

Adjustable Silicone Gastric Banding for Obesity

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Abstract. Adjustable gastric banding is the least invasive operation for morbid obesity. Forty-eight patients underwent surgical adjustable gastric banding between March 1990 and August 1991. In 15 of these patients, radiological examination was performed in the early postoperative period because of dysphagia and vomiting, revealing stenosis of the stoma in all cases (caliber <0.3 cm); in all patients we easily punched, with fluoroscopically guided observation, the inflatable portion and obtained a true calibration of the gastric banding. In seven patients radiological examination was performed 2 months after surgical treatment because of a lack of weight loss. Radiological findings explain surgical failure, revealing a too wide stoma in four patients, the absence of a gastric pouch due to a too high position of the band in two, and the caudal sliding of the banding in one patient.

Key words: Radiology, adjustable gastric banding — Obesity, surgical treatment — Stomach, surgery.

A morbid obesity patient is one who weighs more than 225% of their ideal weight [1]. This measurement can be calculated using the appropriate weight tables, including height, age, and bone structure of the subject. This kind of patient has a greater risk of morbidity and mortality because of an increased incidence of cardiovascular complications. Dieting, behavior modification, and exercise are the safest methods of weight reduction. However, since these methods do not succeed with the morbidly obese patients, surgical intervention is considered. Gastric bypass surgery is frequently complicated by leakage from the gastrojejunal anastomosis which may lead to abscess formation with anastomotic stenosis [2].

In the horizontal gastroplasty about 21% of the patients need a further operation due to inadequate weight loss [3]. These kinds of operations are not reversible; moreover, whenever a transection and an anastomosis is made in the gastrointestinal tract, there is a risk of leak [4].

Adjustable gastric banding [5] is the least invasive surgical procedure and is completely reversible; furthermore, it allows a ready adjustment of the stoma's calibre. The purpose is to create a small gastric pouch with a limited capacity (30–60 ml) which generates an early sensation of fullness so the intake of food is restricted; nevertheless, the digestive sequence remains unaffected. This study focuses on the radiology's contribution in the Kuzmak's adjustable silicone gastric banding treatment.

Materials and Methods

Patients

Forty-eight patients (38 women and 10 men, average age 41.3 years, average weight 141.2 kg, $204 \pm 27\%$ of ideal weight) underwent surgical adjustable gastric banding between March 1990 and August 1991. Fifteen were examined radiologically in the early postoperative period; seven underwent a radiological examination 2 months after the operation. All patients had turned to surgical therapy only after the failure of other therapeutic noninvasive methods [6]. A preoperative evaluation had been performed in all including laboratory tests and endoscopic examination to exclude endocrinologic and organic disease [7].

Surgery

The adjustable gastric banding treatment creates a small pouch by fastening a silicone band around the gastric fundus (Fig. 1A and B). This band is connected to an inflatable portion which is placed outside the peritoneum immediately underneath the fascia of the rectus muscle [8]. Percutaneously, it is possible to inject or withdraw the saline solution in this inflatable portion to regulate the stoma diameter; this operation is guided fluoroscopically. To ensure reversibility and minimal invasiveness, the silicone band is

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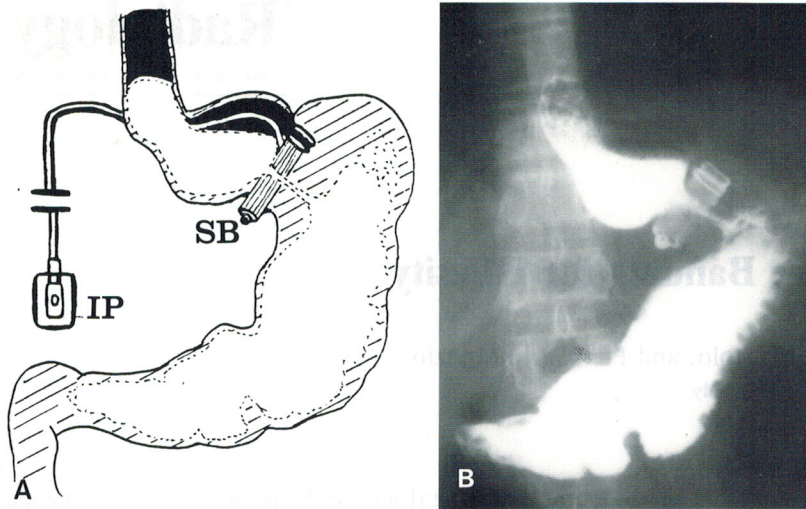


Fig. 1. Adjustable gastric banding. **A** Diagram and **B** study with contrast medium: the pouch is created by fastening a silicone band (SB) around the gastric fundus, connected to an inflatable portion (IP).

anchored with a fixation suture to the gastric peritoneal layer not involving its inner layers [9].

In the early postoperative period, patients undergo exclusively a clinical follow-up; only in cases of suspected stenosis of the stoma with dysphagia and vomiting is a radiologic examination done.

Radiology

Radiological examination is also necessary after about 2 months when delayed complications like a broken suture with consequent rising of the band underneath the diaphragm can occur, or when the clinical indicators demonstrate an inadequate loss of weight. The radiological examination is obtained using water-soluble contrast medium with a patient who is supine at first and erect, if necessary. The subject has to be turned into the left posterior oblique, anteroposterior, and lateral views to properly study the stoma (normal radiological diameter 0.4 cm). The fluoroscopically guided observation permits a fast centering and punching into the radiopaque inflatable portion, with an immediate radiological evaluation of the correct gastric banding calibration.

Results

Normal Postoperative Radiological Findings

At the beginning of our experience we studied asymptomatic patients postoperatively. The esophagus empties promptly even in varied decubitus positions. The pouch may be compared to a sphere with an average diameter of 6 cm. Passage through the stoma is easy and the stoma diameter must be at least 0.4 cm. Modest stagnation of some contrast medium in the gastric pouch indicates correct functioning of the silicone banding.

Early Postoperative Pathological Radiology

Fifteen of the 48 patients had vomiting and dysphagia and therefore have been evaluated radiologically in the early postoperative period. In all subjects the esophagus appeared dilated distally. The gastric pouch was greatly distended and obstructed and there was a close stenosis of the stoma (Fig. 2A). Gastroesophageal reflux occurred (Fig. 2B). Simply relaxing the gastric banding, by fluoroscopically guided manipulation, allows proper adjustment of the band calibre during the radiological examination (Fig. 2C).

Late Postoperative Pathological Radiology

Seven of our patients had no significant weight loss 2 months after the surgical treatment. We have found a too-easy passage of contrast medium through the stoma (Fig. 3), so that there was no early fullness sensation after food ingestion. This can be due to an insufficient insufflation of the silicone band as found in three of these subjects. In this instance, it is enough to swell the silicone band by punching into the inflatable portion and fluoroscopically guiding the operation. Another cause of too-easy passage of contrast medium through the stoma can be a too-small or even absent gastric pouch (Fig. 4) as we have found in three other patients. This condition occurs from a too-high positioning of the silicone band, placed underneath the diaphragm, or from its subsequent sliding up.

We have also noted that there is a chance of the caudal sliding of the banding toward the gastric antrum (Fig. 5) as found in one patient who, despite a

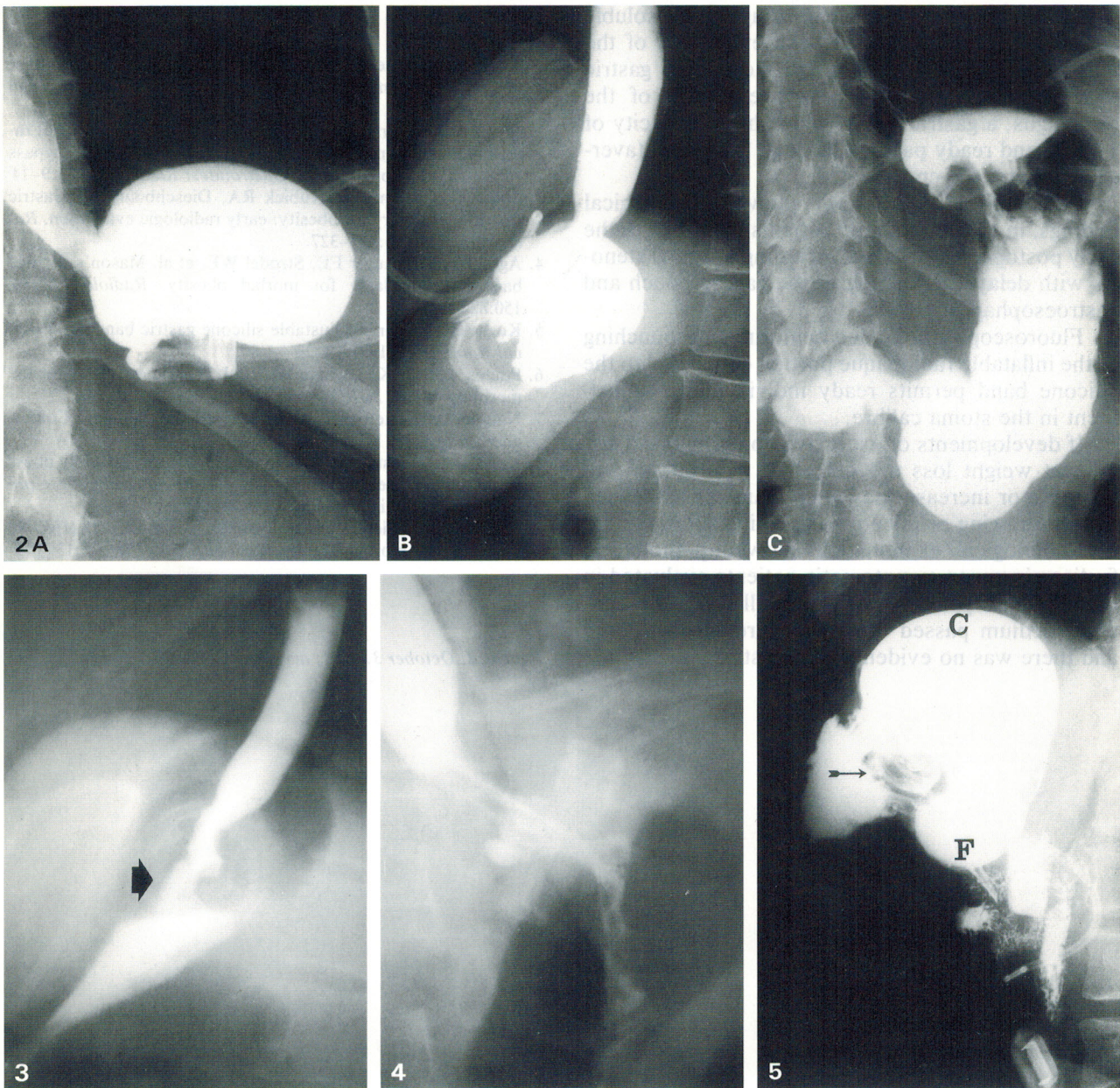


Fig. 2. **A** An excessive punching of saline solution into the gastric banding causes a tight stenosis of the stoma and consequently great distention of the pouch. **B** Contrast medium sometimes refluxes from the stomach into the esophagus. **C** The simple relaxing of the gastric banding allows proper adjustment of the band diameter.

Fig. 3. Because of an insufficient insufflation of the silicone band the stoma is too large (arrow) and the pouch is not filled.

Fig. 4. The rising of the band underneath the diaphragm causes absence of the gastric pouch; the stoma is also too large.

Fig. 5. Caudal sliding of the silicone band (arrow): the gastric great curvature (C) is underneath the diaphragm and the gastric fundus (F) is displaced downstairs.

satisfactory weight loss 2 months after the surgical treatment, had dysphagia and regurgitation.

Discussion

Adjustable gastric banding is the least invasive surgical treatment for morbid obesity; the stomach is neither cut nor crushed by staples and the treatment is completely reversible.

In the early postoperative period clinical indicators of problems include dysphagia and vomiting; in the late postoperative period a clinical indicator of problem is the lack of a significant weight loss.

Radiological examination using water-soluble contrast medium allows an easy evaluation of the normal features in patients with adjustable gastric banding. These include prompt emptying of the esophagus, a gastric pouch which has a capacity of 110 ml, and ready passage through the stoma (average diameter 0.4 cm).

Radiological examination showed pathological findings, in 15 symptomatic patients evaluated in the early postoperative period, including a stomal stenosis with delayed emptying of the gastric pouch and gastroesophageal reflux.

Fluoroscopically guided centering and punching of the inflatable radiopaque portion connected to the silicone band permits ready individualized adjustment in the stoma calibre.

If developments of excessive vomiting or no significant weight loss are detected, it is possible to decrease or increase the stoma diameter as needed by withdrawing or injecting the saline solution.

Radiological examination showed pathological findings in seven symptomatic patients evaluated in the late postoperative period; in all cases the contrast medium passed too easily through the stoma and there was no evidence of a gastric pouch.

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