value probably lies in the interference with the digestive hormonal structure. Since its introduction, the indication has broadened from the first step in treatment of the super obese to a single procedure for a wider range of patients suffering from obesity.[2–4] As this appeared only recently, it is difficult to compete with the long-term results of alternative techniques such as the laparoscopic adjustable gastric band and gastric bypass. As the sleeve gastrectomie is theoretically a more definite procedure than the band without the disadvantages of malabsorptive bypass and the initial results reported are promising, it is necessary to report results on weight loss and co-morbidity. Therefore we evaluated our results of the laparoscopic sleeve gastrectomy.

2. Methods

2.1. Patients

The bariatric surgery section of a large non-academic institute initially adapted the sleeve gastrectomy as a first step-procedure. Since August 2006 it has been performed as a stand-alone procedure. The laparoscopic sleeve gastrectomy was performed on the patients' request or as an escape procedure in case a gastric bypass was too demanding. From this moment on, all patients who underwent a laparoscopic sleeve gastrectomy for treatment of morbid obesity and with a minimum of 6 months follow-up were enrolled into this study.

2.2. Assessment

Medical charts were reviewed for patients' characteristics, co-morbidity and prescribed medications, operative parameters, length of hospital stay and postoperative complications. Patients are followed at the outpatients department at 1, 6 and 12 months postoperatively and then annually. An additional check-up by a research nurse for all patients was performed by the end of April 2009. Gathered data were weight, ability to take solid food,

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satisfaction with the procedure on a verbal descriptor scale ranging from not to very in 4 steps, co-morbidity and differences in prescribed medications. The co-morbidity was defined as a condition for which medical treatment was prescribed.

2.3. Surgical procedure

The patient is positioned anti-Trendelenburg on a special widen and extended surgical table with both arms away from the body. After an established pneumoperitoneum 5 ports are introduced into the abdominal cavity, sometimes the one on the lateral right side can be omitted. The abdomen is explored and liver retracted through the subxphoidal position. One gauze is used to remain the omentum laterally and facilitate the exposure of the angle of His. Dissection of this angle is by coagulation. Then the bursa is opened at the point of the flexura lienalis at which point it is safe and easy (less adhesions to pancreas). Using the 10 mm LigaSure (Covidien), the omentum is separated close to the greater curvature both proximally to the angle of His and distally till approximately 6 cm's prepyloric. This point is usually marked by some adhesions on the dorsal side of the stomach and ventrally by small veins in a so-called crows'feet shape. Guided by a 34-Fr tube, the stomach is divided using 60 mm EndoGia cartridges (Covidien). It takes normally two green (4.8 mm) staplelines followed by three to five blue (3.5 mm) ones. Intraoperative leak tests were not performed. In case of a staple line bleeding an Endoclip (Covidien) is used to clip the bleeding point. In case of less visibility of the angle of His initially, the separation of the omentum proximally and dissection of the stomach are alternated. The dissected part is extracted through the 15 mm trocar site which is closed with endosutures using Endoclose (Covidien). Haemostasis is followed by extraction of the gauze. Then the ports are removed under visibility to prevent abdominal wall bleeding.

2.4. Analysis

The statistical software used was SPSS Statistics 17.0 in order to apply Pearson's Chi-square test, Fisher's Exact Test for ordinal data. Spearman correlations were employed to analyse relationships between subgroups. The Wilcoxon test was used to analyse nominal data. A *p*-value below .05 was considered significant.

3. Results

A total of 74 patients was included. The male/female ration was 29:45 and their characteristics are outlined in Table 1.

The median duration of the procedure was 89 min (range 43–248). There was a significant declining trend in time. See Table 2. Concomitant procedures were 6 removals of a band, two conversions from a vertical banded gastroplasty, two cholecystectomies and one perianal fistula procedure. The median length of hospital stay was 4 days (range 2–126).

Sixteen patients had postoperative complications with a total of 20 events including three conversions to an open procedure. Of the 8 patients with a previous procedure, 4 encountered at least one complication. It is more than compared to a complication rate of 18 per cent with the primary procedures. (not significant, Fisher's Exact Test $p = .061$). Four times a leakage was encountered. One managed by the radiologist with percutaneous drainage, the other three with surgical drainage. Following subsequent conservative treatment, all four fistulas dried up. Other major complications were rhabdomyolysis (2) and re-intervention for bleeding (2). Minor complications included delayed gastric emptying (3), wound infection (2), an atrial flutter, one incisional hernia, one subphrenical abscesses (conservatively treated) and one wound haematoma.

The median postoperative follow-up was 12 months (range 6–33). Fifty-five patients were able to eat solid food, 18 rated this ability as reasonable and one patient was still on fluid food. The follow-up time of the latter 19 patients was shorter. Overall, 69 patients scored very satisfied on a verbal descriptor scale. The portion of dissatisfaction was not related to any other outcome such as complications. The percentage of excess weight loss was median 49.6% (range 22–96%EWL). The loss in BMI points was median 23.1% (range 9–50%BMIL). The differences in medical treatment for co-morbidity is outlined in Table 3. Forty-five times out of 60 (75%), patients were able to diminish or stop their medications diabetes, hypertension and hyperlipedemia.

Table 1
Patients characteristics.

	Median	Range
Age, y	42	16–66
Weight, kg	155	92–255
BMI, kg/m2	51	35–94
Waist size, cm	147	118–210
Hip size, cm	148	110–220

BMI = Body Mass Index.

Table 2
Duration of procedure.

Time in minutes	Median	Range	*P*-value
First 25 cases	110	63–248	.000[a]
Middle 24 cases	82	53–191	.007[a]
Last 25 cases	71	43–117	.081[b]

[a] Wilcoxon Test, compared to last 25 cases.
[b] Wilcoxon Test, compared to first 25 cases.

4. Discussion

The results of this study underlined that the laparoscopic sleeve gastrectomy is an effective procedure in reducing weight. With regard to operating time and convalescence it is a feasible technique. Most important was the focus on co-morbidity and clinical relevant was the reduction or quitting of medication in 75% of the cases.

It has been stated before that laparoscopic sleeve gastrectomy is a less technically demanding procedure than laparoscopic gastric bypass. Nevertheless, a learning curve for even experienced bariatric surgeons was observed: median operating time decreased from 110 to 71 min. The technique in the present study was somewhat different than described in other reports.[5–7] First, no specimen collection bag was used. It is not likely that the technique will be adjusted on this point as in the evaluation there was an infection rate of only 2.7%. Secondly, the stapler line was not routinely over-sewn. This is probably associated with bleedings and not with the number of gastric leakages/fistulas. In the present

Table 3
Co-morbidity.

	Treatment preoperative	Treatment same	Treatment with lower doses	Treatment stopped	*P*-value
T2DM (oral)	9	1	1	7	.000
T2DM (insulin)	11	1	7	3	.000
HT	26	8	7	11	.000
HL	14	5	4	5	.000

T2DM = Type 2 Diabetes Mellitus, (oral) = oral medication, HT = Hypertension, HL = hyperlipedemia, Pearson's Chi-square test.

study three re-interventions (2 open, 1 scopic) and one radiologic drainage were due to this complication (5.4%). The total number of leakages was too small for further investigation. In the study of Fuks et al.[8] with a comparable design, a gastric leakage was encountered in 5.1%. Although higher incidences than reported in studies wherein over-sewing was used,[5–7] also no leakage has been reported in a trial without over-sewing.[9] Within all these trials there is no distinctive difference in bleeding rate. As for haemostasis, the use of an endoclip or a suture when indicated seemed to be an acceptable alternative for over-sewing routinely. The localisation of a bleeding intra-operatively was mostly distally and visible after removal of the gastric tube under vision. Then an endoclip was used. The postoperative bleedings were mostly from the vasa breva area. There were no mortalities. The total number of complications was somewhat disappointing and responsible for prolonged hospital stays up to 126 days. As 15 out of 20 complications were following the first 17 procedures performed, it was presumed related to initial experience and initial heavier patients. Although not significant, there was a high impact of previous gastric banding on complications. Based on these experience the protocol has been changed into removal of a gastric band and performing the subsequent sleeve gastrectomy at least 12 weeks later. The severe complication of rhabdomyolysis was encountered twice. This has been reported before.[10–12] Supposedly after optimizing the anaesthetic technique for fluid control, this complication has not been encountered anymore. Almost all complications in the last year were delayed gastric emptying requiring re-hospitalisation.

The percentage of excess weight loss was median 49.6%. Even though the measure moment was not fixed and follow-up ranged from 6 to 33 months, this result was comparable to the percentages reported in the literature. The other important endpoint was reduction of medicaments necessary for an obesity related chronic condition. The influence on co-morbidity is the most important endpoint in bariatric studies. Vidal et al.[13] reported the diabetes and metabolic syndrome reduction in severely obese patients. They reported a comparable effectiveness for this specific group for sleeve gastrectomy as well as gastric bypass. In the study of DePaula[14] promising results were reported for the laparoscopic interposition of an ileum segment into the proximal jejunum. In one study thirty patients with diabetes were treated by LSG and there was a resolution of 63% at 6 months follow-up.[15] In this study medical treatment for diabetes, hypertension or hyperlipidemia was noted for 60 patients. 32% of this group could lower their dose and 43% stopped at all. The number of resolution is lower compared to most figures in a systematic review comparing gastric banding and bypass.[16]

In summary, the laparoscopic sleeve gastrectomie is effective in reduction of weight and co-morbidity. When the complication rate decreases with experience, it can be regarded as a safe technique. Therefore, patient's selection is recommendable for initial surgical experience. With a shorter operative time and less postoperative complications it has the possibilities to replace the gastric bypass as the standard treatment for patients suffering from morbid obesity. Supposedly, more benefits could be revealed as a result food follows the physiological route. Furthermore, the possibility remains available to convert a sleeve gastrectomie into a gastric bypass in cases of weight reducing failures. On the other hand, the present results were only of short term nature and other long follow-up data are lacking yet, there are possibilities of regaining weight after a sleeve gastrectomy, dilatation of the pouch and complications following re-intervention. So, the gastric bypass remains the gold standard and long follow-up after sleeve gastrectomy is necessary.

Conflict of interest
None declared.

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