Marginal Ulcers and Strictures in Gastric Bypass
Preventable and Treatable?
Best Reoperative Strategy?

Rami E Lutfi, FACS FASMBS ABOM
President, CEO Chicago Institute of Advanced Surgery
Clinical Professor of Surgery, Rosalind Franklin School of Medicine

Chicago Institute of Advanced Surgery

Chicago Institute of Advanced Bariatrics

Disclosures:

- Consultant:
  - Medtronic
  - Ethicon
  - Gore
  - Storz
  - GT Metabolic
- Educational Grant:
  - Gore
- Medical Advisor:
  - Carrum Health
- Investor
  - GT Metabolic

Epidemiology and Clinical Burden

- Marginal ulcers (MU): 1–16% incidence after RYGB
- Early (<1y) vs late (>1y) presentation
- Up to 50% of revisional operations post-RYGB due to MU

- Strictures: 3–12% incidence, median onset 4–6 weeks post-op

Pathophysiology

Marginal Ulcers → **Strictures**

- Ischemia
- Acid exposure
- Risk factors
  - Smoking
  - NSAIDs
  - Steroids
  - H. pylori
  - Pouch size

- Ischemia
- Fibrosis
- Tension
- Technical error
  - Stapler (circular)
  - Stapler size (circular & linear)
  - Cautery damage

Prevention Strategies

- **Patient:**
  - smoking cessation
  - NSAID avoidance
  - manage steroid dependence
- **Medical:**
  - PPI 3–12 months (lifelong in high-risk)
  - H. pylori eradication
- **Surgical:**
  - linear stapler + hand-sewn closure
  - absorbable sutures
  - tension-free
  - good blood supply

Management Algorithm

Marginal Ulcers

Diagnosis: Endoscopy

Step 1: PPI + Sucralfate + Risk Factor Modification

Step 2: Persistent 6–12 months → Endoscopic Therapy

Step 3: Refractory or Complicated → Surgical Revision (Redo GJ +/- Pouch Reduction +/- Vagotomy / Reversal)

Strictures

Diagnosis: Dysphagia → Endoscopy

Step 1: Endoscopic Balloon Dilation (1–3 attempts)

Step 2: Cutting Stricturotomy (if fibrotic ring)

Step 3: Refractory → Surgical Revision (Redo GJ / Pouch Revision / Reversal)

Technical Pearls in Revisional Surgery for Marginal Ulcers / Strictures after RYGB

- **Preoperative Workup**
  - Ensure strict risk factor control: smoking cessation, NSAID/steroid avoidance.
  - Rule out *H. pylori* and gastro-gastric fistula.
  - Nutritional optimization to reduce leak risk.

Technical Pearls in Revisional Surgery for Marginal Ulcers / Strictures after RYGB

- **Preoperative Workup**
  - Ensure strict risk factor control: smoking cessation, NSAID/steroid avoidance.
  - Rule out *H. pylori* and gastro-gastric fistula.
  - Nutritional optimization to reduce leak risk.
- **Intraoperative Technique** (Intra-op Endoscopy)
  - **Redo gastrojejunostomy (GJ):**
    - Resect ulcerated tissue and ischemic edges.
    - Wide, tension-free anastomosis with robust blood supply (avoid circular stapler)
    - Absorbable sutures to avoid foreign body nidus.
  - **Pouch revision:** Reduce pouch size to minimize acid exposure.
  - **Remnant diversion:** In refractory cases, consider distalization or remnant gastrectomy if acid contribution suspected.
  - **Truncal vagotomy:** Adjunct in patients with hyperacidity.
  - **Reversal to normal anatomy:** Reserved for high-risk, non-compliant patients.

ELSEVIER

Surgery for Obesity and Related Diseases 21 (2025) 412–417

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

10-Year outcomes of marginal ulcer formation and impact of gastrojejunostomy technique in Roux-en-Y gastric bypass

James W. Feimster, M.D.[a], Leslie Okorji, M.D.[b], B. Amy Paul, R.N.[c], Kyle J. Thompson, Ph.D.[b], Selwan Barbat, M.D.[a], Timothy S. Kuwada, M.D.[a], Keith S. Gersin, M.D.[a], Roc Bauman, M.D.[a], Iain H. Mckillop, Ph.D.[b], Abdelrahman Nimeri, M.D.[d,*]

Primary Roux-en-Y gastric bypass cases, demographics, type of gastrojejunal anastomosis, complications, and interventions

	CS (n = 1564; 58.3%)	LS (n = 884; 32.9%)	HS (n = 235; 8.8%)	*P* value*
Upper endoscopy	242 (15.4)	72 (8.1)	19 (8.1)	<.0001
MUs	144 (9.2)	29 (3.4)	8 (3.4)	<.0001
Time to MU, d, mean ± SD	356.4 ± 569.5	454.7 ± 597.3	174.5 ± 235.2	.0666
Strictures	91 (5.8)	10 (1.1)	4 (1.7)	<.0001
Revisional surgery for MU	27 (1.7)	4 (.4)	0 (0)	<.005

ventions, smoking, and nonsteroidal anti-inflammatory drug (NSAID) use were analyzed.

Results: Overall, 2683 RYGBs were performed (1564 CS, 883 LS, and 236 HS) and an upper endoscopy was performed in 12.4% of these patients (15.4% of CS, 8.1% of LS, and 8.1% of HS patients). The incidence of MU was 6.7% (9.2% of CS, 3.3% of LS, 3.4% of HS patients). Rates of endoscopy were higher after CS versus LS and HS GJA, and incidence of MU was higher in the CS cohort versus LS and HS. Incidence of strictures was higher after CS GJA versus LS and HS, and revision of the GJA due to MU was higher following use of a CS versus LS and HS.

Conclusion: Comparing 3 common GJA techniques for RYGB, the incidence of upper endoscopy after RYGB was higher following CS GJA, and incidence of MU, stricture, and revisional surgery for MU after RYGB were high in the CS cohort. (Surg Obes Relat Dis 2025;21:412–417.)

Obesity Surgery, 17, 878-884

Predictors, Treatment, and Outcomes of Gastrojejunostomy Stricture after Gastric Bypass for Morbid Obesity

Mark C. Takata, MD[1]; Ruxandra Ciovica, MD[1]; John P. Cello, MD, FACG[2]; Andrew M. Posselt, MD, PhD[1]; Stanley J. Rogers, MD, FACS[1]; Guilherme M. Campos, MD, FACS[1]

[1]Department of Surgery, [2]Department of Medicine, University of California San Francisco, San Francisco, CA, USA

Background: The aims of this study were to determine the rate of gastrojejunostomy (GJ) stricture following Roux-en-Y gastric bypass (RYGBP), the independent predictors of stricture, and clinical outcomes with and without a stricture.

Methods: Univariate and multivariate analysis of peri-operative and outcomes data were prospectively collected from 379 morbidly obese patients who underwent consecutive open or laparoscopic RYGBP from January 2003 to August 2006. Predictors studied were age, gender, BMI, co-morbidities, surgical technique (hand-sewn vs linear stapler vs 21-mm vs 25-mm circular stapler; open vs laparoscopic; retrocolic retrogastric vs antecolic antegastric Roux limb course, and Roux limb length), and surgeon experience. Outcomes studied consisted of occurrence of GJ strictures, technical details and outcomes after endoscopic therapy, and excess weight loss (EWL) at 12 months.

Results: 15 patients (4.1%) developed a GJ stricture. The use of a 21-mm circular stapler was identified as the only independent predictor of a GJ stricture (odds ratio 11.3; 95% CI 2.2-57.4, *P*=0.004). Endoscopic dilation relieved stricture symptoms in all patients (60% one dilation only). There was no significant difference in %EWL at 12 months between the patients with a stricture (median EWL 54%, IQR 49 – 63) vs those without a stricture (median EWL 61%, IQR 49-73, *P*=0.33).

Conclusion: The rate of GJ strictures is 4.1%. The use of a 21-mm circular stapler is the only independent predictor of GJ stricture. Endoscopic dilation relieved symptoms in all patients. Weight loss is independent of the anastomotic technique used and occurrence of a GJ stricture.

Key words: Bariatric surgery, gastric bypass, morbid obesity, complications, gastrojejunostomy stricture, weight loss, endoscopic dilation, outcomes

Introduction

Roux-en-Y gastric bypass (RYGBP) is a safe and effective method of producing sustained and meaningful weight loss, improvement or resolution of obesity-associated co-morbidities,[1] and significant enhancement in quality of life for the majority of patients with morbid obesity.[2] As a result, RYGBP is the most commonly performed operation for the treatment of morbid obesity in the United States.[3]

Gastrojejunostomy (GJ) stricture following RYGBP is a well-known complication that has been reported to occur in 3 to 27% of patients.[4,5] Most of the time, direct endoscopic balloon dilation successfully alleviates the presenting symptoms of dysphagia, vomiting, or abdominal pain.[6] However, many

Obesity Surgery, 17, 878-884

Predictors, Treatment, and Outcomes of Gastrojejunostomy Stricture after Gastric Bypass for Morbid Obesity

Mark C. Takata, MD[1]; Ruxandra Ciovica, MD[1]; John P. Cello, MD, FACG[2]; Andrew M. Posselt, MD, PhD[1]; Stanley J. Rogers, MD, FACS[1]; Guilherme M. Campos, MD, FACS[1]

[1]Department of Surgery, [2]Department of Medicine, University of California San Francisco, San Francisco, CA, USA

Background: The aims of this study were to determine the rate of gastrojejunostomy (GJ) stricture following Roux-en-Y gastric bypass (RYGBP), the independent predictors of stricture, and clinical outcomes with and without a stricture.

Methods: Univariate and multivariate analysis of peri-operative and outcomes data were prospectively collected from 379 morbidly obese patients who underwent consecutive open or laparoscopic RYGBP from January 2003 to August 2006. Predictors studied were age, gender, BMI, co-morbidities, surgical technique (hand-sewn vs linear stapler vs 21-mm vs 25-mm circular stapler; open vs laparoscopic; retrocolic retrogastric vs antecolic antegastric Roux limb course, and Roux limb length), and surgeon experience. Outcomes studied consisted of occurrence of GJ strictures, technical details and outcomes after endoscopic therapy, and excess weight loss (EWL) at 12 months.

Results: 15 patients (4.1%) developed a GJ stricture. The use of a 21-mm circular stapler was identified as the only independent predictor of a GJ stricture (odds ratio 11.3; 95% CI 2.2-57.4, *P*=0.004). Endoscopic dilation relieved stricture symptoms in all patients (60% one dilation only). There was no significant difference in %EWL at 12 months between the patients with a stricture (median EWL 54%, IQR 49 – 63) vs those without a stricture (median EWL 61%, IQR 49-73, *P*=0.33).

Conclusion: The rate of GJ strictures is 4.1%. The use of a 21-mm circular stapler is the only independent predictor of GJ stricture. Endoscopic dilation relieved symptoms in all patients. Weight loss is independent of the anastomotic technique used and occurrence of a GJ stricture.

Key words: Bariatric surgery, gastric bypass, morbid obesity, complications, gastrojejunostomy stricture, weight loss, endoscopic dilation, outcomes

Introduction

Roux-en-Y gastric bypass (RYGBP) is a safe and effective method of producing sustained and meaningful weight loss, improvement or resolution of obesity-associated co-morbidities,[1] and significant enhancement in quality of life for the majority of patients with morbid obesity.[2] As a result, RYGBP is the most commonly performed operation for the treatment of morbid obesity in the United States.[3]

Gastrojejunostomy (GJ) stricture following RYGBP is a well-known complication that has been reported to occur in 3 to 27% of patients.[4,5] Most of the time, direct endoscopic balloon dilation successfully alleviates the presenting symptoms of dysphagia, vomiting, or abdominal pain.[6] However, many

Table 1. Demographics and clinical features for patients with and without a gastrojejunostomy stricture

		All n=379	No Stricture n=364	GJ Stricture n=15	*P*-value
Gender, n (%)	Female	318 (83.9)	305 (95.9)	13 (4.1)	0.55
	Male	61 (16.1)	59 (96.7)	2 (3.3)	
Mean age, years (range)		45 (17-70)	45 (17-70)	44 (27-61)	0.73
Mean BMI, kg/m^2 (range)		51 (35-103)	50 (35-103)	52 (36-70)	0.67
Diabetes Mellitus, n (%)	Yes	127 (33.5)	121 (95.3)	6 (4.7)	
	No	252 (66.5)	243 (96.4)	9 (3.6)	0.39
Hypertension, n (%)	Yes	228 (60.3)	217 (95.2)	11 (4.8)	
	No	150 (39.7)	146 (97.3)	4 (2.7)	0.22
Hyperlipidemia, n (%)	Yes	122 (32.3)	117 (95.9)	5 (4.1)	
	No	256 (67.7)	246 (96.1)	10 (3.9)	0.56
OSA, n (%)	Yes	111 (29.4)	108 (97.3)	3 (2.7)	
	No	267 (70.6)	255 (95.5)	12 (4.5)	0.31
Arthritis or DJD, n (%)	Yes	212 (56.1)	202 (95.3)	10 (4.7)	
	No	166 (43.9)	161 (97.0)	5 (3.0)	0.28

GJ = gastrojejunostomy; BMI = body mass index; OSA = obstructive sleep apnea; DJD = degenerative joint disease.

Table 2. Operative details for patients with and without a gastrojejunostomy stricture

	n (%)	GJ Stricture n (%)	*P*-value
Linear stapler	195 (51.5)	8 (4.1)	
25-mm circular stapler	154 (40.6)	4 (2.6)	
21-mm circular stapler	13 (3.4)	3 (23.1)	0.02, 0.01*
Antecolic, antegastric Roux	297 (78.4)	9 (3.0)	
Retrocolic, retrogastric Roux	82 (21.6)	6 (7.3)	0.08
1st 50 cases	150 (39.6)	9 (6.0)	
>50 cases	229 (60.4)	6 (2.6)	0.08
Roux limb 100 cm	327 (86.3)	14 (4.3)	
Roux limb 150 cm	52 (13.7)	1 (1.9)	0.37
Open RYGBP	65 (17.2)	2 (3.1)	
Laparoscopic RYGBP	314 (82.8)	13 (4.1)	0.51

**P*=0.02 Linear vs 21-mm circular stapler, *P*=0.01 25-mm circular stapler vs 21-mm circular stapler.

Table 3. Endoscopy details and treatment of gastrojejunostomy strictures

	n	Mean no. days to EGD (range)	Mean GJ diameter, mm (range)	Mean no. dilations (range)	>1 dilation
21-mm circular stapler	3	29.3 (20 - 34)	3.3 (2 - 5)	1.3 (1 – 2)	1/3
25-mm circular stapler	4	33.6 (31 – 35)	5.3 (4 - 9)	1.5 (1 – 2)	2/4
Linear stapler	8	29.6 (10 – 41)	5.3 (3 - 12)	1.5 (1 – 3)	3/8

Obesity Surgery, 17, 878-884

Predictors, Treatment, and Outcomes of Gastrojejunostomy Stricture after Gastric Bypass for Morbid Obesity

Mark C. Takata, MD[1]; Ruxandra Ciovica, MD[1]; John P. Cello, MD, FACG[2]; Andrew M. Posselt, MD, PhD[1]; Stanley J. Rogers, MD, FACS[1]; Guilherme M. Campos, MD, FACS[1]

[1]Department of Surgery, [2]Department of Medicine, University of California San Francisco, San Francisco, CA, USA

Background: The aims of this study were to determine the rate of gastrojejunostomy (GJ) stricture following Roux-en-Y gastric bypass (RYGBP), the independent predictors of stricture, and clinical outcomes with and without a stricture.

Methods: Univariate and multivariate analysis of peri-operative and outcomes data were prospectively collected from 379 morbidly obese patients who underwent consecutive open or laparoscopic RYGBP from January 2003 to August 2006. Predictors studied were age, gender, BMI, co-morbidities, surgical technique (hand-sewn vs linear stapler vs 21-mm vs 25-mm circular stapler; open vs laparoscopic; retrocolic retrogastric vs antecolic antegastric Roux limb course, and Roux limb length), and surgeon experience. Outcomes studied consisted of occurrence of GJ strictures, technical details and outcomes after endoscopic therapy, and excess weight loss (EWL) at 12 months.

Results: 15 patients (4.1%) developed a GJ stricture. The use of a 21-mm circular stapler was identified as the only independent predictor of a GJ stricture (odds ratio 11.3; 95% CI 2.2-57.4, *P*=0.004). Endoscopic dilation relieved stricture symptoms in all patients (60% one dilation only). There was no significant difference in %EWL at 12 months between the patients with a stricture (median EWL 54%, IQR 49 – 63) vs those without a stricture (median EWL 61%, IQR 49-73, *P*=0.33).

Conclusion: The rate of GJ strictures is 4.1%. The use of a 21-mm circular stapler is the only independent predictor of GJ stricture. Endoscopic dilation relieved symptoms in all patients. Weight loss is independent of the anastomotic technique used and occurrence of a GJ stricture.

Key words: Bariatric surgery, gastric bypass, morbid obesity, complications, gastrojejunostomy stricture, weight loss, endoscopic dilation, outcomes

Introduction

Roux-en-Y gastric bypass (RYGBP) is a safe and effective method of producing sustained and meaningful weight loss, improvement or resolution of obesity-associated co-morbidities,[1] and significant enhancement in quality of life for the majority of patients with morbid obesity.[2] As a result, RYGBP is the most commonly performed operation for the treatment of morbid obesity in the United States.[3]

Gastrojejunostomy (GJ) stricture following RYGBP is a well-known complication that has been reported to occur in 3 to 27% of patients.[4,5] Most of the time, direct endoscopic balloon dilation successfully alleviates the presenting symptoms of dysphagia, vomiting, or abdominal pain.[6] However, many

Table 1. Demographics and clinical features for patients with and without a gastrojejunostomy stricture

		All n=379	No Stricture n=364	GJ Stricture n=15	*P*-value
Gender, n (%)	Female	318 (83.9)	305 (95.9)	13 (4.1)	0.55
	Male	61 (16.1)	59 (96.7)	2 (3.3)	
Mean age, years (range)		45 (17-70)	45 (17-70)	44 (27-61)	0.73
Mean BMI, kg/m^2 (range)		51 (35-103)	50 (35-103)	52 (36-70)	0.67
Diabetes Mellitus, n (%)	Yes	127 (33.5)	121 (95.3)	6 (4.7)	
	No	252 (66.5)	243 (96.4)	9 (3.6)	0.39
Hypertension, n (%)	Yes	228 (60.3)	217 (95.2)	11 (4.8)	
	No	150 (39.7)	146 (97.3)	4 (2.7)	0.22
Hyperlipidemia, n (%)	Yes	122 (32.3)	117 (95.9)	5 (4.1)	
	No	256 (67.7)	246 (96.1)	10 (3.9)	0.56
OSA, n (%)	Yes	111 (29.4)	108 (97.3)	3 (2.7)	
	No	267 (70.6)	255 (95.5)	12 (4.5)	0.31
Arthritis or DJD, n (%)	Yes	212 (56.1)	202 (95.3)	10 (4.7)	
	No	166 (43.9)	161 (97.0)	5 (3.0)	0.28

GJ = gastrojejunostomy; BMI = body mass index; OSA = obstructive sleep apnea; DJD = degenerative joint disease.

Table 2. Operative details for patients with and without a gastrojejunostomy stricture

	n (%)	GJ Stricture n (%)	*P*-value
Linear stapler	195 (51.5)	8 (4.1)	
25-mm circular stapler	154 (40.6)	4 (2.6)	
21-mm circular stapler	13 (3.4)	3 (23.1)	0.02, 0.01*
Antecolic, antegastric Roux	297 (78.4)	9 (3.0)	
Retrocolic, retrogastric Roux	82 (21.6)	6 (7.3)	0.08
1st 50 cases	150 (39.6)	9 (6.0)	
>50 cases	229 (60.4)	6 (2.6)	0.08
Roux limb 100 cm	327 (86.3)	14 (4.3)	
Roux limb 150 cm	52 (13.7)	1 (1.9)	0.37
Open RYGBP	65 (17.2)	2 (3.1)	
Laparoscopic RYGBP	314 (82.8)	13 (4.1)	0.51

**P*=0.02 Linear vs 21-mm circular stapler, *P*=0.01 25-mm circular stapler vs 21-mm circular stapler.

Table 3. Endoscopy details and treatment of gastrojejunostomy strictures

	n	Mean no. days to EGD (range)	Mean GJ diameter, mm (range)	Mean no. dilations (range)	>1 dilation
21-mm circular stapler	3	29.3 (20 - 34)	3.3 (2 - 5)	1.3 (1 – 2)	1/3
25-mm circular stapler	4	33.6 (31 – 35)	5.3 (4 - 9)	1.5 (1 – 2)	2/4
Linear stapler	8	29.6 (10 – 41)	5.3 (3 - 12)	1.5 (1 – 3)	3/8

Obesity Surgery, 17, 878-884

Predictors, Treatment, and Outcomes of Gastrojejunostomy Stricture after Gastric Bypass for Morbid Obesity

Mark C. Takata, MD[1]; Ruxandra Ciovica, MD[1]; John P. Cello, MD, FACG[2]; Andrew M. Posselt, MD, PhD[1]; Stanley J. Rogers, MD, FACS[1]; Guilherme M. Campos, MD, FACS[1]

[1]Department of Surgery, [2]Department of Medicine, University of California San Francisco, San Francisco, CA, USA

Background: The aims of this study were to determine the rate of gastrojejunostomy (GJ) stricture following Roux-en-Y gastric bypass (RYGBP), the independent predictors of stricture, and clinical outcomes with and without a stricture.

Methods: Univariate and multivariate analysis of peri-operative and outcomes data were prospectively collected from 379 morbidly obese patients who underwent consecutive open or laparoscopic RYGBP from January 2003 to August 2006. Predictors studied were age, gender, BMI, co-morbidities, surgical technique (hand-sewn vs linear stapler vs 21-mm vs 25-mm circular stapler; open vs laparoscopic; retrocolic retrogastric vs antecolic antegastric Roux limb course, and Roux limb length), and surgeon experience. Outcomes studied consisted of occurrence of GJ strictures, technical details and outcomes after endoscopic therapy, and excess weight loss (EWL) at 12 months.

Results: 15 patients (4.1%) developed a GJ stricture. The use of a 21-mm circular stapler was identified as the only independent predictor of a GJ stricture (odds ratio 11.3; 95% CI 2.2-57.4, *P*=0.004). Endoscopic dilation relieved stricture symptoms in all patients (60% one dilation only). There was no significant difference in %EWL at 12 months between the patients with a stricture (median EWL 54%, IQR 49 – 63) vs those without a stricture (median EWL 61%, IQR 49-73, *P*=0.33).

Conclusion: The rate of GJ strictures is 4.1%. The use of a 21-mm circular stapler is the only independent predictor of GJ stricture. Endoscopic dilation relieved symptoms in all patients. Weight loss is independent of the anastomotic technique used and occurrence of a GJ stricture.

Key words: Bariatric surgery, gastric bypass, morbid obesity, complications, gastrojejunostomy stricture, weight loss, endoscopic dilation, outcomes

Introduction

Roux-en-Y gastric bypass (RYGBP) is a safe and effective method of producing sustained and meaningful weight loss, improvement or resolution of obesity-associated co-morbidities,[1] and significant enhancement in quality of life for the majority of patients with morbid obesity.[2] As a result, RYGBP is the most commonly performed operation for the treatment of morbid obesity in the United States.[3]

Gastrojejunostomy (GJ) stricture following RYGBP is a well-known complication that has been reported to occur in 3 to 27% of patients.[4,5] Most of the time, direct endoscopic balloon dilation successfully alleviates the presenting symptoms of dysphagia, vomiting, or abdominal pain.[6] However, many

Table 1. Demographics and clinical features for patients with and without a gastrojejunostomy stricture

		All n=379	No Stricture n=364	GJ Stricture n=15	*P*-value
Gender, n (%)	Female	318 (83.9)	305 (95.9)	13 (4.1)	0.55
	Male	61 (16.1)	59 (96.7)	2 (3.3)	
Mean age, years (range)		45 (17-70)	45 (17-70)	44 (27-61)	0.73
Mean BMI, kg/m^2 (range)		51 (35-103)	50 (35-103)	52 (36-70)	0.67
Diabetes Mellitus, n (%)	Yes	127 (33.5)	121 (95.3)	6 (4.7)	
	No	252 (66.5)	243 (96.4)	9 (3.6)	0.39
Hypertension, n (%)	Yes	228 (60.3)	217 (95.2)	11 (4.8)	
	No	150 (39.7)	146 (97.3)	4 (2.7)	0.22
Hyperlipidemia, n (%)	Yes	122 (32.3)	117 (95.9)	5 (4.1)	
	No	256 (67.7)	246 (96.1)	10 (3.9)	0.56
OSA, n (%)	Yes	111 (29.4)	108 (97.3)	3 (2.7)	
	No	267 (70.6)	255 (95.5)	12 (4.5)	0.31
Arthritis or DJD, n (%)	Yes	212 (56.1)	202 (95.3)	10 (4.7)	
	No	166 (43.9)	161 (97.0)	5 (3.0)	0.28

GJ = gastrojejunostomy; BMI = body mass index; OSA = obstructive sleep apnea; DJD = degenerative joint disease.

Table 2. Operative details for patients with and without a gastrojejunostomy stricture

	n (%)	GJ Stricture n (%)	*P*-value
Linear stapler	195 (51.5)	8 (4.1)	
25-mm circular stapler	154 (40.6)	4 (2.6)	
21-mm circular stapler	13 (3.4)	3 (23.1)	0.02, 0.01*
Antecolic, antegastric Roux	297 (78.4)	9 (3.0)	
Retrocolic, retrogastric Roux	82 (21.6)	6 (7.3)	0.08
1st 50 cases	150 (39.6)	9 (6.0)	
>50 cases	229 (60.4)	6 (2.6)	0.08
Roux limb 100 cm	327 (86.3)	14 (4.3)	
Roux limb 150 cm	52 (13.7)	1 (1.9)	0.37
Open RYGBP	65 (17.2)	2 (3.1)	
Laparoscopic RYGBP	314 (82.8)	13 (4.1)	0.51

*P=0.02 Linear vs 21-mm circular stapler, P=0.01 25-mm circular stapler vs 21-mm circular stapler.

Table 3. Endoscopy details and treatment of gastrojejunostomy strictures

	n	Mean no. days to EGD (range)	Mean GJ diameter, mm (range)	Mean no. dilations (range)	>1 dilation
21-mm circular stapler	3	29.3 (20 - 34)	3.3 (2 - 5)	1.3 (1 – 2)	1/3
25-mm circular stapler	4	33.6 (31 – 35)	5.3 (4 - 9)	1.5 (1 – 2)	2/4
Linear stapler	8	29.6 (10 – 41)	5.3 (3 - 12)	1.5 (1 – 3)	3/8

Am J Gastroenterol. 2009 Mar;104(3):575-82; quiz 583. doi: 10.1038/ajg.2008.102. Epub 2009 Feb 3.

Endoscopy is accurate, safe, and effective in the assessment and management of complications following gastric bypass surgery

Jeffrey K Lee [1], Jacques Van Dam, John M Morton, Myriam Curet, Subhas Banerjee

Results: Of 1,079 patients, 76 (7%) who underwent RYGB were referred for endoscopy to evaluate UGI symptoms. Endoscopic findings included normal surgical anatomy (n=24, 31.6%), anastomotic stricture (n=40, 52.6%), marginal ulcer (n=12, 15.8%), unraveled nonabsorbable sutures causing functional obstruction (n=3, 4%) and gastrogastric fistula (n=2, 2.6%). Patients with abnormal findings on endoscopy presented with UGI symptoms at a mean of 110.7 days from their RYGB, which was significantly shorter than the time of 347.5 days for patients with normal endoscopy (P<0.001). A total of 40 patients with anastomotic strictures underwent 86 endoscopic balloon dilations before complete symptomatic relief. In one patient, a needle knife was used to open a completely obstructed anastomotic stricture. Unraveled, nonabsorbable suture material was successfully removed using endoscopic scissors in three patients.

Conclusions: Patients presenting with UGI symptoms less than 3 months after surgery are more likely to have an abnormal finding on endoscopy. Endoscopic balloon dilation is safe and effective in managing anastomotic strictures. Endoscopic scissors are safe and effective in removing unraveled, nonabsorbable sutures contributing to obstruction.

Conclusions: Patients presenting with UGI symptoms less than 3 months after surgery are more likely to have an abnormal finding on endoscopy. Endoscopic balloon dilation is safe and effective in managing anastomotic strictures. Endoscopic scissors are safe and effective in removing unraveled, nonabsorbable sutures contributing to obstruction.

Obesity Surgery (2018) 28:2252–2260
https://doi.org/10.1007/s11695-018-3162-7

ORIGINAL CONTRIBUTIONS

Endoscopic Management of Recalcitrant Marginal Ulcers by Covering the Ulcer Bed

Sindhu Barola[1] · Lea Fayad[1] · Christine Hill[2] · Thomas Magnuson[3] · Michael Schweitzer[3] · Vikesh Singh[1] · Yen-I Chen[1] · Saowanee Ngamruengphong[1] · Mouen A. Khashab[1] · Anthony N. Kalloo[1] · Vivek Kumbhari[1]

Published online: 19 March 2018

Abstract

Background Management options for marginal ulcers (MU) vary from medical therapy to revision surgery. Medical therapy is often ineffective and revision surgery is associated with a high morbidity and possible recurrence.

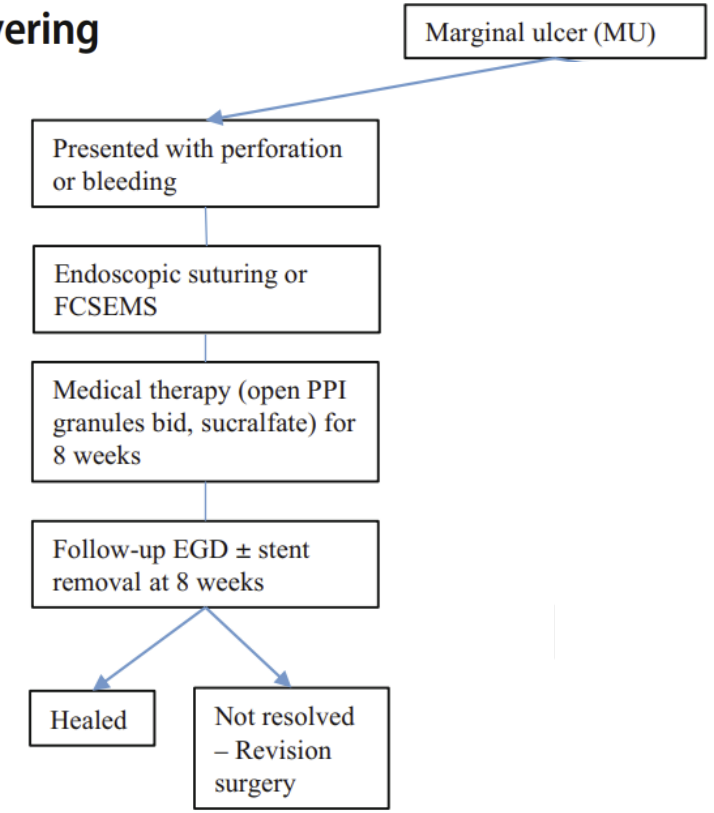
Aims To evaluate technical feasibility, efficacy, and safety of endoscopic management of MU by covering the ulcer bed using oversewing and/or deploying a fully covered self-expandable metallic stent (FCSEMS).

Methods Medical records of consecutive patients who underwent endoscopic suturing and/or FCSEMS deployment for recalcitrant MU between August 2016 and June 2017 at a single academic center were reviewed. Recalcitrant MU was defined as an ulcer that persists after 6 to 8 weeks despite maximal medical therapy (open capsule PPI, 40 mg bid as well as sucralfate qid), cessation of smoking and nonsteroidal anti-inflammatory drugs (NSAIDs), and *Helicobacter pylori* eradication.

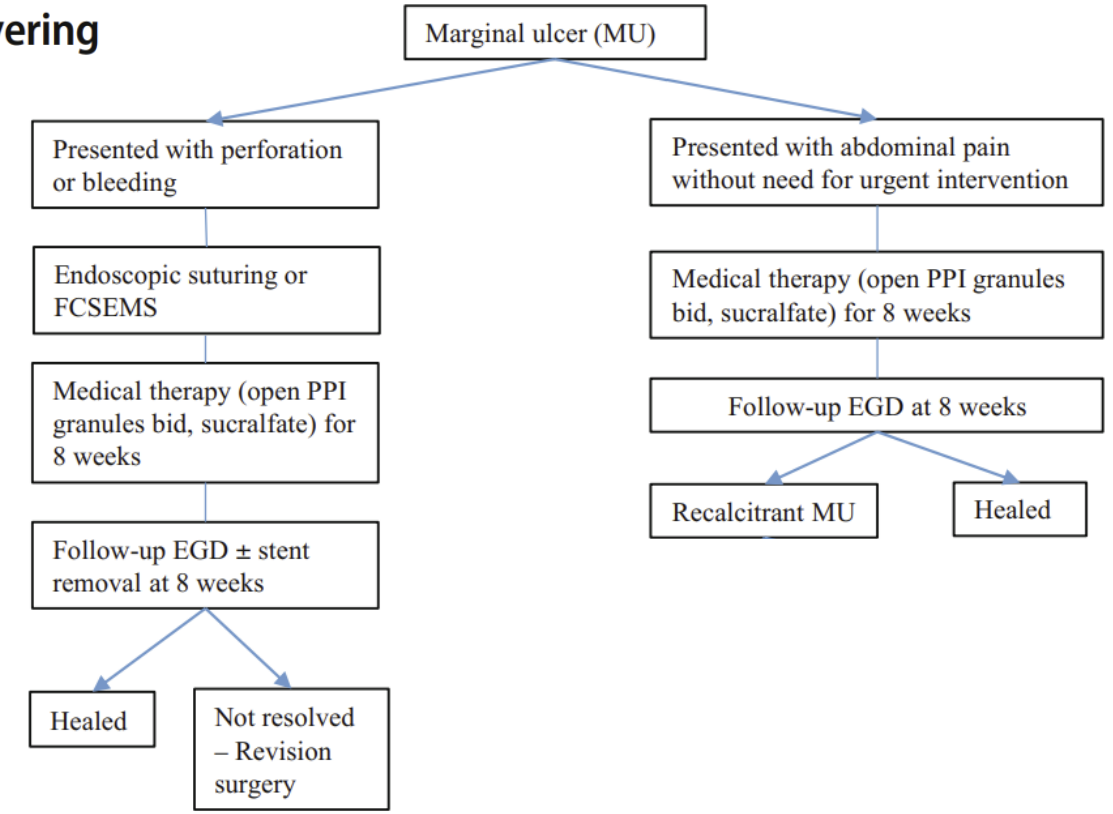
Results Eleven patients (age range 31–60; all females) with mean BMI of 27.72 ± 5.93 kg/m^2 underwent endoscopic suturing and/or stent deployment for recalcitrant MU with abdominal pain at a median of 50 months (range 3–120) post-Roux-en-Y gastric bypass (RYGB). Seven patients were managed by oversewing, two were managed by FCSEMS, and two patients required both. Technical success was 100%. All patients reported resolution of abdominal pain at 1 week. Surveillance endoscopy performed in 10/11 (90.9%) patients at 8 weeks revealed complete ulcer healing in 9/10 (90%). No adverse events were reported.

Conclusion Endoscopic management is an effective and safe method to treat MU and should be considered an alternative to surgical revision. It appears effective for perforated and recalcitrant MU.

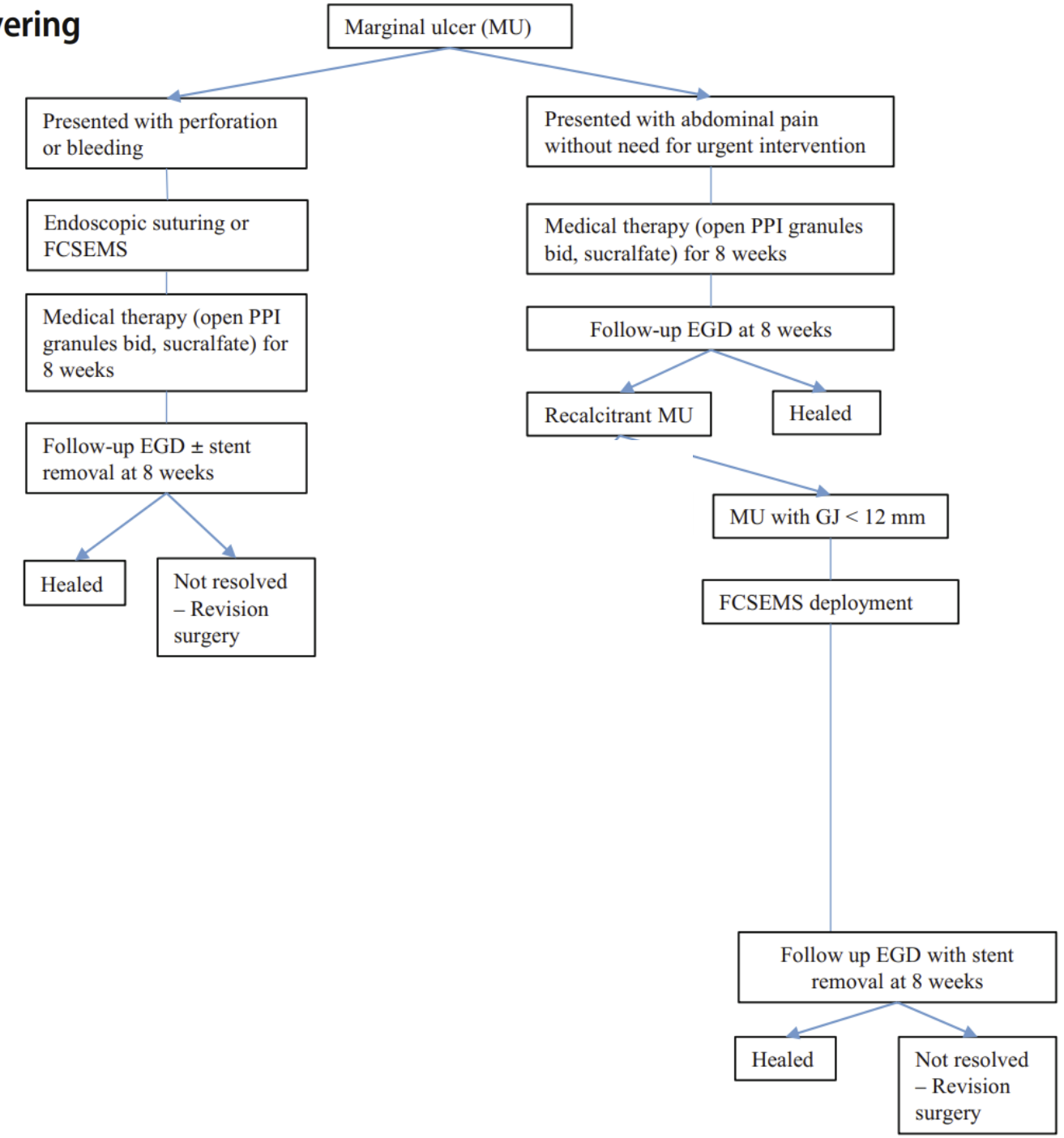
Endoscopic Management of Recalcitrant Marginal Ulcers by Covering the Ulcer Bed



Endoscopic Management of Recalcitrant Marginal Ulcers by Covering the Ulcer Bed

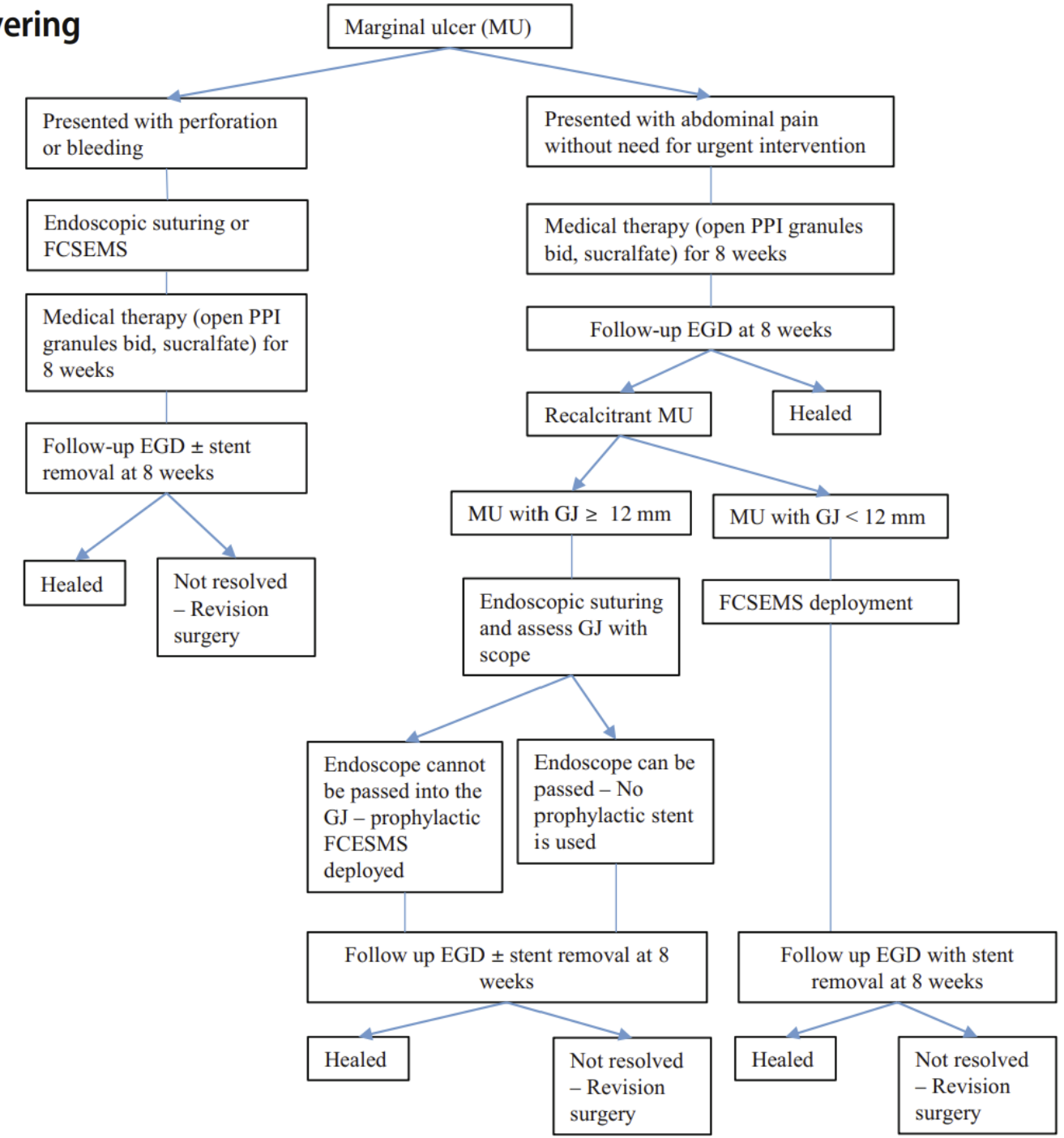


Endoscopic Management of Recalcitrant Marginal Ulcers by Covering the Ulcer Bed



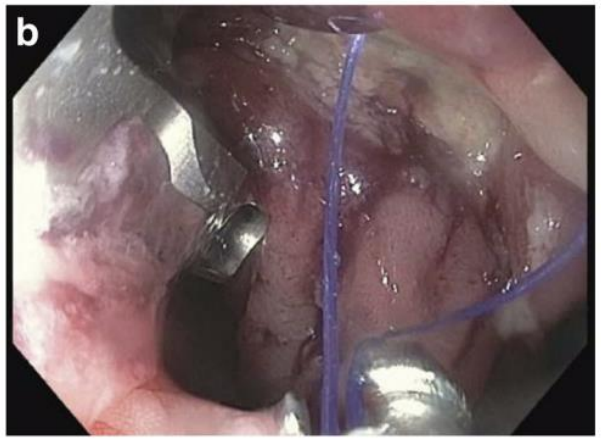
Chicago Institute of Advanced Surgery

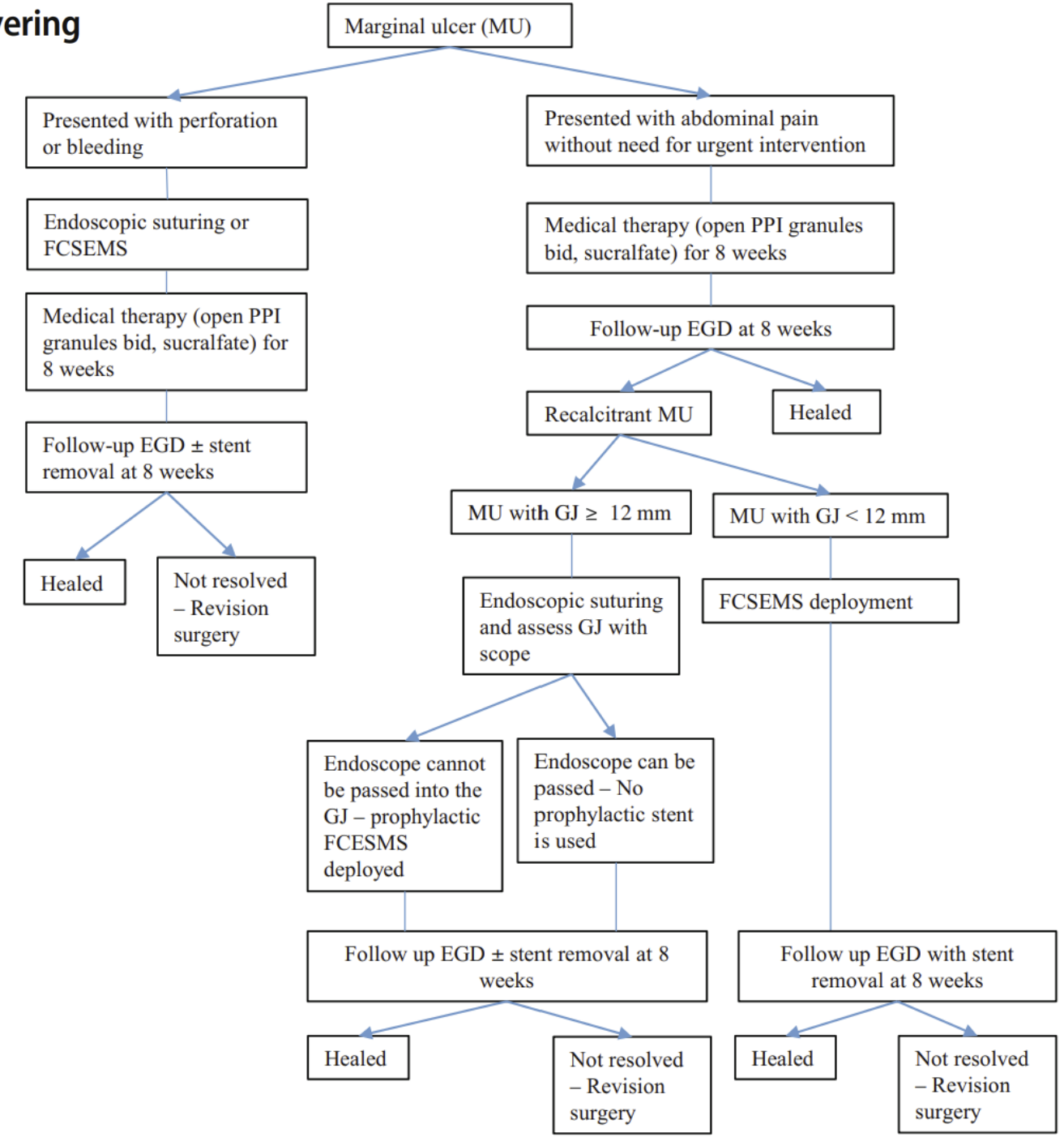
Endoscopic Management of Recalcitrant Marginal Ulcers by Covering the Ulcer Bed



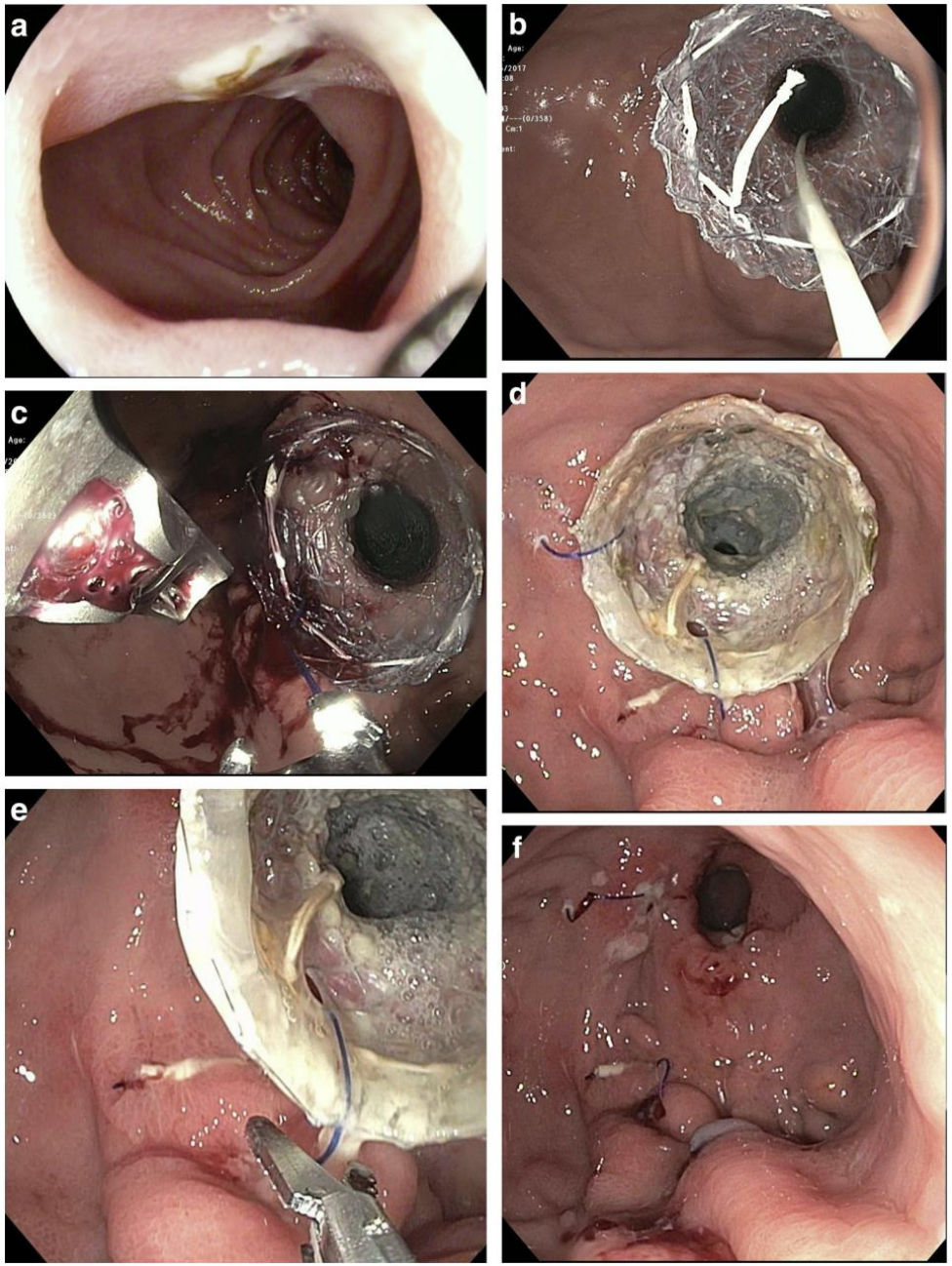
Chicago Institute of Advanced Surgery

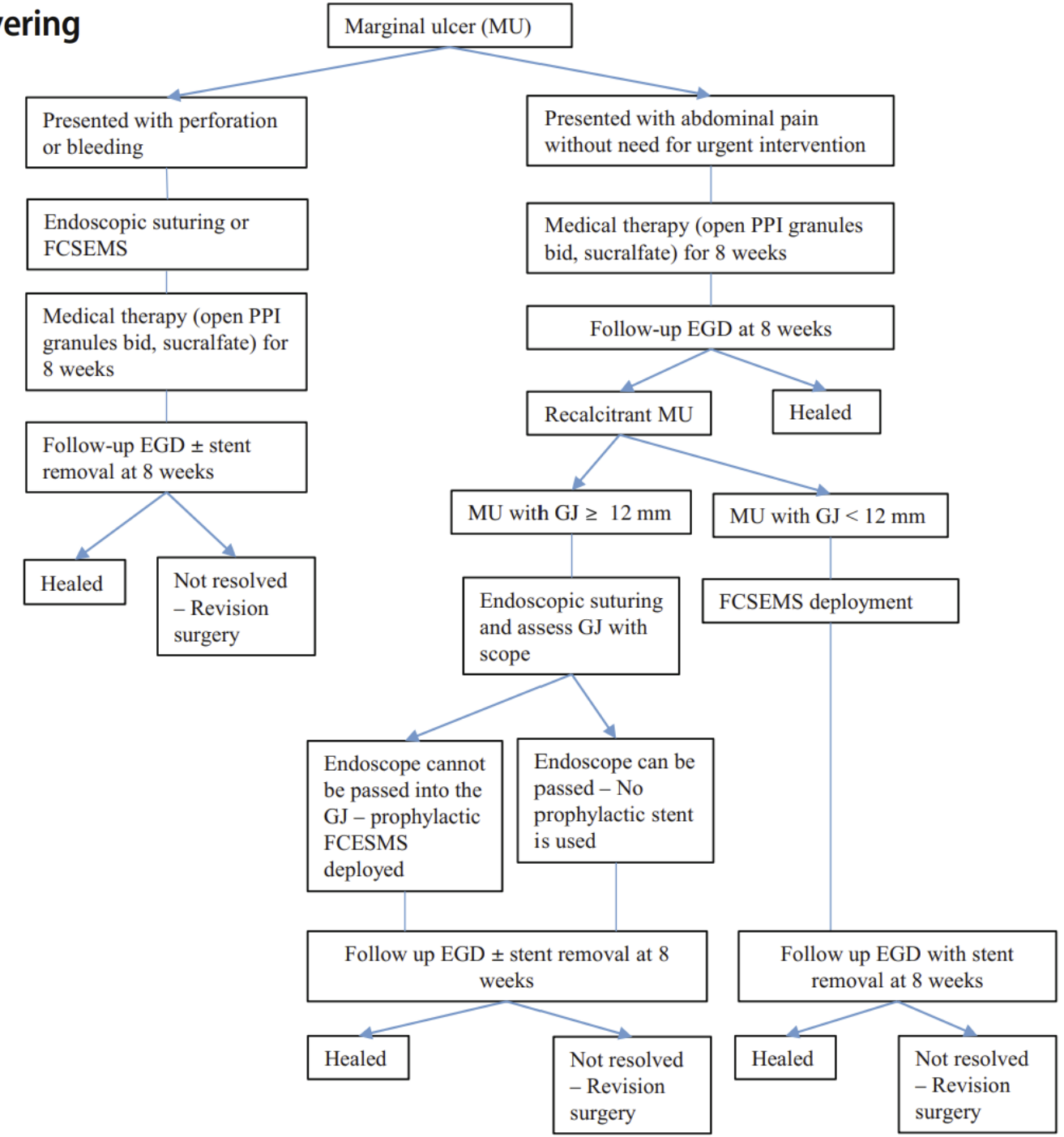
Endoscopic Management of Recalcitrant Marginal Ulcers by Covering the Ulcer Bed





Endoscopic Management of Recalcitrant Marginal Ulcers by Covering the Ulcer Bed





Obesity Surgery (2018) 28:2252–2260
https://doi.org/10.1007/s11695-018-3162-7

ORIGINAL CONTRIBUTIONS

Endoscopic Management of Recalcitrant Marginal Ulcers by Covering the Ulcer Bed

Sindhu Barola[1] · Lea Fayad[1] · Christine Hill[2] · Thomas Magnuson[3] · Michael Schweitzer[3] · Vikesh Singh[1] · Yen-I Chen[1] · Saowanee Ngamruengphong[1] · Mouen A. Khashab[1] · Anthony N. Kalloo[1] · Vivek Kumbhari[1]

Published online: 19 March 2018

Abstract

Background Management options for marginal ulcers (MU) vary from medical therapy to revision surgery. Medical therapy is often ineffective and revision surgery is associated with a high morbidity and possible recurrence.

Aims To evaluate technical feasibility, efficacy, and safety of endoscopic management of MU by covering the ulcer bed using oversewing and/or deploying a fully covered self-expandable metallic stent (FCSEMS).

Methods Medical records of consecutive patients who underwent endoscopic suturing and/or FCSEMS deployment for recalcitrant MU between August 2016 and June 2017 at a single academic center were reviewed. Recalcitrant MU was defined as an ulcer that persists after 6 to 8 weeks despite maximal medical therapy (open capsule PPI, 40 mg bid as well as sucralfate qid), cessation of smoking and nonsteroidal anti-inflammatory drugs (NSAIDs), and *Helicobacter pylori* eradication.

Results Eleven patients (age range 31–60; all females) with mean BMI of 27.72 ± 5.93 kg/m^2 underwent endoscopic suturing and/or stent deployment for recalcitrant MU with abdominal pain at a median of 50 months (range 3–120) post-Roux-en-Y gastric bypass (RYGB). Seven patients were managed by oversewing, two were managed by FCSEMS, and two patients required both. Technical success was 100%. All patients reported resolution of abdominal pain at 1 week. Surveillance endoscopy performed in 10/11 (90.9%) patients at 8 weeks revealed complete ulcer healing in 9/10 (90%). No adverse events were reported.

Conclusion Endoscopic management is an effective and safe method to treat MU and should be considered an alternative to surgical revision. It appears effective for perforated and recalcitrant MU.

ELSEVIER

Surgery for Obesity and Related Diseases 10 (2014) 229–234

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Management and treatment outcomes of marginal ulcers after Roux-en-Y gastric bypass at a single high volume bariatric center

Rena C. Moon, M.D., Andre F. Teixeira, M.D., Michael Goldbach, M.D., Muhammad A. Jawad, M.D., F.A.C.S.*

Department of Bariatric Surgery, Orlando Regional Medical Center & Bariatric and Laparoscopy Center, Orlando Health

Received July 16, 2013; accepted October 1, 2013

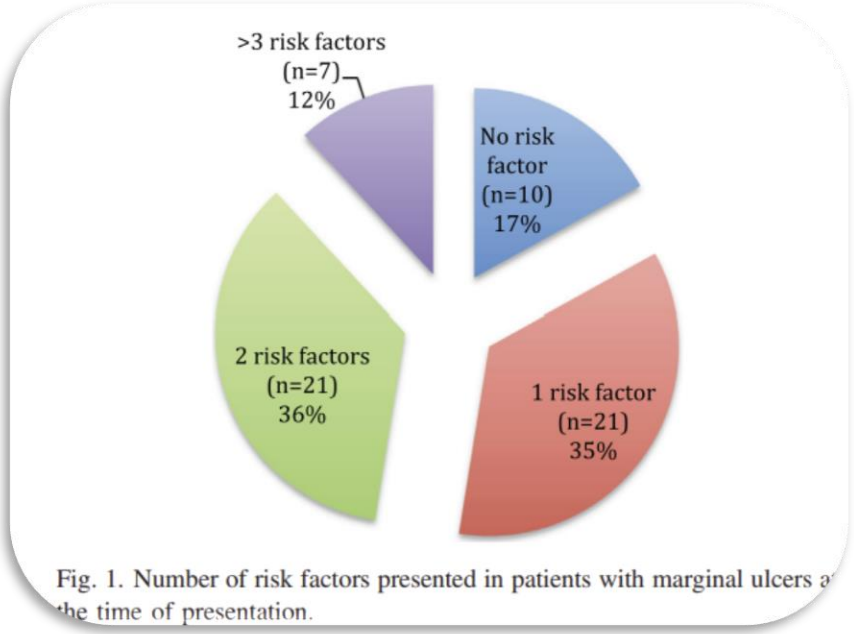


Fig. 1. Number of risk factors presented in patients with marginal ulcers a the time of presentation.

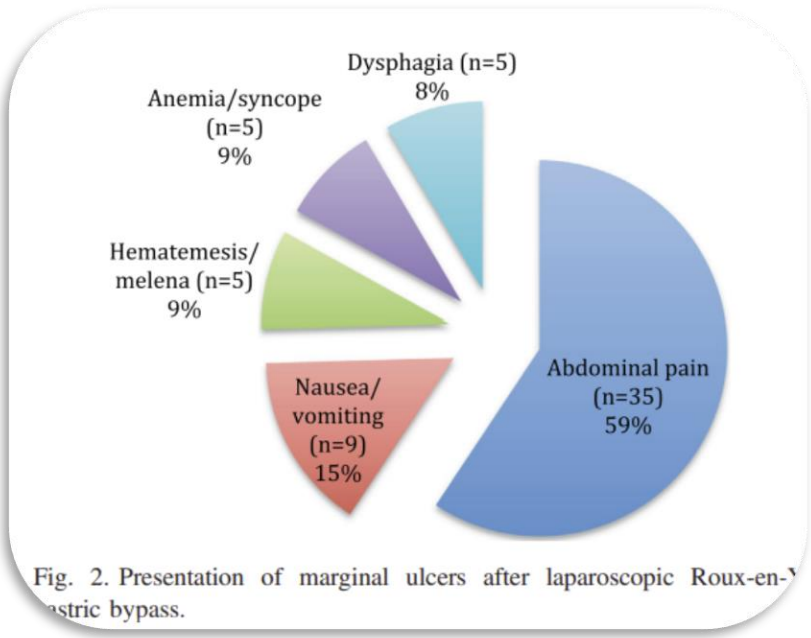


Fig. 2. Presentation of marginal ulcers after laparoscopic Roux-en-Y astric bypass.

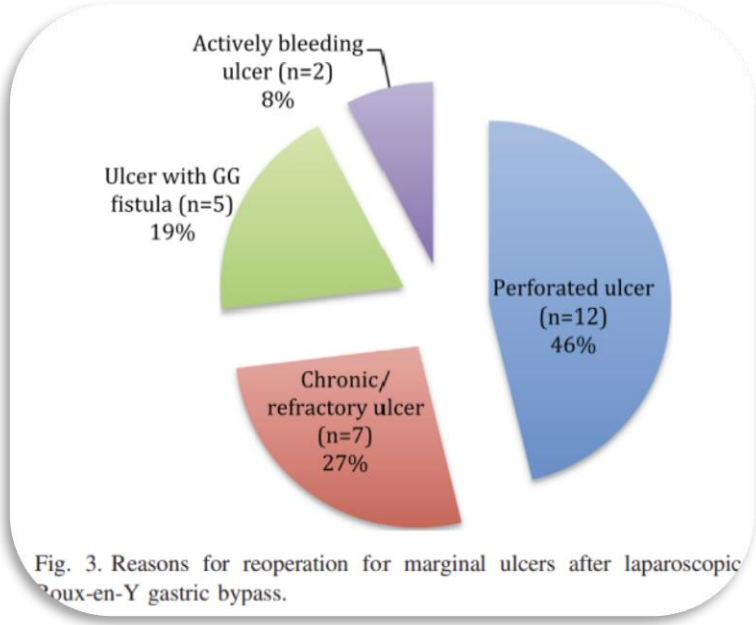
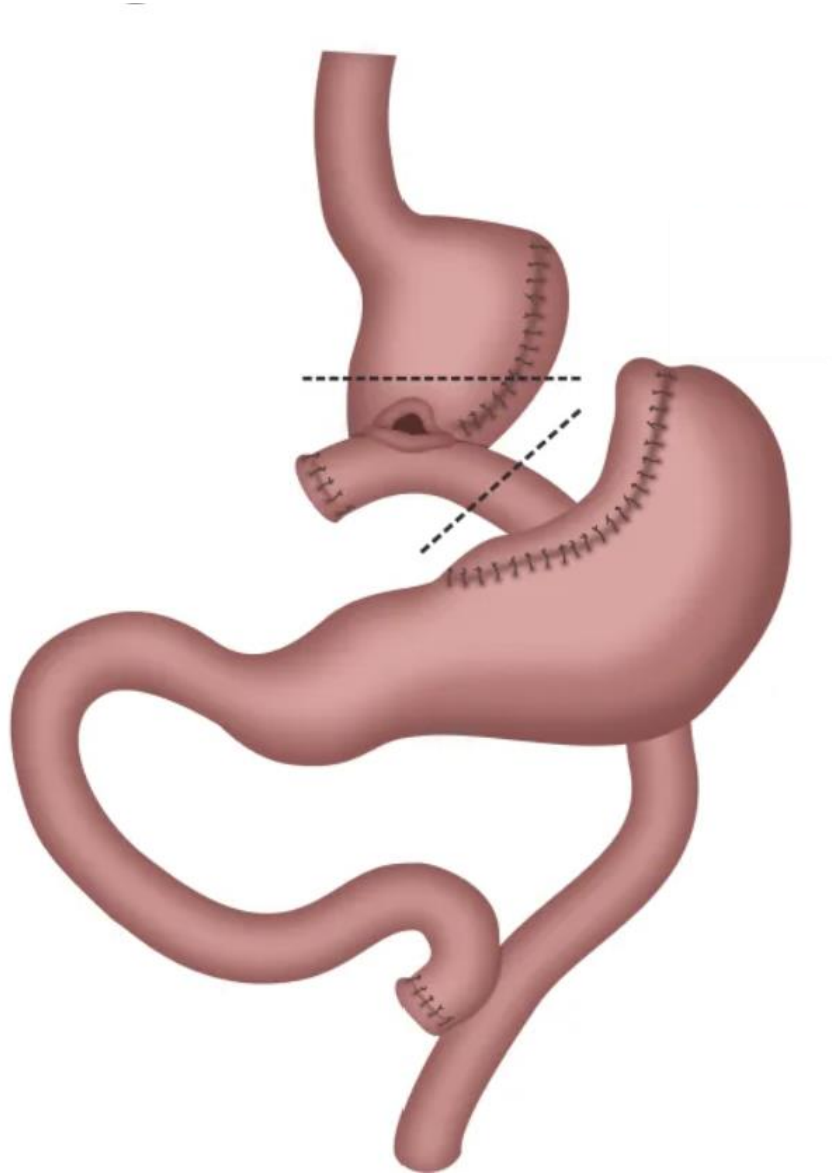


Fig. 3. Reasons for reoperation for marginal ulcers after laparoscopic Roux-en-Y gastric bypass.



ELSEVIER

CrossMark

Surgery for Obesity and Related Diseases 13 (2017) 588–593

SURGERY FOR OBESITY AND RELATED DISEASES

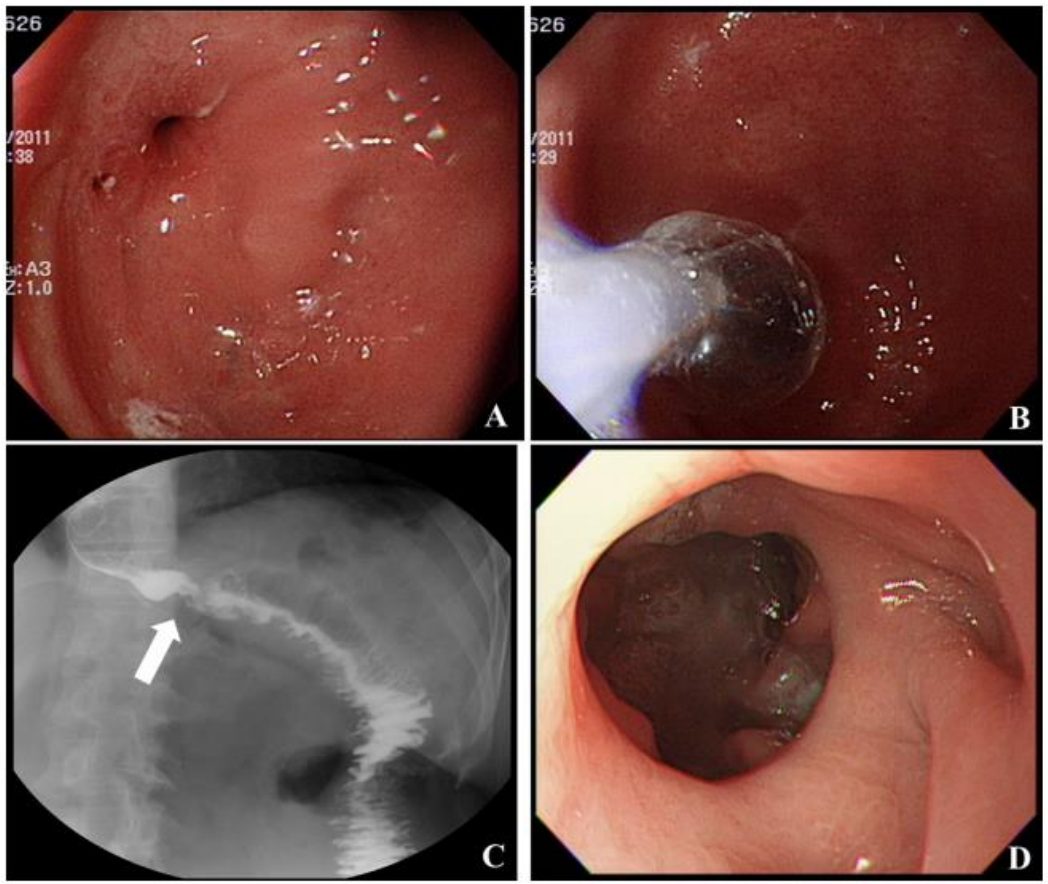
Original article

Revision using totally hand-sewn gastrojejunostomy and truncal vagotomy for refractory marginal ulcer after laparoscopic Roux-en-y gastric bypass: a case series

Po-Chih Chang, M.D.[a,b,c,d,*], Chih-Kun Huang, M.D.[e], Chi-Ming Tai, M.D.[a,f], Ivy Ya-Wei Huang, R.N.[a,c], Ming-Che Hsin, M.D.[e], Chao-Ming Hung, M.D.[g]

[b]Division of

Taiwan



Abstract

Demographic characteristics of patients with a refractory marginal ulcer for totally hand-sewn gastrojejunostomy with truncal vagotomy

Variable	Result
Duration	August 2005 to May 2015
Male/Female	7/4
Mean age at surgery (yr)	39.5 ± 16.0 (range, 19–66)
Mean BMI at surgery (kg/m^2)	37.5 ± 9.3 (range, 32–57)
Dominant manifestation:	
Significant bleeding	3 (27.2%)
Intractability	5 (45.4%)
Stricture	3 (27.2%)
Staples exposure in the gastroendoscopic examination	90.9% (10/11)
Mean interval to refractory MU (mo)	10.2 ± 8.1 (range, 4–28)
Mean interval to revisional surgery (mo)	38.7 ± 22.6 (range, 10–76)
Follow-up after revisional surgery (mo)	28.0 ± 16.2 (range, 10–48)

BMI = body mass index; MU = marginal ulcer.

Summary of revisional surgery (totally hand-sewn gastrojejunostomy and concomitant truncal vagotomy)

Variable	Result
Laparoscopic approach	100%
Mean operation time (min)	150.4 ± 59.8 (range, 80–300)
Mean length of hospital stay after revisional surgery (d)	4.2 ± 1.4 (range, 2–7)
Mean blood loss (mL)	53.6 ± 37.7 (range, 30–150)
Perioperative complication or mortality	0%
Symptomatic improvement	100% (11/11)
Gastroendoscopic resolution (1-yr follow-up)	100% (9/9)

Comparative Study > Am Surg. 2012 Jun;78(6):663-8.

Effectiveness of thoracoscopic truncal vagotomy in the treatment of marginal ulcers after laparoscopic Roux-en-Y gastric bypass

John Hunter [1], Richard D Stahl, Manasi Kakade, Igal Breitman, Jayleen Grams, Ronald H Clements

Affiliations + expand

PMID: 22643261

Abstract

Marginal ulcer is a significant complication of laparoscopic Roux-en-Y gastric bypass (LRYGB). Most marginal ulcers resolve with medical management, but nonhealing ulcers may require revision of the gastrojejunostomy, a procedure with significant morbidity and mortality. Traditionally, surgical therapy for refractory peptic ulcers includes a vagotomy. The current study evaluates the effectiveness of thoracoscopic truncal vagotomy (TTV) in the management of refractory marginal ulcers. All patients at two institutions with an intractable marginal ulcer after LRYGB treated with TTV between 2003 and 2010 were reviewed. Data were collected from chart review and telephone interview. Seventeen patients (mean age, 39 ± 13 years; 16 females) were diagnosed with marginal ulceration a median of 18 months after LRYGB and proceeded to TTV at a mean of 39 ± 43 weeks (range, 1 to 114 weeks) after the diagnosis. The median operative time was 89 ± 65 minutes (range, 45 to 318 minutes). Four patients had a complication (sympathetic contralateral pleural effusion, pneumothorax, operative bleeding, and readmission for emesis). Eleven patients had follow-up of 3 months to 6 years (median, 7 months). Nine patients (82%) had symptomatic improvement and/or endoscopic resolution, whereas two (18%) did not. No patient had endoscopic evidence of persistent or recurrent marginal ulcer. TTV achieves symptomatic improvement and/or endoscopic resolution of intractable marginal ulcers in over 80 per cent of patients status post gastric bypass and therefore offers a less morbid alternative to revision of the gastrojejunostomy.

Steinemann et al. BMC Surgery 2011, 11:33
http://www.biomedcentral.com/1471-2482/11/33

BMC Surgery

CASE REPORT Open Access

Laparoscopic gastric pouch and remnant resection: a novel approach to refractory anastomotic ulcers after Roux-en-Y Gastric Bypass: Case report

Daniel C Steinemann[1,2], Marc Schiesser[1], Pierre-Alain Clavien[1] and Antonio Nocito[1*]

Abstract

Background: Anastomotic or marginal ulcers occur in 0.6 to 16% of patients after laparoscopic Roux-en-Y-Gastric Bypass. Initial therapy aims at eliminating known risk factors including smoking, Helicobacter pylori infection, use of non-steroidal anti-inflammatory drugs and inhibition of gastric acid secretion. While this approach is successful in 68 to 88% of the cases, up to one third of patients need a subsequent surgical revision. However, marginal ulcers still recur in up to 10% of cases after revisional surgery, thus constituting a serious challenge for bariatric surgeons.

Case presentation: We herein report a case of an insidious marginal ulcer refractory to both medical therapy with high-dosed proton pump inhibitors and sucralfate as well as surgical therapy consisting of the lengthening of a short alimentary limb and later resection of the gastroenterostomy and construction of a new tension-free anastomosis. Only after gastrectomy by laparoscopic en-bloc resection of the gastrojejunostomy, the gastric pouch and resection of the gastric remnant with reconstruction by esophagojejunostomy the patient remained free of symptoms.

Conclusion: By laparoscopic resection of the entire gastric pouch and the gastric remnant the risk to leave a suboptimally vascularised or even ischemic pouch in situ was avoided. The esophagojejunostomy was then created in healthy, good vascularised tissue. In our case this novel approach was effective in the management of a refractory anastomotic ulcer and might represent a rescue option when simple revision of the gastrojejunostomy fails.

Keywords: Roux-en-Y-Gastric Bypass, bariatric surgery, anastomotic ulcer, marginal ulcer, obesity

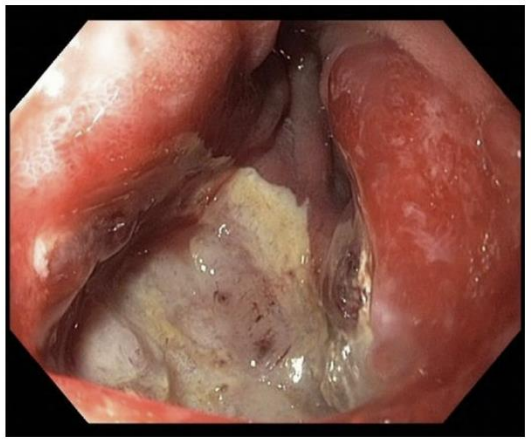


Figure 1 Recurrent anastomotic ulcer in the intestinal part of the gastrojejunostomy.

CASE REPORT Open Access

Laparoscopic gastric pouch and remnant resection: a novel approach to refractory anastomotic ulcers after Roux-en-Y Gastric Bypass: Case report

Daniel C Steinemann[1,2], Marc Schiesser[1], Pierre-Alain Clavien[1] and Antonio Nocito[1*]

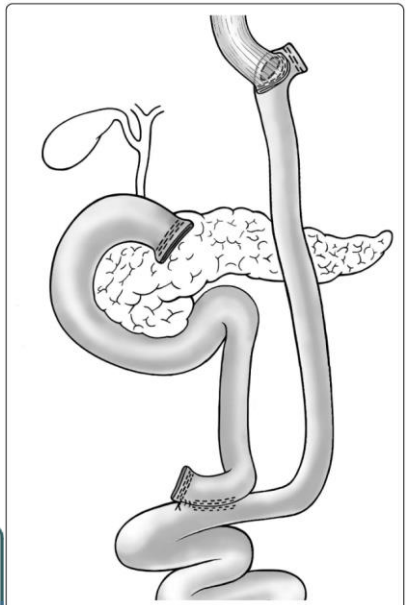


Figure 3 Roux-Y reconstruction with esophagojejunostomy.

Abstract

Background: Anastomotic or marginal ulcers occur in 0.6 to 16% of patients after laparoscopic Roux-en-Y-Gastric Bypass. Initial therapy aims at eliminating known risk factors including smoking, Helicobacter pylori infection, use of non-steroidal anti-inflammatory drugs and inhibition of gastric acid secretion. While this approach is successful in

Conclusion: By laparoscopic resection of the entire gastric pouch and the gastric remnant the risk to leave a suboptimally vascularised or even ischemic pouch in situ was avoided. The esophagojejunostomy was then created in healthy, good vascularised tissue. In our case this novel approach was effective in the management of a refractory anastomotic ulcer and might represent a rescue option when simple revision of the gastrojejunostomy fails.

symptoms.

Conclusion: By laparoscopic resection of the entire gastric pouch and the gastric remnant the risk to leave a suboptimally vascularised or even ischemic pouch in situ was avoided. The esophagojejunostomy was then created in healthy, good vascularised tissue. In our case this novel approach was effective in the management of a refractory anastomotic ulcer and might represent a rescue option when simple revision of the gastrojejunostomy fails.

Keywords: Roux-en-Y-Gastric Bypass, bariatric surgery, anastomotic ulcer, marginal ulcer, obesity

Conclusion

- Marginal Ulcers and Strictures are largely preventable
- Preop and postop education and optimization + good technique

- Medications + Endoscopy are highly successful

- Surgery is difficult and may require additional steps to resection