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RESEARCH ARTICLE

Laparoscopic Gastric Rebanding for Slippage with Pouch Dilation: Results on 29 Consecutive Patients

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Abstract
Background Laparoscopic adjustable gastric banding (LAGB) slippage with pouch dilation is one the most serious long-term complications and requires reoperation in most cases. It is still controversial whether banding should be offered again or a different procedure should be chosen. We report the results of synchronous de-rebanding on a prospective series of patients treated at our institution for slippage with pouch dilation.
Methods From January 2000 to May 2007, 29 consecutive patients underwent laparoscopic de-rebanding for slippage with pouch dilation. The mean age at primary operation was 38.9±8.2 years and the mean BMI was 46.4±8 kg/m^2. Twenty-eight had previous LAGB, while one had previous open gastric banding, the perigastric technique being used at that time. All the redo procedures were successfully carried out under laparoscopy, via the *pars flaccida* technique, and all the patients were followed-up according to the usual schedule.
Results The mean time from the original LAGB was 45.3±30.3 months, and the mean follow-up after rebanding was 26.9±20.6 months. At rebanding, the mean BMI was 34.3±7.6, percent excess weight loss (%EWL) 54.5±31, and percent excess BMI loss (%EBL) 58.3±33, respectively. After 1 year, BMI was 36.3±7.9, %EWL 40.8±30.5, and %EBL 43.9±32.7, respectively. After 2 years, BMI was 37.13±7.4, %EWL 36.9±29.4, and %EBL 39.6±31.6, respectively, and after 3 years, BMI was 33.5±5.6, %EWL 51.9±24.3, and %EBL 55.7±25.7, respectively. One patient had re-rebanding after 6 months for a new slippage, two had band removal with refusal to switch to another procedure, one had biliopancreatic diversion for slippage recurrence, and one underwent sleeve gastrectomy for insufficient weight loss after 6 months.
Conclusions Although this is a limited series, our results show that good outcomes can be expected after rebanding in properly assessed patients with slippage and pouch dilation. Larger series and longer follow-up are needed to confirm these findings.

Keywords Morbid obesity · Bariatric surgery · Laparoscopic gastric banding · Band slippage · Gastric-rebanding

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Introduction

Laparoscopic adjustable gastric banding (LAGB) is considered a good treatment option for patients with morbid obesity, with significant long-term weight loss and comorbidity resolution, very low morbidity, and negligible mortality [1–5]. Slippage and pouch dilation represent the most common surgical complications requiring revisional surgery [6]. Although the occurrence of band dislocation significantly decreased after the *pars flaccida* approach, it still affects 4–6% of patients [6–8]. Given the large number of bands implanted worldwide, the expected number of

revisional procedures can be consistent, especially among high-volume centers. It is still controversial whether a rebanding or a different procedure should be offered after slippage, as few and, sometimes, contradictory data have been published on rebanding outcomes [9–15]. In this study, we report on the outcomes of 29 consecutive patients who underwent synchronous de-rebanding for slippage and pouch dilation.

Patients and Methods

LAGB-compliant and willing-to-redo patients with band slippage and pouch dilation discovered during follow-up were offered synchronous laparoscopic gastric de-rebanding. Patients with slippage but with either poor-LAGB compliance or unsatisfactory weight loss or those who were not willing to redo banding were excluded from this study and detoured to other procedures, namely, staged sleeve gastrectomy and duodenal switch.

Redo surgery was planned immediately after the diagnosis of slippage and pouch dilation (Fig. 1). All the patients underwent upper endoscopy to rule out erosion. Redo procedures consisted of two phases carried out during the same operation: debanding and *pars flaccida* rebanding. Surgery was performed through five abdominal trocars, and intra-abdominal pressure was maintained at 15–16 mm Hg. Adhesiolysis was always required to free the band, particularly from the left hepatic lobe. The buckle was then identified by pulling on the tube with a grasper, and this maneuver allowed us to dissect free the entire band and detach the overwrapping fundic valve. The band was then cut with scissors and retrieved from the abdominal cavity along with its reservoir. The new band was positioned according to the *pars flaccida* technique and left empty.

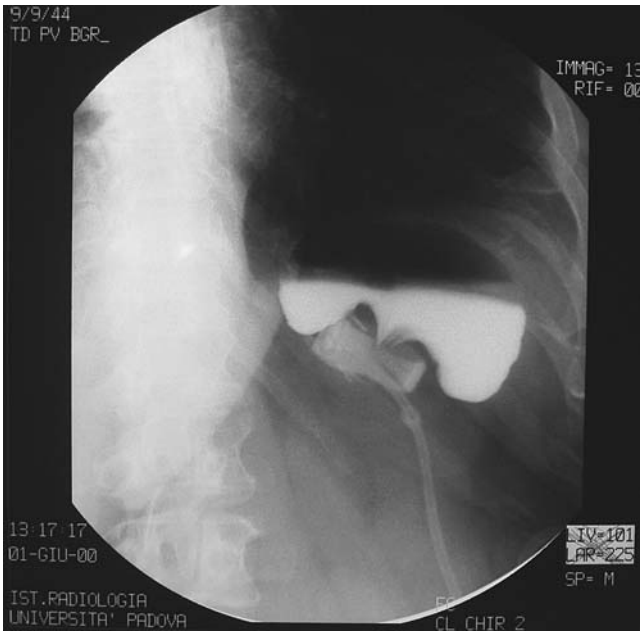


Fig. 1 Upper GI series showing slippage with pouch dilation and obstruction



Fig. 2 Day 1 postoperative water-solube swallow showing the band properly repositioned with no leak

Methylene blue dye test was intraoperatively carried out to identify any leakage resulting from debanding. On postoperative day 1, all the patients underwent upper GI series with oral water-soluble contrast medium (Fig. 2) to further rule out any leaks and then were discharged on a soft liquid diet, PPI, and low-molecular-weight heparin for 30 days. Follow-up was carried out according to the traditional schedule after 1, 3, 6, and 12 months, and then yearly. Band adjustments were freely performed when the patient reported loss of satiety.

Data regarding age, gender, comorbidity, and primary and further surgery were prospectively collected in our database. Mean BMI with SD, percent excess BMI loss (% EBL), and percent excess weight loss (%EWL) were calculated according to the recent recommendations on reporting weight loss [16]. Median and interquartile range %EBL and %EWL values were also calculated because these values better describe how the majority of patients behave in such a small series.

Results

From January 2000 to May 2007, 29 patients (26 females, 3 males) with band slippage and pouch dilation underwent synchronous de-rebanding at our institute. All the patients

Table 1 Comorbidities before the original gastric banding in 29 rebanded patients

	No.	%
Hypertension	4	13.8
Type II diabetes	5	17.2
Dylipidemia	3	10.3
Sleep apnea syndrome	8	27.5
Arthritis	14	48.2
Cholelithiasis	4	13.8
Depression	11	37.9
Sweet eating	8	27.5
Binge eating	2	6.9

had symptoms of outlet obstruction of different degrees that prompted us to undertake upper GI series to make the correct diagnosis.

Primary Operation

The mean age at the primary operation was 38.9±8.3 years, and the mean BMI was 46.4±8 kg/m^2. Comorbidities are depicted in Table 1. Twenty-eight patients had LAGB, while one had open gastric banding. All the bands (9.75-mm Lap-Band®, Allergan) were positioned via a "perigastric" approach. One (3.5%) patient had the Bio-Enterics Intragastric Balloon before LAGB and 13/29 (44.8%) had previous abdominal surgery. Neither intra-operative nor early postoperative complications were recorded. Three patients (10.3%) underwent further surgery, namely laparoscopic cholecystectomy. At the maximum weight loss, the mean BMI was 31.4±6.5 kg/m^2, %EWL 67.9±25.9, and %EBL 73.0±27.9, respectively (Table 2).

Only one patient (3.4%) in our series suffered from binge-eating disorder before surgery, which is actually lower than our whole series (4.2%). Occasional vomiting (<2 episodes per month) was reported in most of the patients, which is not very different from our whole series. The mean number of band adjustments performed after primary surgery was 1.8±1.9 (range 0–6), still again not significantly different from our whole series.

Redo Surgery

All the 29 patients of this series had their bands successfully positioned via *pars flaccida* under laparoscopic approach. Up to December 2004, 17 of the patients received 10-mm Lap-Band® (Allergan), while later, the remaining 12 received SAGB QuickClose 2200-X® (Ethicon). The supplier was changed according to Italian legislation regarding the supply of medical devices for National Health System hospitals.

No postoperative deaths have occurred. Neither intra-operative, nor early postoperative complications were recorded. At redo surgery, the mean BMI was 34.3±7.6 kg/m^2, %EWL 54.5±31.0, and %EBL 58.3±33.0, respectively. The mean time elapsed from primary operation was 45.3±30.3 months. The mean and median results in terms of BMI, %EWL, and %EBL during regularly scheduled follow-up are illustrated in Table 2. The mean follow-up after redo surgery was 26.9±20.6 (range 3–60) months.

Five patients (17.2%) underwent further surgery for failure or complications after redo procedures. One requested band removal after 3 months and refused to switch to another procedure. One underwent laparoscopic sleeve gastrectomy after 36 months from reoperation for insufficient weight loss. Three patients experienced recurrent slippage after 1, 6, and 12 months, respectively. One of these was converted to a biliopancreatic diversion (BPD) (+3 months), another one had re-rebanding (+6 months), and the last one (+12 months) had her band removed due to concurrent neurologic disorder. The make of the band did not influence post-redo outcomes.

Table 2 Results in 29 rebanded patients

Time	BMI	%EWL		%EBL	
		Mean±SD	Median (IQR)	Mean±SD	Median (IQR)
Primary op	46.4±8	–	–	–	–
Max WL	31.4±6.5	67.9±25.9	68.2 (50.7–84)	73±27.9	74.9 (54.5–90.1)
Redo	34.3±7.6	54.5±31	52 (37.1–71.6)	58.3±33	56.4 (40.5–77.5)
3 months	35±7.1	50.3±27.8	49 (28.7–67.4)	53.9±29.5	52 (29.9–71.7)
6 months (27/29)	36.4±7.8	42.4±28.5	40.4 (25.7–62.3)	45.6±30.6	43.4 (27.5–68)
1 year (22/29)	36.3±7.9	40.8±30.5	42.8 (24.2–61.9)	43.9±32.7	45.9 (25.8–65.5)
2 years (18/29)	37.1±7.4	36.9±29.4	38.9 (19.9–55.4)	39.6±31.6	41.9 (20.9–57.8)
3 years (14/29)	33.5±5.6	51.9±24.3	59 (30.4–72.3)	55.7±25.7	64.1 (33.2–77.8)

IQR = interquartile range

Discussion

LAGB is considered an effective "easy-to-do early-to discharge" operation for morbid obesity, although long-term complications are to be expected during follow-up. Among these, slippage with pouch dilation and obstructive symptoms mandate surgical revision. The type of procedure that should be performed in patients with slippage of gastric banding is far less clear. Different studies have been published to address this issue, most of them advising to switch either to Roux-en-Y operation (RYGBP) or BPD [9–11]. These suggestions are mainly based on the assumption that a failed restrictive procedure should not be offered again and that patients should be switched to a procedure with other mechanisms of action than pure restriction. In our experience, if the slippage or stomach prolapse occurred in patients who did well with the banding, this complication has to be considered a band-related complication permitting revisional surgery and not a failure of the restrictive mechanism itself. This highly selected subset of patients can therefore benefit from rebanding, which is a much more complex intervention than primary LAGB, but with less complications when compared to RYGBP or BPD and with the same rate as the primary, in our series.

Rebanded patients showed comparable eating habits to the whole series, with no significant number of repeated vomiters or binge eaters. The number of band adjustments was similar to the number of uncomplicated patients. On the other hand, it is noteworthy that all the patients had their primary band implanted via a perigastric approach, which is considered to be a more slippage-prone technique [8]. We decided to replace the band instead of repositioning it for various reasons. Firstly, it was sometimes difficult to unbuckle the prolapsed lap band, due to the abscence of the buckle (old fashioned) or the risk of tears in older ones. There is no warranty anywhere regarding the expected life of the device, and we think that unbuckle-repositioning should not be recommended for long-implanted devices (>3–5 years) for safety reasons. In this sense, in our series, the mean time elapsed from primary surgery was 45.3 months. Second, if repositioning should be the issue, the technique may be tear-prone for the band, as it implied the *pars flaccida* approach, i.e., completely rethreading the band behind the stomach and its consequent manipulations via grabbing instruments. Redo surgery was then carried out in a relatively new field, much like a primary operation, with a brand new band, the really tricky point being the detaching of the gastric overlap. Most authors recommend that rebanding should be performed via a new retrogastric tunnel, as it has been found that simply reducing the gastric prolapse through the band is not reliable enough [12, 13, 15]. In our series, we have been using, due to administrative issues, two different bands during redo procedures. The outcomes of the two groups of patients were not different, and the same results were found in the whole series. This supports the concept that slippage does not rely on the device only but results from a complex interaction between the way of positioning, the patient compliance, and the surgeon's attitude in band filling.

We reported 3 out of 29 recurrent slippages (~10%) after rebanding, 1 of which was successfully treated with re-rebanding. Although the series is limited, this rate cannot be considered high in complicated patients. On the other hand, middle–long-term results are encouraging with a median %EBL steadily >40%, which, in our experience, is associated with comorbidity resolution [5]. It should be noted that a weight regain was observed in virtually all patients after redo banding. However, the lower BMI and the higher %EBL and %EWL observed before redo are probably the consequence of the severely impaired patients swallowing with consequent dehydration and malnutrition in patients with obstruction and slippage. The postredo weight regain should not necessarily be considered a negative phenomenon, but the result of a late-onset complication (the slippage), as patients recovered their own post-LAGB weight steady state after resolution of obstruction. These factors strongly support that rebanding does not necessarily jeopardize outcomes.

In conclusion, our small series suggested that, in patients with initial good results after primary LAGB and subsequent band slippage, a repositioning of the band may be considered. This conclusion probably does not apply to patients with poor nutritional compliance and poor weight loss after primary operation. The choice of the redo procedure should therefore be adapted to the individual patients and not based on a standardized approach.

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