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## Long Term Efficacy of Laparoscopic Adjustable Gastric Banding – Retrospective Analysis

### Długoterminowa skuteczność laparoskopowego regulowanego opaskowania żołądka – analiza retrospektywna

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of article; G – other

#### Abstract

**Background.** Laparoscopic procedures have emerged over the past decade for treatment of obesity. Laparoscopic adjustable gastric banding is the easiest surgical technique for morbid obesity.

**Objectives.** The authors analyzed the long term results of laparoscopic adjustable gastric banding in their center.

**Material and Methods.** A total of 172 consecutive patients who had undergone laparoscopic adjustable gastric banding between May 2005 and February 2011 in authors clinic were contacted for evaluation. The main outcome measures were complications, secondary operations, percent excess weight loss, mortality, patient satisfaction and band removal rate.

**Results.** The follow-up rate was 62.2%. Mean age of patients was 30.6 years. Mean body mass index of patients was  $48.47 \pm 7.8$  kg/m<sup>2</sup>. Median follow-up interval was 36 months (min 8, max 81) and band removal rate was 19.1%. There was one mortality. Of all patients, 33 had band removal. The band was removed laparoscopically in 21 patients. The main reason for band removal was slippage followed by band erosion. After band removal, 4 patients had re-banding, 5 had Roux-en-Y gastric bypass. Overall, the mean percent excess weight loss was  $50.6 \pm 7.8\%$  (range, 5–100%). Mean percent excess weight loss for those who had band removal was  $27.8 \pm 5.78\%$  (range 12.5–34.1%). Overall satisfaction index was rated as “good” for 42% of patients.

**Conclusions.** Despite a low satisfaction index, considerable mean percent excess weight loss and vast improvement in co-morbidities is achieved after laparoscopic adjustable gastric banding. The authors conclude that laparoscopic adjustable gastric banding can be utilized as the initial surgical procedure in morbid obesity (*Adv Clin Exp Med* 2012, 21, 5, 615–619).

**Key words:** obesity, surgery, gastric band, gastric by-pass, laparoscopy.

#### Streszczenie

**Wprowadzenie.** W ciągu ostatniej dekady opracowano zabiegi laparoskopowe do leczenia otyłości. Laparoskopowe regulowane opaskowanie żołądka jest najprostszą techniką chirurgiczną do leczenia chorobliwej otyłości.

**Cel pracy.** Autorzy analizowali długoterminowe wyniki regulowanego opaskowania żołądka w ich ośrodku.

**Material i metody.** Skontaktowano się łącznie ze 172 kolejnymi pacjentami poddanymi regulowanemu opaskowaniu żołądka od maja 2005 r. do lutego 2011 r. w klinice autorów, aby ocenić wyniki odległe. Głównymi punktami końcowymi badania były: powikłania, operacje powtórne, procent utraty nadmiernej masy ciała, śmiertelność, zadowolenie pacjenta i odsetek usuwania opasek.

**Wyniki.** Odsetek pacjentów w obserwacji to 62,2%. Średni wiek chorych wynosił 30,6 roku. Średni wskaźnik masy ciała chorych wynosił  $48,47 \pm 7,8$  kg / m<sup>2</sup>. Mediana czasu obserwacji wynosiła 36 miesięcy (minimum 8, maksimum 81), a odsetek usuwania opasek to 19,1%. Wystąpił 1 zgon. Wśród wszystkich pacjentów u 33 usunięto opaskę. Opaska została usunięta laparoskopowo u 21 pacjentów. Głównym powodem usunięcia opaski było zsuniecie się, a następnie erozja opaski. Po usunięciu opaski u 4 pacjentów założono ją ponownie, a u 5 wykonano wyłączenie żołądka metodą Roux-en-Y. Ogólnie średni procent utraty nadmiernej masy ciała wyniósł  $50,6 \pm 7,8\%$  (zakres

5–100%). Średni procent utraty nadmiernej masy ciała u pacjentów, u których usunięto opaskę to  $27,8 \pm 5,78\%$  (zakres 12,5–34,1%). Ogólnie wskaźnik zadowolenia został oceniony jako „dobry” przez 42% pacjentów.

**Wnioski.** Mimo małego wskaźnika satysfakcji po laparoskopowym założeniu regulowanej opaski żołądka uzyskano znaczny procent utraty nadmiernej masy ciała i zdecydowane złagodzenie chorób współistniejących. Autorzy konkludują, że laparoskopowe regulowane opaskowanie żołądka może być wykorzystywane jako wstępny zabieg chirurgiczny w chorobie otyłości (*Adv Clin Exp Med* 2012, 21, 5, 615–619).

**Słowa kluczowe:** otyłość, chirurgia, opaska żołądka, wyłączenie żołądkowe, laparoscopia.

Laparoscopic adjustable gastric banding (LAGB) is the most common surgical procedure performed for the treatment of morbid obesity [1]. Authors team started LAGB in 2005 with the same trend in growth of this technique in Europe. Nowadays, there is a tendency to abandon LAGB and shift to sleeve gastrectomy or Roux-en-Y gastric bypass [2, 3]

LAGB poses certain life changes, requires frequent office visits for adjustments [4] and brings failures with structural changes (i.e. dilatation, erosion). These seem to support the tendency of shifting away from LAGB. In this study, the authors analyzed their 6-year follow-up experience with 172 patients who had LAGB in their clinic in an attempt to find out whether this shift from LAGB is justified.

## Material and Methods

A total of 172 consecutive patients who had undergone LAGB between May 2005 and February 2011 in the clinic were contacted and called in for evaluation. Data was collected from hospital medical records, outpatient visits and questionnaires filled out by patients during follow-up visits. Local ethics committee approval was obtained before the study was initiated.

LAGB was performed using the perigastric technique ( $n = 82$ ) for the earlier group of patients. The authors then switched to the pars flaccida technique ( $n = 90$ ) in recent patients. Details of these two techniques are described elsewhere [5]. They used MiniMizer® (HospiMedical GmbH, Meerbusch, Germany) for the first 19 patients and then switched to AMI® (Agency for Medical Innovations, Austria) for the next 48 patients. The following 53 patients had Cousin® (Cousin Biotech, France) brand placed. For the last 52 patients the authors used Heliogast® (Hélioscopie, France). Patients had an index esophagogram on postoperative day 7. The port of the band was filled with 3cc saline under fluoroscopic guidance within 4–6 weeks after the procedure. Patients had follow-up visits in 2–3 week intervals. When satiety and 0.5–1 kg/week weight loss were achieved, follow-up was performed every 6 weeks for the first year and twice a year thereafter with yearly esophagograms.

The main outcome measures in present study were complications, secondary operations, percent excess weight loss, mortality, patient satisfaction, band removal rate and resolution of co-morbidities. Complications were classified as port infection, pouch dilatation, band slippage, band erosion and band intolerance. Pouch dilatation and band slippage were identified with gastroscopy and/or upper gastrointestinal fluoroscopy. Gastroscopy was performed for all patients when there was a suspicion of band erosion (i.e. port site infection, gastric fluid inside port), reflux symptoms, weight gain and abdominal discomfort. Patient satisfaction was evaluated using the Bariatric Analysis and Reporting Outcome System. Details of this scoring system are mentioned elsewhere [6].

Laparoscopic band removal was carried out with either 3 or 4 ports in the Lloyd-Davies position. A methylene blue test was done if there was a suspicion of perforation. Perforations were addressed with suturing if the gastric mucosa was exposed. One perigastric drain was placed in all patients who had band removal.

The statistical analysis was carried out using SPSS software (SPSS, Chicago, Illinois).

## Results

Overall, there were 26 male and 146 female patients. Mean age was 30.6 (range 18–45 years). Mean body mass index (BMI) was  $48.47 \pm 7.8 \text{ kg/m}^2$  (range 36–72  $\text{kg/m}^2$ ). There was one postoperative mortality secondary to intra-abdominal abscess and sepsis due to missed gastric perforation. One-hundred seven patients (62.2%) attended regular office visits and phone call follow-ups. Mean postoperative follow up was  $40.4 \pm 20.3$  months (range 19.1–82.3 months). Forty-one patients out of 172 (23.8%) had 59 complications (Table 1). Of the 107 patients, 18 (16.8%) had re-operations. Thirteen (12.1%) of these had port revisions, three had cholecystectomy (2.8%) and two patients (1.86%) had surgery for spontaneous band opening. These latter two patients were found to have unlocked bands which were re-locked laparoscopically. These two bands were earlier brands. Thirteen patients out of 107 (12.1%) had hiatal hernia repair

**Table 1.** Complications seen during follow-up for laparoscopic adjustable gastric banding surgery

**Tabela 1.** Powikłania zauważone podczas obserwacji pacjentów, u których wykonano laparoskopowe regulowane opaskowanie żołądka

Complication (Powikłanie)	n
Intra-abdominal abscess	1
Intractable dyspepsia	1
Pulmonary embolus	1
Port displacement	2
Spontaneous band opening	2
Port-tubing disconnection	4
Intolerance	4
Pouch dilatation	6
Band erosion	10
Slippage	13
Port site infection	15

and 8 (7.4%) had cholecystectomy in the same session with LAGB.

Of all patients, 33 (19.1%) had band removal. The band was removed laparoscopically in 21 patients. For the remaining 13 patients, laparoscopic removal was attempted initially but was converted to laparotomy. Reasons for the conversion were (a) gastric perforation during dissection (n = 6) and (b) bleeding from dense adhesions between the stomach and liver (n = 7). Mean time interval between band placement and removal was  $772.8 \pm 491.1$  days (range 7–1868 days). The main reason for band removal was slippage (n = 13) followed by band erosion (n = 10) (Table 2). After band removal, 4 patients had re-banding and 5 had Roux-en-Y gastric bypass. The rest did not have any further procedure.

The slippage and dilatation rate was higher in the first 82 patients.

Overall, the mean percent excess weight loss was  $50.6 \pm 7.8\%$  (range 21–100%). Mean percent excess weight loss for those who had band removal was  $27.8 \pm 5.78\%$  (range 12.5–34.1%).

Overall satisfaction index was good for 42.1% of patients, 23.8% were dissatisfied and 34.1% were neutral.

Of the 107 patients, there were three type-2 diabetes patients who were weaned off insulin at the end of 6 months postoperatively. There was one type-1 diabetes patient who could not be weaned off insulin. Eight patients (7.47%) had hyperlipidemia preoperatively and only one remained hy-

**Table 2.** Reasons for band removal

**Tabela 2.** Przyczyny usunięcia opaski

Reason (Przyczyna)	n
Slippage	13
Band erosion	10
Intolerance	4
Pouch dilatation	4
Halted weight loss	3
Infection	3

perlipidemic at the end of the follow-up. Twelve patients (11.21%) were treated for hypertension before LAGB while only 1 of them needed treatment for hypertension at the end of the follow up. Ten patients (9.3%) had obstructive sleep apnea before banding and all were symptom free at the end of the follow-up.

## Discussion

There were 172 patients who had LAGB surgery in the 6-year period. This number is comparable to other series with longer time intervals [7–9].

As this group started LAGB relatively later than other high volume centers, the authors have more patients who used the “pars flaccida” technique than other centers. This explains the reason for the higher slippage and dilatation rate in the first 82 patients in this series as confirmed by literature [10].

Complications occurred in 41 patients in this series. These complications accumulated in the first half of the patient population. This reflects both authors learning curve and transition from the perigastric to pars flaccida technique. This finding contradicts the findings of other authors who could not show a significant difference between the two techniques [11]. Another factor affecting present findings could be the use of newer band systems in the second half of the patient population. Newer band systems were shown to cause fewer complications than previous band types [12].

Six patients (5.6%) out of 107 had pouch dilatation. This rate is inside the range cited by other authors [13]. This complication was equally distributed between patients with perigastric and pars flaccida techniques in this series. Other factors cited responsible for dilatation are overinflation of the band, patient non-compliance and physiological response of viscous to stenosis [14]. Of note, it

used to be presumed that gastro-gastric fixation sutures (GGS) prevented complications such as pouch dilatation in LAGB. This group showed in a randomized trial that there was no difference in rates of slippage, migration, pouch dilatation complications, and percent excess weight loss between the group with GGS and the group without GGS [15].

The band removal rate in present study was 19.1%. This rate varies between 50% and 98% in the literature [9, 16]. Sleeve gastrectomy or Roux-en-Y bypass is recommended if another procedure is planned after band removal [17]. Four of described band removal patients had re-banding and 5 had Roux-en-Y gastric bypass. The rest did not have any further procedure. The main reason for re-banding and no additional procedure at all was conforming to patients' decision. The two main reasons for band removal were slippage and erosion in this study group. This is also confirmed by other authors [18].

Mean percent excess weight loss after LAGB is widely variable between studies [7, 8]. Present findings showed that even in patients with band removal there was a 27.8% mean percent excess weight loss.

The place of simultaneous surgeries with LAGB has been questioned in the literature. It has been shown that hiatal hernia repair at the time of LAGB reduces the need for a secondary surgery [7] while cholecystectomy performed in the same session as LAGB in patients with asymptomatic cholelithiasis is a technically feasible approach with low complication rates [19].

Only 45 patients (42.1%) out 107 were pleased with the LAGB procedure. This can be explained with the frequency of complications, re-operations and band removals. Despite this discouraging satisfaction rate, patients with certain co-morbidities in present study (i.e. type-2 diabetes, hypertension, hyperlipidemia, sleep apnea) had outstanding relief from co-morbidities after LAGB.

In conclusion, with the pars flaccida technique, newer band systems and good patient compliance, LAGB can achieve a percent excess weight loss comparable to other morbid obesity surgery techniques. The authors think that LAGB has a place in the treatment of morbid obesity related co-morbidities. Complications secondary to LAGB reflect a learning curve and should decrease with experience.

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