Comparison of Gastroenterostomy Techniques at Roux-en-Y Gastric By-pass

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ABSTRACT

Introduction: Different methods can be used for gastrojejunal anastomosis in Roux-en-Y gastric by-pass for the treatment of obesity. We aimed to compare the results of our three anastomotic techniques, as 21 mm and 25 mm staplers and hand-sewn, retrospectively.

Materials and Methods: Forty-seven patients who underwent open Roux-en-Y gastric by-pass were included. Selection of the anastomotic technique was based mainly on the staplers available in the operating room. Preoperative parameters of the patients were comparable. We evaluated the postoperative body mass index, percent of excess weight loss, development of dysphagia, and requirement of endoscopic dilatation.

Results: The number of patients in the 21 mm stapler, 25 mm stapler and hand-sewn groups were 14, 24 and 9, respectively. Postoperative body mass index and excess weight loss were 30.5 ± 7.0, 29.0 ± 6.0, 25.9 ± 4.7 and 77.3 ± 20.5, 79.1 ± 20.8, 89.3 ± 15.5, respectively. Half of the patients in the 21 mm stapler group suffered from dysphagia and 21.4% required endoscopic dilatation. One-third of the patients in the 25 mm stapler group had dysphagia and 8.3% required endoscopic intervention. Dysphagia was present in only 1 patient (11.1%) in the hand-sewn group, and this patient did not require endoscopic dilatation.

Conclusion: Although the differences were not significant, the 21 mm stapler group had no advantages with respect to percent of excess weight loss and they had a higher risk for dysphagia and endoscopic dilatation.

Key Words: Morbid obesity, gastric by-pass, stapler, anastomosis, dysphagia, weight loss.

Received: August 04, 2013 • Accepted: August 20, 2013

ÖZET

Roux-en-Y Gastrik By-pass'ta Gastroenterostomi Tekniklerinin Karşılaştırılması

Giriş: Obezite tedavisinde uygulanan Roux-en-Y gastrik by-pass'ta yapılan gastrojejunal anastomoz için farklı yöntemler uygulanabilir. 21 mm, 25 mm stapler ve elle anastomoz şeklindeki üç tekniğin sonuçlarını karşılaştırmayı amaçladık.

INTRODUCTION

In the present day, obesity has become an important health problem not only for the industrialized western communities but also across the globe. Prevention and treatment form the two significant topics in the struggle against obesity. A great variety of methods have been defined in its treatment. The surgical treatment of obesity is an effective, resumable and reliable method that is currently being applied for long-term weight loss. Roux-en-Y gastric by-pass has a significant place among the obesity operations. Currently, it is perhaps the most frequently used operation type worldwide. Different surgical techniques can be used for gastrojejunostomy anastomosis, which is a stage of this operation. In place of hand-sewn anastomosis, use of linear stapler or circular stapler is possible. The most convenient anastomosis technique must have lower complication rates as well as provide effective weight loss. In addition, the ease of application of this technique may provide an advantage in comparison with the other methods. In this study, we evaluated three different gastrojejunos- tomy methods in morbid obese cases who underwent Roux-en-Y gastric by-pass, in terms of efficiency of weight loss and anastomatic stenosis.

MATERIALS and METHODS

Forty-seven patients who could be contacted in the long-term among the patients we treated with Roux-en-Y gastric by-pass in our institution between June 2006 and March 2012 were included in the study. These patients were questioned in terms of age, sex, body mass index (BMI), and comorbid diseases. Roux-en-Y gastric by-pass with open method was applied to all of these cases. All of the operations were performed in the same hospital by the same surgical team.

Surgical Technique of Gastrojejunostomy Anastomosis

The abdomen was opened with an upper midline incision. We used automatic sternum lifting retractors. We arrived at the posterior part of the stomach by dissection of the small curvature at the level of the 2nd gastric vein going beyond the cardia of the stomach. The stomach was transected by means of linear cutter stapler of 80 mm, which was inserted in the small curvature of the stomach after nasogastric tube was withdrawn, so both sides of the stomach were closed. Then, if stapler anastomosis was applied, gastrostomy was made to the remnant stomach, and the anvil of the stapler (21 mm or 25 mm) that would be used from this point was inserted into the pouch and ejected from the corner close to the small curvature. After gastrostomy was closed over two layers, a small gastric pouch was formed by using linear cutter staplers of 100 mm from the site at which the transverse stapler line ends at the fundus. Digestion and biliopancreatic limbs were formed by cutting the jejunal segment of approximately 50 cm from the Treitz ligament. Its shaft was ejected from the bowel by penetrating the circular stapler from the cut edge of the digestion tube. The open edge of the jejunum was closed over two layers. For hand-sewn anastomoses, after the stomach pouch was formed with the cutter stapler, two layers of anastomosis (with digestion tube and end-to-side) were made manually by cutting the jejunum at the same distance from the Treitz ligament. The biliopancreatic limb of the anastomosis was formed (two layers hand-sewn end-to-side) 150 cm from the gastrojejunostomy anastomosis. A test was applied by ejecting 100 cc methylene blue through the nasogastric catheter that was previously inserted by the anesthesia team; additional sutures

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were manually stitched to the anastomoses where leakage was determined. Cholecystectomy was performed in patients suffering from cholelithiasis. At the end of the operation, an abdominal drain was inserted to the line of the gastrojejunostomy anastomosis.

Postoperative Follow-up
The patients were admitted to the intensive care unit. Subcutaneous low molecular weight heparin therapy was applied to each patient as emboli prophylaxis. The combination of intravenous ceftriaxone + ornidazole was used as prophylactic antibiotic. On the postoperative first day of the intensive care unit follow-up, methylene blue was given orally, and mobilization was provided. A liquid diet was started for those patients in whom no leakage was observed. Generally, patients that were in the intensive care unit for two days were transferred to the service on the third day, and the abdominal drain was withdrawn on the same day. Upon discharge from the hospital, a water-soluble multivitamin preparation and analgesic were prescribed, and a liquid diet for 100 days was recommended.

Through a review of the patient files, telephone calls or face-to-face interviews, patient data were recorded, as weight of the patients in the preoperative period at the time of consultation to the hospital, their subsequent weight, their ratio of recovering from overweight [percent excess weight loss (EWL%)], and the presence or not of dysphagia in the postoperative period. Chi-square (if required, Fisher’s exact according to the expected frequency rate/interval) and Student-t tests were used in the statistical analysis. Values of p < 0.05 were accepted as significant.

RESULTS
The sex, age, preoperative BMI, type of anastomosis (antecolic-antegastric, retrocolic-antegastric), and the presence of diabetes, hypertension, diathrosis, and sleep apnea are given in Table 1. The average hospital stay was five days, which also reflects social status, as the majority of our patients came from out of town. The development of dysphagia, application of endoscopic intervention, length of follow-up, postoperative BMI, and EWL% according to the type of anastomosis are shown in Table 2. EWL% is a term used to express how much an individual, whose BMI is over 25, loses from his/her excess weight[1]. While no statistically significant difference in terms of dysphagia and weight loss could be found in the formation of gastrojejunostomy anastomosis using three different methods (21 mm stapler, 25 mm stapler, hand-sewn), an apparent difference was proportionally observed with respect to dysphagia and endoscopic intervention requirement in the 21 mm stapler group.

DISCUSSION
There is a wide range of treatment methods in the therapy of obesity that can be classified roughly as surgical or non-surgical. However, diet, exercise, modifications in behavior, and medicines are not as satisfactory as desired, particularly in the morbidly obese group. The surgical procedures include gastric limitation, malabsorption, or their combination. According to the surgical procedure applied, a decrease of nearly 60–70% in excess body weight is provided, and this decrease lasts for 10 years or more[2,3]. Recently, the preferred surgical intervention has been Roux-en-Y gastric by-pass. Anastomotic leakage, postoperative hemorrhage, bowel obstruction, and faulty Roux leg reconstruction are among the early complications of this operation, while anastomosis stenosis, marginal ulcer development, fistula development, nutritional deficiency, and regaining of weight are among the late complications.

Gastrojejunostomy anastomosis, which is a stage of the operation, can be hand-sewn or performed with linear or circular stapler. Stenosis may be observed in all three types of anastomosis, with rates ranging between 2.9% and 23% according to the type of anastomosis[4,5]. Stenosis in gastrojejunostomy anastomosis is different from the feeling of sticking, about which patients complain the most, and it is the most frequently encountered complication of this operation. In another description of stenosis, patients express the feeling of occlusion despite being on a liquid diet. It reveals itself with progressive dysphagia and daily vomiting. There is no or minimal stomach-ache. It presents within a period ranging from weeks to months. Anastomosis tension, ischemia and individual healing factors that are patient-dependent have been cited among the causes. In addition, it is being reported that it is seen more frequently in laparoscopic rather than open approach[5].
Table 1. Relationship between some of the parameters according to anastomosis type

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Type of anastomosis</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21 mm stapler</td>
<td>25 mm stapler</td>
<td>Hand-sewn</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>M</td>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>4 (28.6%)</td>
<td>5 (20.8%)</td>
<td>4 (44.4%)</td>
<td>13 (27.7%)</td>
<td></td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>10 (71.4%)</td>
<td>19 (79.2%)</td>
<td>5 (55.6%)</td>
<td>34 (72.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>38.28 ± 12.14</td>
<td>37.95 ± 9.37</td>
<td>38.22 ± 12.75</td>
<td>38.22 ± 10.67</td>
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<td>0.99</td>
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<tr>
<td>Preoperative BMI</td>
<td>46.08 ± 7.04</td>
<td>44.67 ± 6.83</td>
<td>41.94 ± 6.15</td>
<td>44.57 ± 6.78</td>
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<td>0.36</td>
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<tr>
<td>Anastomosis form</td>
<td>AC-AG</td>
<td>RC-AG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 (100%)</td>
<td>22 (91.7%)</td>
<td>8 (88.9%)</td>
<td>44 (93.6%)</td>
<td></td>
<td>0.48</td>
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<td>Presence of diabetes</td>
<td>2 (14.3%)</td>
<td>6 (25.0%)</td>
<td>5 (55.6%)</td>
<td>13 (27.7%)</td>
<td></td>
<td>0.34</td>
</tr>
<tr>
<td>Presence of hypertension</td>
<td>7 (50%)</td>
<td>12 (50%)</td>
<td>5 (55.6%)</td>
<td>24 (51.1%)</td>
<td></td>
<td>0.90</td>
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<tr>
<td>Presence of joint problems</td>
<td>10 (71.4%)</td>
<td>14 (58.3%)</td>
<td>9 (100%)</td>
<td>33 (70.2%)</td>
<td></td>
<td>0.20</td>
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<tr>
<td>Presence of sleep apnea</td>
<td>11 (78.6%)</td>
<td>16 (66.7%)</td>
<td>8 (88.9%)</td>
<td>35 (74.5%)</td>
<td></td>
<td>0.66</td>
</tr>
</tbody>
</table>


Table 2. The effect of the type of anastomosis on weight loss and occurrence of dysphagia

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Type of anastomosis</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21 mm stapler</td>
<td>25 mm stapler</td>
<td>Hand-sewn</td>
<td>Total</td>
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<tr>
<td>Dysphagia</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 (50%)</td>
<td>7 (50%)</td>
<td>16 (34%)</td>
<td></td>
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<td>0.15</td>
</tr>
<tr>
<td>Endoscopic intervention</td>
<td>3 (21.4%)</td>
<td>2 (8.3%)</td>
<td>0</td>
<td>5 (10.6%)</td>
<td></td>
<td>0.23</td>
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<tr>
<td>Follow-up time (months)</td>
<td>35.92 ± 4.76</td>
<td>33.54 ± 8.47</td>
<td>28.33 ± 6.76</td>
<td>33.25 ± 7.56</td>
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<td>0.06</td>
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<tr>
<td>(Mean ± Standard Deviation)</td>
<td>30.50 ± 6.96</td>
<td>29 ± 6</td>
<td>25.89 ± 4.72</td>
<td>28.81 ± 6.16</td>
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<td>0.22</td>
</tr>
<tr>
<td>Postoperative BMI</td>
<td>77.34 ± 20.56</td>
<td>79.14 ± 20.79</td>
<td>89.27 ± 15.46</td>
<td>80.54 ± 19.9</td>
<td></td>
<td>0.33</td>
</tr>
<tr>
<td>(Mean ± Standard Deviation)</td>
<td>35.92 ± 4.76</td>
<td>33.54 ± 8.47</td>
<td>28.33 ± 6.76</td>
<td>33.25 ± 7.56</td>
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</tr>
</tbody>
</table>

BMI: Body mass index. EWL%: Percentage excess weight loss.

Whichever method is used for anastomosis, dysphagia may occur. Nguyen, Fisher, Suggs, and Markar reported that the occurrence of dysphagia is greater when using a number 21 stapler[6-9]. Fisher et al. stated that use of a 25 mm stapler tended to specifically lessen anastomatic stenosis[7]. In addition, it has been shown that the requirement of endoscopic dilatation is less with the 25 mm stapler[7].

In our study, we did not observe any anastomotic leakage; however, endoscopic dilatation was required in five cases. Although all the stenoses were benign and recovered after one dilatation, it was an extra intervention and a second source of stress for the patient as well as the surgeon. A higher risk of leakage or stenosis might be expected in the hand-sewn anas-
tomosis group. However, the risk of anastomosis leak does not increase in the operations performed using manual anastomosis, and the risk of leakage has been determined as even lower than before. It has been stated that the rate of stenosis is 4.9% as shown in Table 3, and thus this technique can also be applied confidently [10]. In a study of Gould et al. in 2006, they used a 21 mm stapler for 145 patients, and when it was understood that the rate of stricture was high (23 patients; 15.9%), they began using 25 mm staplers [11]. It was shown that the weight loss was the same, but the rate of stenosis was lower. The long-term effect of the gastrojejunostomy diameter on weight loss was also researched, and at the end of five years, no significant difference could be found between the use of 21 mm or 25 mm staplers [12]. Cottam et al. also stated that the gastrojejunostomy diameter has no effect upon the weight loss [13]. Further, in handsewn anastomoses, nearly 70% EWL was seen at the end of the 12th month [10].

The duration of the operation depends on the stapler usage. Weight loss is similar in anastomoses made using 21 mm and 25 mm staplers. However, the 25 mm stapler provides better results since dysphagia and endoscopic intervention are seen much more with the 21 mm stapler. Manual anastomosis appears to be a good alternative in the event a stapler is not available.

REFERENCES


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