University of Naples "Federico II"

Department of Advanced Biomedical Sciences

Fistola: Classificazione ed Inquadramento Clinico

Prof. Mario Musella

Disclosures

Johnson & Johnson (Consultant)

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Prof. Mario Musella

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World Journal of Gastroenterology

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MINIREVIEWS

Gastric leaks post sleeve gastrectomy: Review of its prevention and management

Antoine Abou Rached, Melkart Basile, Hicham El Masri

In base alla presentazione clinica e radiologica, le fistole si distinguono in:

- Tipo A: microperforazioni in assenza di evidenza clinica o radiologica della presenza della fistola
- Tipo B: evidenza radiologica della fistola in assenza di manifestazione clinica della stessa
- Tipo C: evidenza sia clinica che radiologica della presenza della fistola

In base al tempo d'insorgenza possiamo distinguere le fistole in:

- Precoci: dalla prima alla quarta giornata post-operatoria
- Intermedie: dalla quinta alla nona giornata post-operatoria
- Tardive: dalla decima giornata post-operatoria a seguire

ELSEVIER

Surgery for Obesity and Related Diseases 17 (2021) 947–955

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Gastric leak after sleeve gastrectomy: risk factors for poor evolution under conservative management

Lionel Rebibo, M.D.[a,b], Meghane Tricot, M.D.[c], Jeanne Dembinski, M.D.[c], Abdennaceur Dhahri, M.D.[c], Franck Brazier, M.D.[d], Jean-Marc Regimbeau, M.D., Ph.D.[c,e,*]

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[b]*Université de Paris, Inserm UMR 1149 F-75018 Paris, France*
[c]*Department of Digestive Surgery, Amiens University Medical Center, Amiens, France*
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[e]*Simplification of Surgical Patient Care Clinical Research Unit, University of Picardie Jules Verne, Amiens, France*

Received 14 September 2020; accepted 21 January 2021

Gastric leak (GL) is the most highly feared early postoperative complication after sleeve gastrectomy (SG), with an incidence of 1% to 2%. This complication may require further surgery/endoscopy, with a risk of management failure that may require additional surgery, including total gastrectomy, leading to a risk of mortality of 0% to 9%

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Received 14 September 2020; accepted 21 January 2021

The prognosis of GL after SG has gradually improved due to the emergence of new endoscopic techniques, in particular, double pigtail stents (DPSs), an implementation algorithm for surgical and endoscopic management, and, especially, better classification of GL, making it possible to propose revisional surgery to reduce the morbidity risk of GL in certain cases.

Table 3
Clinical data at admission in our institution

	eGL group (n = 73)	hGL group (n = 50)	Total group (n = 123)	*P* value
Type of GL, n (%)				.04
Early	26 (35.6)	27 (54)	53 (43)	
Delayed	47 (64.4)	23 (46)	70 (57)	
Delay of diagnosis, d, mean (range)	17.3 (1–156)	11.8 (1–78)	15.1 (1–156)	.06
Hypovolemic shock rate	9 (12.3)	15 (30)	24 (19.5)	.02
Admission in ICU rate	24 (32.8)	14 (28)	38 (30.9)	.57

GL = gastric leak.

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Received 14 September 2020; accepted 21 January 2021

Improvement of nutritional status before SG and early referral for GL could reduce the risk of delayed closure or the need for further surgery

Table 5
Reoperation data and type of renutrition of patients with GL after SG

	eGL group (n = 73)	hGL group (n = 50)	Total group (n = 123)	*P* value
Reoperation				
Rate of reoperation	35 (48)	39 (78)	74 (60)	<.001
Reoperation using laparoscopy	20 of 35 (57.1)	26 of 39 (66.6)	46 of 74 (62.2)	.37
Reoperation using laparotomy	15 of 35 (42.9)	13 of 39 (33.4)	28 of 74 (37.8)	.48
Suture of the GL	10 of 35 (28.5)	9 of 39 (23)	19 of 74 (25.6)	.52
Type of renutrition				.01
Feeding jejunostomy	30 (41)	33 (66)	63 (51.2)	
Nasojejunal tube	38 (52)	13 (26)	51 (41.4)	
Venous catheter	5 (7)	4 (8)	9 (7.4)	

GL = gastric leak.
Data are presented as n (%).

Obesity Surgery (2021) 31:612–616
https://doi.org/10.1007/s11695-020-05008-y

IFSO

ORIGINAL CONTRIBUTIONS

Check for updates

Challenges in the Diagnosis of Leak After Sleeve Gastrectomy: Clinical Presentation, Laboratory, and Radiological Findings

Mohammad Al Zoubi[1] · Nesreen Khidir[2] · Moataz Bashah[2,3]

Post LSG leaks can be misdiagnosed, resulting in delayed management and catastrophic consequences.
The clinical presentation, signs, and symptoms are highly variable, ranging from asymptomatic to septic shock.
Debate exists on what is the best diagnostic modality in diagnosing LSG leak. Though all agreed that early detection is associated with a better outcome, and a high index of suspicion is the cornerstone in the diagnosis

Prof. Mario Musella

Fistola: Classificazione ed Inquadramento Clinico

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Challenges in the Diagnosis of Leak After Sleeve Gastrectomy: Clinical Presentation, Laboratory, and Radiological Findings

Mohammad Al Zoubi[1] · Nesreen Khidir[2] · Moataz Bashah[2,3]

Table 2 Details of incorrect diagnosis for patients with post sleeve gastrectomy leaks who had more than one ER visits to the emergency (53 patients)

Incorrect diagnosis	*n* (%)
Gastritis	26 (49.0%)
Pneumonia	12 (22.6%)
Shoulder pain	2 (3.7%)
Pulmonary embolism	2 (3.7%)
Minimal intraabdominal collection	11 (20.7%)

n Number of patients

Obesity Surgery (2021) 31:612–616
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ORIGINAL CONTRIBUTIONS

Challenges in the Diagnosis of Leak After Sleeve Gastrectomy: Clinical Presentation, Laboratory, and Radiological Findings

Mohammad Al Zoubi[1] · Nesreen Khidir[2] · Moataz Bashah[2,3]

Abdominal pain, tachycardia, or fever after LSG should raise the suspicion of a leak. CT scan of the abdomen and UGIC study detected leaks in 75% and 77.5% consecutively. Only 29.3% of patients were diagnosed correctly as a leak from the first visit to the ER

Table 4 Imaging findings of CT scan and upper gastrointestinal contrast meal study

Finding	*n* (%)
CT—Intraabdominal collection	75 (93.7%)
CT—Contrast extravasation	60 (75.0%)
CT—Pleural effusion	42 (52.5%)
CT—Free air	37 (46.2%)
Contrast swallow—Free contrast passage	68 (85.0%)
Contrast swallow—Contrast extravasation	62 (77.5%)

Table 3 Details of clinical signs and symptoms and laboratory findings

Variable	Value
Signs and symptoms	
Abdominal pain (*n*, %)	72 (90.0%)
Shoulder pain (*n*, %)	28 (35.0%)
Back pain (*n*, %)	20 (25.0%)
Tachycardia (*n*, %)	57 (71.3%)
Fever (*n*, %)	49 (61.3%)
Shortness of breath (*n*, %)	34 (42.5%)
Nausea (*n*, %)	33 (41.3%)
Vomiting (*n*, %)	28 (35.0%)
Laboratory findings	(M ± SD)
WBCs (cells/mm^3)	14700 ± 5900
CRP (mg/L)	270 ± 133
Lactic acid (mmol/L)	1.6 ± 0.85
Platelets (10^3/L)	367 ± 128
Albumin (g/L)	30.3 ± 6.6

Obesity Surgery (2018) 28:2396–2405
https://doi.org/10.1007/s11695-018-3172-5

ORIGINAL CONTRIBUTIONS

Efficacy of Postoperative Upper Gastrointestinal Series (UGI) and Computed Tomography (CT) Scan in Bariatric Surgery: a Meta-analysis on 7516 Patients

Mario Musella[1] · Valeria Cantoni[1] · Roberta Green[1] · Wanda Acampa[1] · Nunzio Velotti[1] · Paola Maietta[1] · Alberto Cuocolo[1]

- CT scan showed a pooled sensitivity of 91%, significantly higher than sensitivity of UGI series.
- In symptomatic patients the pooled sensitivity of UGI series was significantly lower than sensitivity of CT scan
- A CT scan triggered by clinical suspicion must be considered the first-line procedure to detect a postoperative leak following primary sleeve gastrectomy or Roux-en-Y gastric bypass

Table 2 Sensitivity, specificity, PPV, and NPV of both UGI and CT scan

	UGI series	CT scan	*p* value
Sensitivity, pooled	54%	91%	< 0.001
Specificity, mean	98.6%	99.7%	n.s.
PPV, mean	54%	100%	< 0.001
NPV, mean	96%	98%	n.s.

PPV positive predictive value, *NPV* negative predictive value, *n.s.* not significant

JOURNAL OF LAPAROENDOSCOPIC & ADVANCED SURGICAL TECHNIQUES
Volume 26, Number 0, 2016

DOI: 10.1089/lap.2015.0343

Full Report

Acute Leaks Following Laparoscopic Sleeve Gastrectomy: Early Surgical Repair According to a Management Algorithm

Mario Musella, MD,[1] Marco Milone, MD,[1] Paolo Bianco, MD,[1] Paola Maietta, MD,[1] and Giuseppe Galloro, MD[2]

The management of leaks following LSG remains in general a debated argument, and different algorithms have been suggested throughout the years to approach this problem.
Although a high level of consensus has been reached by several experts about the need to treat by surgery leaks in unstable patients presenting with fever, leukocytosis, and tachycardia, we felt it was useful to define a treatment protocol aimed to manage patients presenting with an acute leakage in the early postoperative period regardless of their hemodynamic conditions

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It is reasonable in selected cases to consider a wider role for early surgery. A timely surgical approach following an appropriate algorithm may offer a resolutive and cost-effective answer to the management of acute leaks following LSG

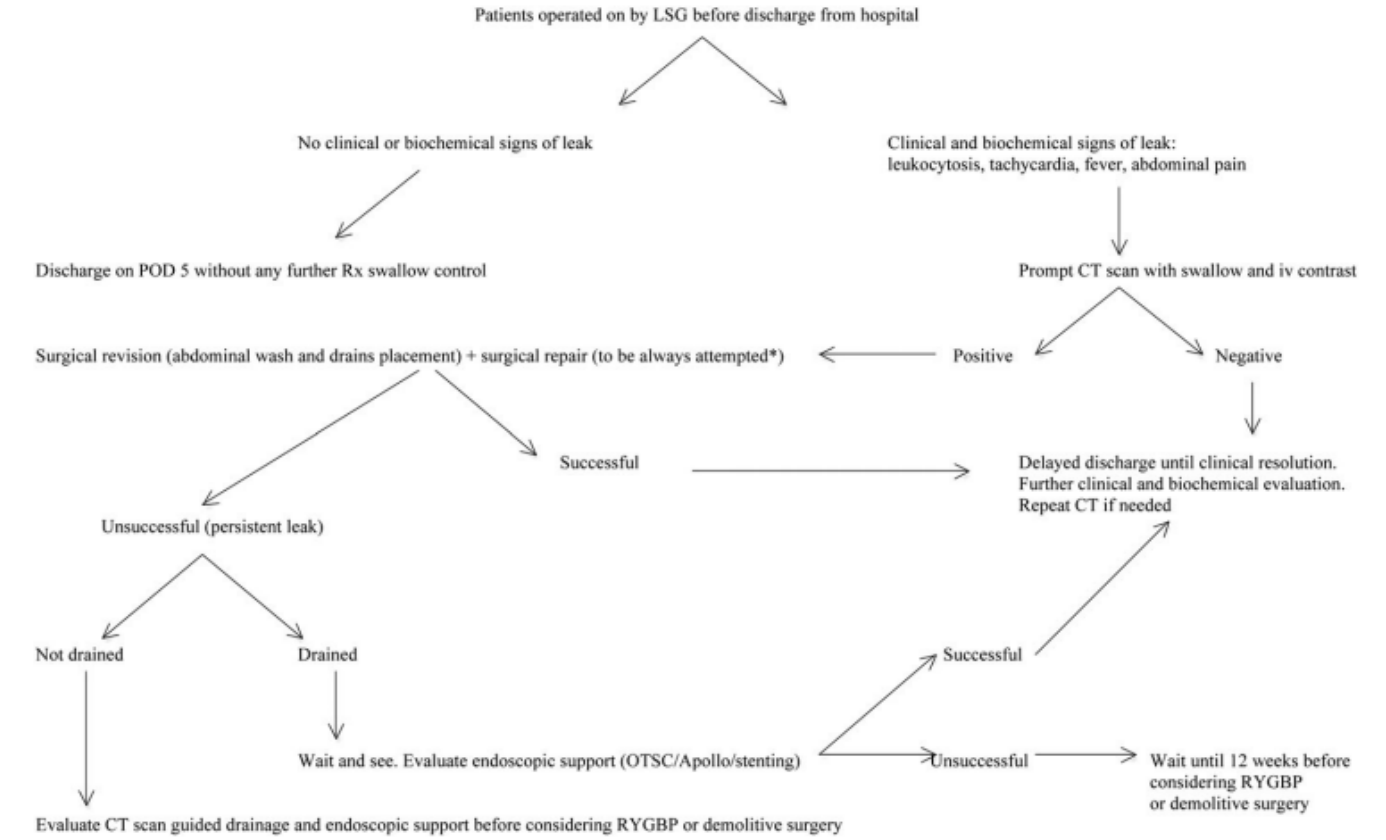

FIG. 2. Algorithm of diagnosis and management. *By stapler if not located at the gastroesophageal junction. Apollo, OverStitch™ endoscopic suturing system from Apollo Endosurgery; CT, computed tomography; LSG, laparoscopic sleeve gastrectomy; OTSC, over the scope clip (OTSC®; Ovesco Endoscopy); POD, postoperative day; RYGBP, Roux-en-Y gastric bypass; stenting, Megastent from Taewoong Medical Industries.

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Help Desk: http://www.wjgnet.com/esps/helpdesk.aspx
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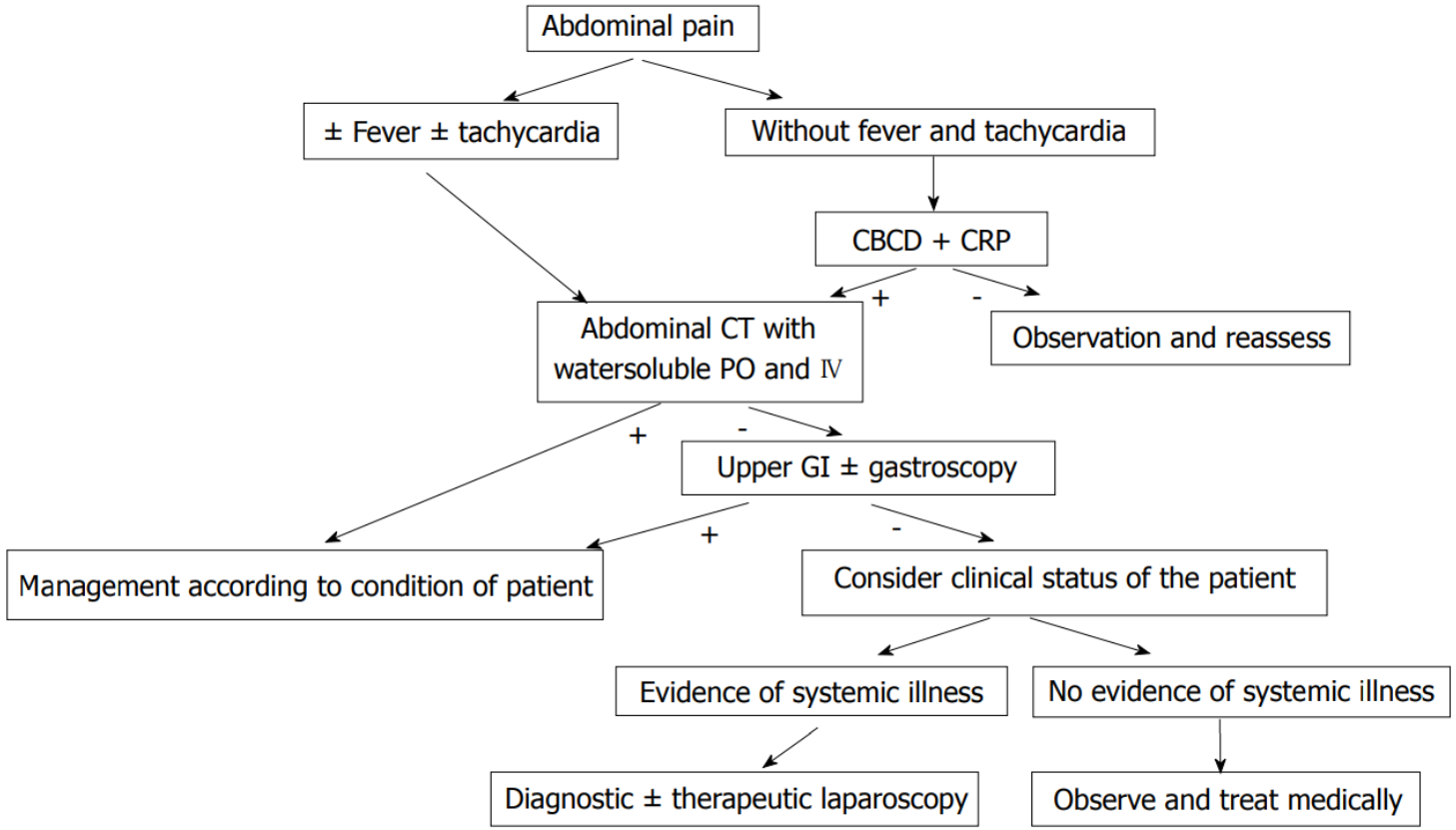

Prof. Mario Musella

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Obesity Surgery (2021) 31:4861–4867
https://doi.org/10.1007/s11695-021-05656-8

IFSO

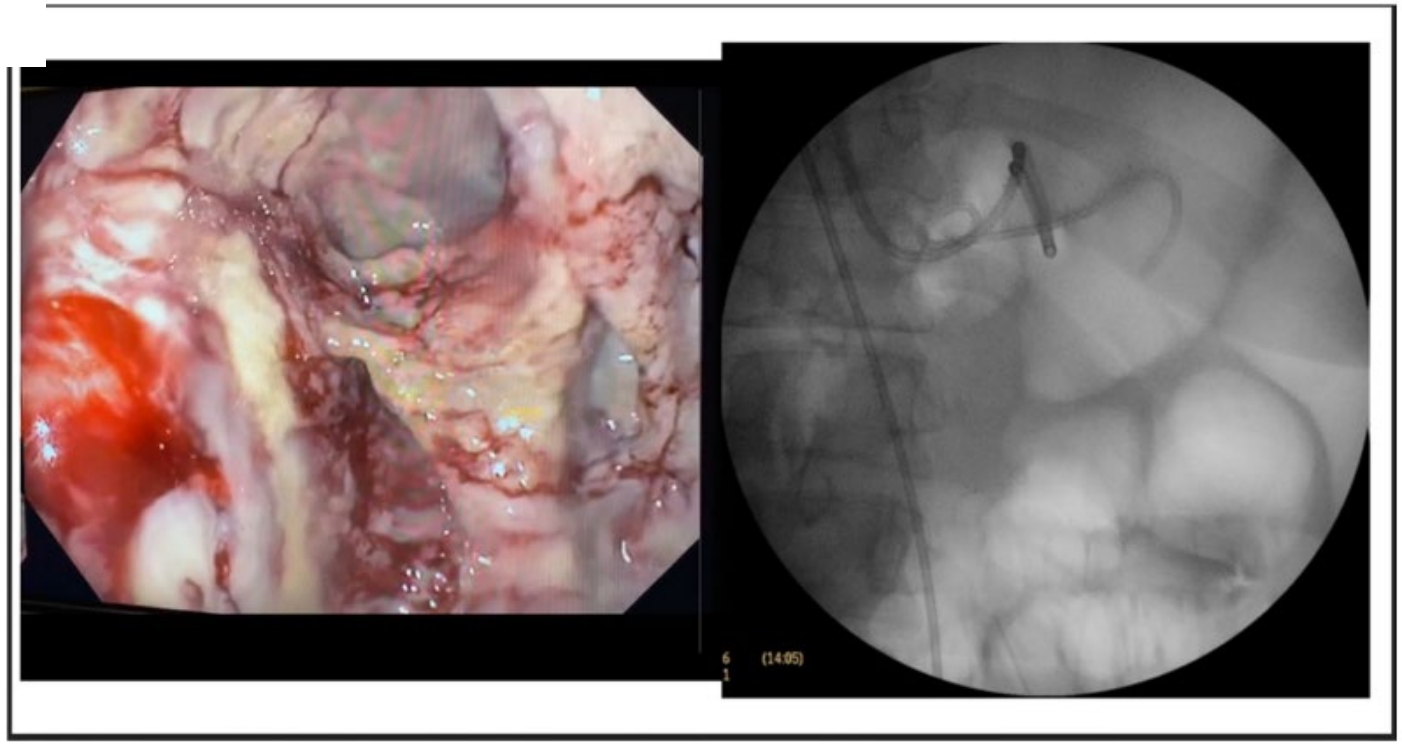
ORIGINAL CONTRIBUTIONS

Check for updates

Leak After Sleeve Gastrectomy: Updated Algorithm of Treatment

Thierry Manos[1] · Marius Nedelcu[1,2] · Anamaria Nedelcu[2] · Michel Gagner[3] · Abdul Kader Weiss[4] · Christophe Bastid[1] · Sergio Carandina[2] · Patrick Noel[1,4,5]

The staple line gastric leak (GL) is estimated to be the most serious complication of this procedure, due to a difficult healing process when using a non-standardized endoscopic approach, with a currently reported rate of 0.3 to 0.4%



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After an initial enthusiasm for stents, the endoscopic treatment evolved including in the current management the septotomy with balloon dilatation and pigtails insertions

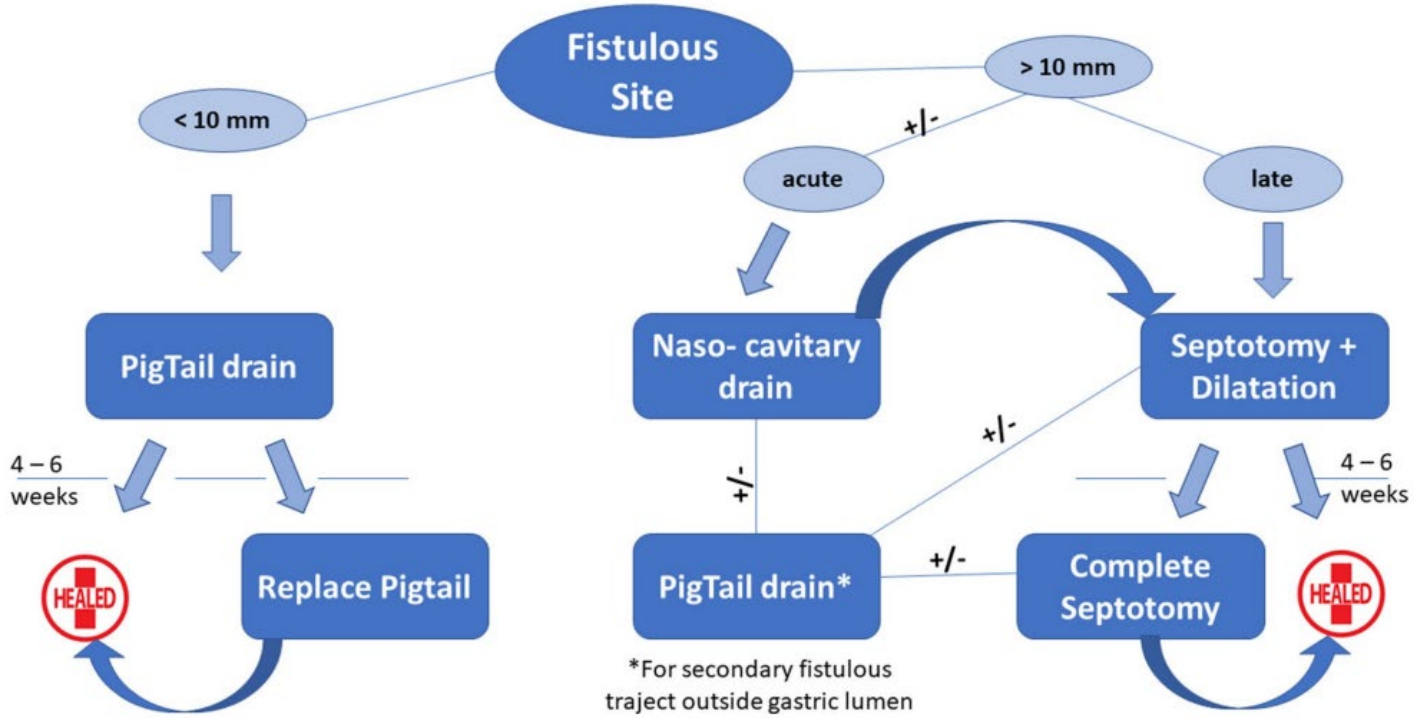

Fig.1 Algorithm of endoscopic treatment of leaks after LSG

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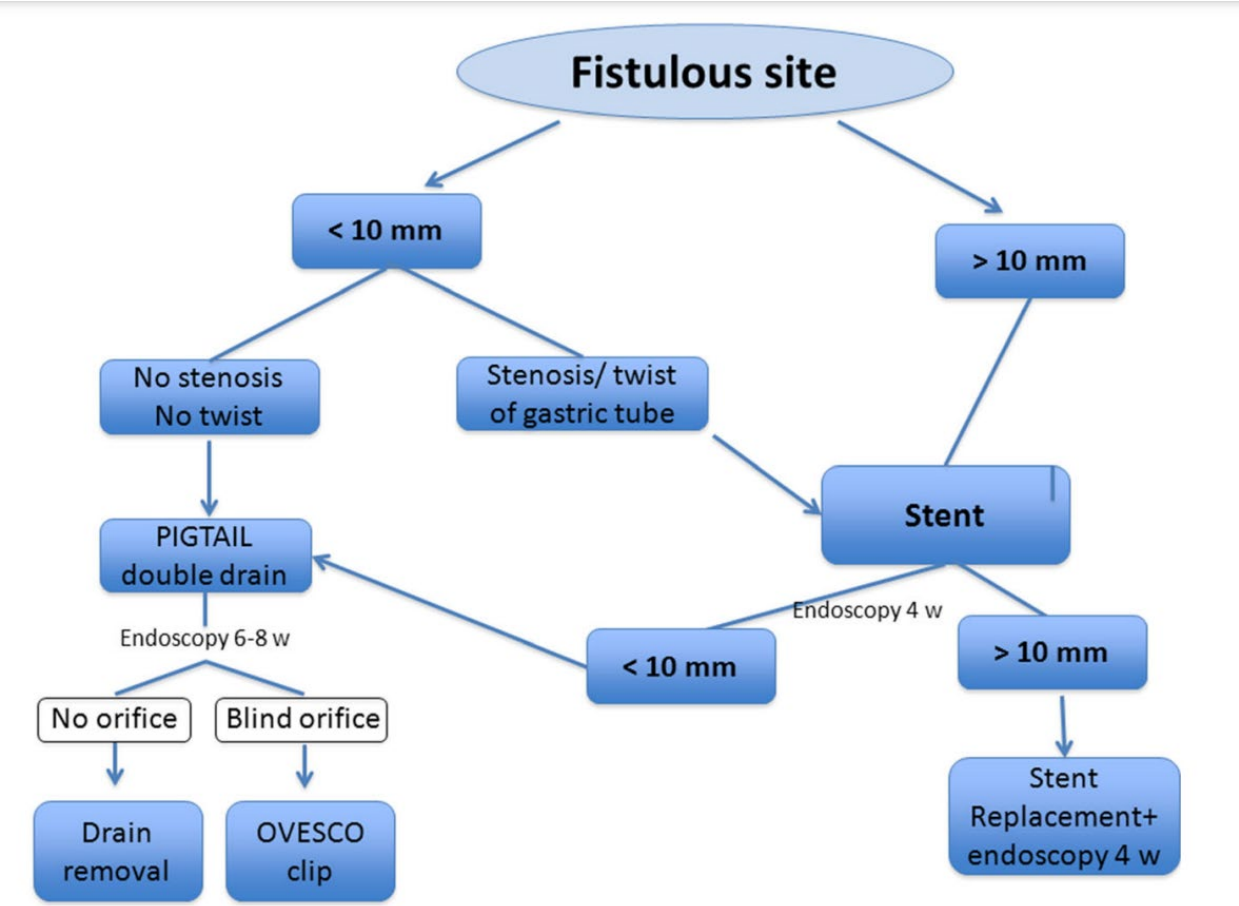
OBES SURG (2015) 25:559–563
DOI 10.1007/s11695-014-1561-y

NEW CONCEPT

Outcome of Leaks After Sleeve Gastrectomy Based on a New Algorithm Adressing Leak Size and Gastric Stenosis

Marius Nedelcu · Thierry Manos · Adrian Cotirlet · Patrick Noel · Michel Gagner

The leak was classified depending on the primary orifice's size (more or less than 10 mm) or on the presence of gastric stenosis.
The average duration to achieve complete healing was 3.4 months



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Obesity Surgery (2021) 31:79–83
https://doi.org/10.1007/s11695-020-04646-6

IFSO

ORIGINAL CONTRIBUTIONS

Check for updates

Roux-en-Y Gastric Bypass for the Treatment of Leak Following Sleeve Gastrectomy

Olivier Degrandi[1,2] · Anamaria Nedelcu[3] · Marius Nedelcu[3,4] · Agathe Simon[1,2] · Denis Collet[1,2,5] · Caroline Gronnier[1,2]

Surgery should be considered in case of failure of the endoscopic treatment of chronic leak after LSG.

RYGBP approach including the leak site offers a low morbidity rate

Authors	Year	Number of cases	Types of surgery	Laparoscopy vs laparotomy	Number of leaks (leak rate)
Van de Vrande et al. [11]	2013	11	11 fistulo--jejunotomies	11 vs 0	5 (45.4%)
Nedelcu et al. [9]	2013	8	2 total gastrectomies 4 fistulo--jejunotomies	1 vs 7	4 (50%)
Safadi et al. [10]	2014	10	2 gastric bypass 8 total gastrectomies 1 fistulo--jejunotomy	2 vs 8	0 (0%)
Ramos et al. [12]	2014	12	1 gastric bypass 12 total gastrectomies	12 vs 0	0 (0%)
Chouillard et al. [18]	2014	21	21 fistulo--jejunotomies	21 vs 0	0 (0%)
Bruzzi et al. [20]	2016	12	12 total gastrectomies	0 vs 12	3 (25%)

ORIGINAL ARTICLE

Early Complications After Laparoscopic Gastric Bypass Surgery: Results From the Scandinavian Obesity Surgery Registry

Erik Stenberg, MD,† Eva Szabo, MD, PhD,† Göran Ågren, MD,† Erik Näslund, MD, PhD,‡ Lars Boman, MD, PhD,§ Ami Bylund, RN, MSc,¶ Jan Hedenbro, MD, PhD,||** Anna Laurenius, RD, PhD,†† Göran Lundegårdh, MD, PhD,‡‡ Hans Lönroth, MD, PhD,†† Peter Möller, MD,§§ Magnus Sundbom, MD, PhD,¶¶ Johan Ottosson, MD, PhD,*† and Ingmar Näslund, MD, PhD†;*

For the Scandinavian Obesity Surgery Registry Study Group

Anastomotic leak at the GJ is a rare but feared complication, occurring in 1-2% of all cases. A leak causes bacteria from saliva and gastric content to enter the abdomen and may lead to infection, abscess and sepsis. Mortality from leak is stated to range from 0.1%-8.5%

OBES SURG (2008) 18:623–630
DOI 10.1007/s11695-007-9297-6

RESEARCH ARTICLE

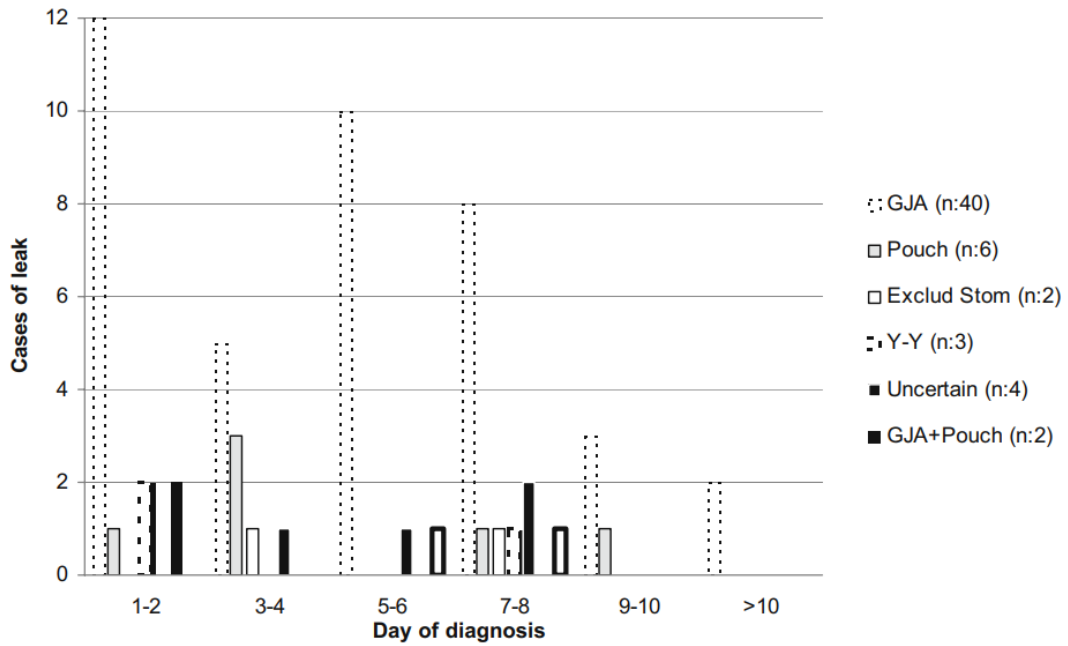
Management of Anastomotic Leaks After Laparoscopic Roux-en-Y Gastric Bypass

Carlos Ballesta · René Berindoague · Marta Cabrera · Miquel Palau · Magdiel Gonzales

Leaks were located as follows:

67.8% in the gastrojejunostomy,
10.2% in the gastric pouch,
3.4% in the excluded stomach,
5.1% in the jejunojejunal anastomosis,
3.4% in the gastrojejunostomy plus pouch,
3.4% in the pouch plus excluded stomach,
6.8% in undetermined sites

Fig. 1 Location of postoperative leaks in 59 patients according to day of diagnosis



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ORIGINAL CONTRIBUTIONS

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Mario Musella[1] · Valeria Cantoni[1] · Roberta Green[1] · Wanda Acampa[1] · Nunzio Velotti[1] · Paola Maietta[1] · Alberto Cuocolo[1]

Table 2 Sensitivity, specificity, PPV, and NPV of both UGI and CT scan

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PPV positive predictive value, *NPV* negative predictive value, *n.s.* not significant

Original article

Management of suspected anastomotic leak after bariatric laparoscopic Roux-en-Y gastric bypass

H. J. Jacobsen[1,2], B. J. Nergard[1,2], B. G. Leifsson[2], S. G. Frederiksen[2], E. Agajahni[1,2], M. Ekelund[2], J. Hedenbro[2] and H. Gislason[1,2]

Patients who underwent surgical treatment early after the symptoms of leakage developed had a shorter hospital stay than those who had symptoms for more than 24 h before reoperation.

Clinical suspicion of an anastomotic leak should prompt an aggressive surgical approach without undue delay.

Delays in treatment, including patient delay, after symptom development were associated with adverse outcomes.

	Leakage ($n = 64$)	No leakage ($n = 5966$)	P‡
Age (years)	43 (22–65)	42 (17–73)	0·599
Sex ratio (F : M)	45 : 19	4653 : 1313	0·141§
Body mass index (kg/m^2)†	42·6 (35–59)	42·9 (28·7–81·0)	0·909
Weight (kg)†	125 (93–196)	123 (75–263)	0·348
Revisional procedure*	2 (3)	154 (2·6)	0·785§
Length of hospital stay (days)	13·3 (2–110)	1·7 (1–13)	< 0·001

Prof. Mario Musella

Fistola: Classificazione ed Inquadramento Clinico

Original article

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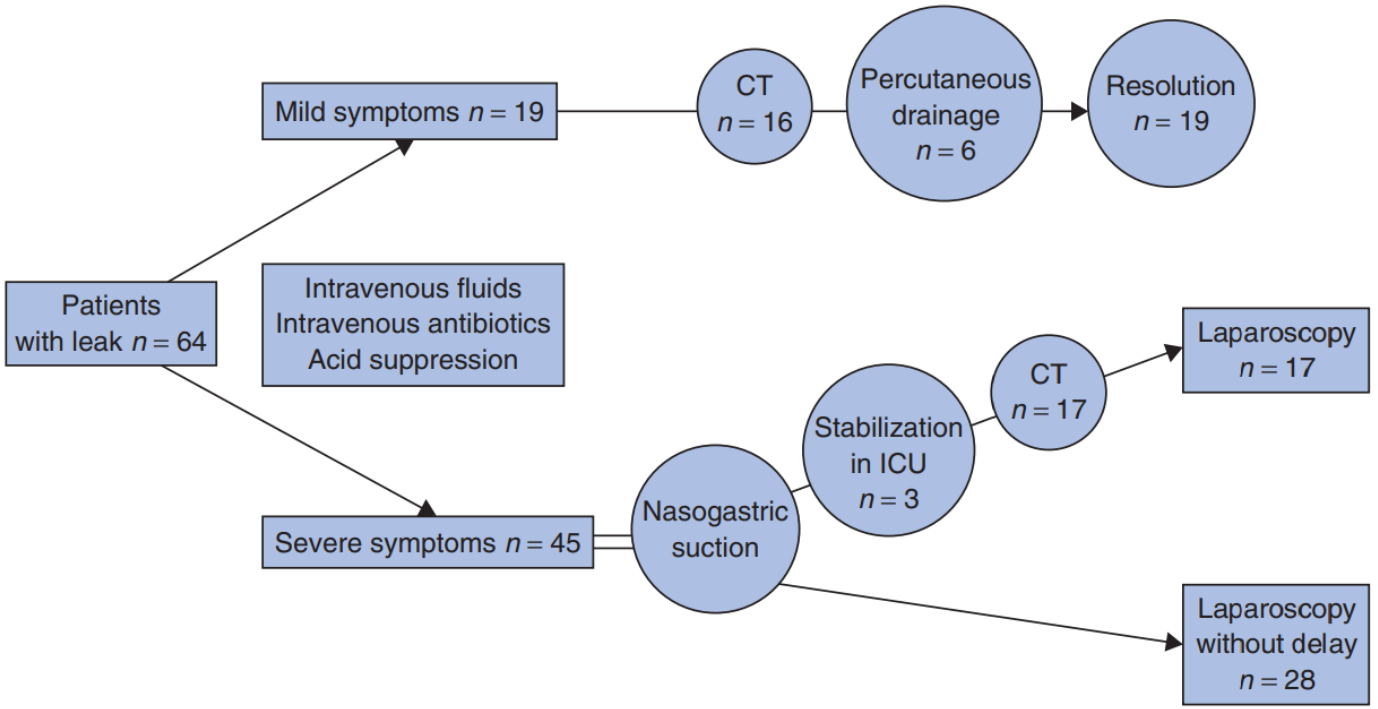

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OBES SURG (2017) 27:2956–2967
DOI 10.1007/s11695-017-2726-2

ORIGINAL PAPER

Complications Following the Mini/One Anastomosis Gastric Bypass (MGB/OAGB): a Multi-institutional Survey on 2678 Patients with a Mid-term (5 Years) Follow-up

Mario Musella[1] · Antonio Susa[2] · Emilio Manno[3] · Maurizio De Luca[4] · Francesco Greco[5] · Marco Raffaelli[6] · Stefano Cristiano[7] · Marco Milone[1] · Paolo Bianco[1] · Antonio Vilardi[2] · Ivana Damiano[3] · Gianni Segato[4] · Laura Pedretti[5] · Piero Giustacchini[6] · Domenico Fico[7] · Gastone Veroux[8] · Luigi Piazza[8]

Leaks following MGB/OAGB are especially dangerous due to the presence of both acidic and alkaline fluids.
By focusing our attention on this specific complication, it has to be highlighted that the leak rate in the early period in our series is 0.4%.

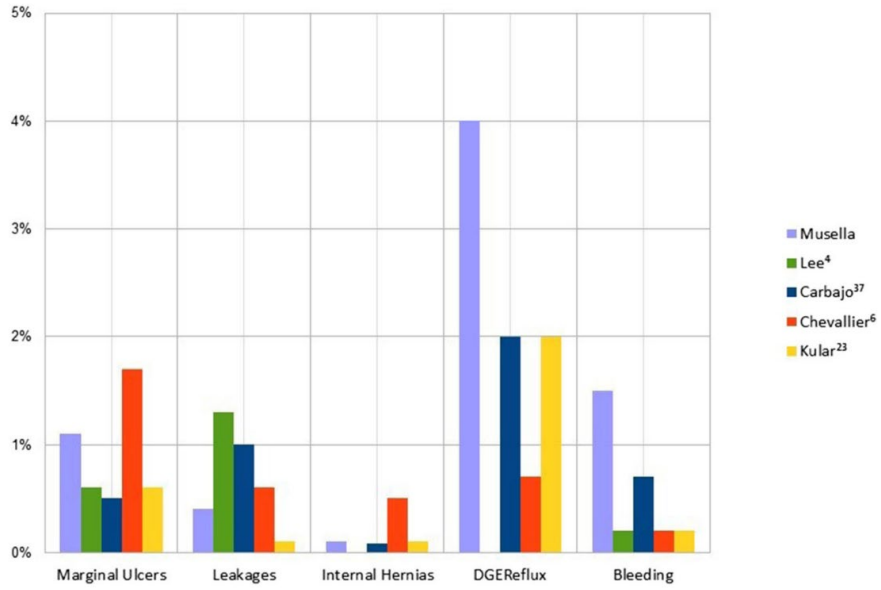

Table 3 Late complications rate and their management

Late complications	A	B	C	Treatment	Total	Percent
5 years FU	65	226	392		683/1091	62.6
Marginal ulcer	2	5	1	3—PPI treatment 4—laparoscopic repair 1—laparotomic repair	8	1.1
DGER	3[a] + 6	7[a] + 4	2[a] + (2)[a] + 4	9—RY laparoscopic conversion 3—Braun laparoscopic anastomosis 16—conservative treatment	14[a] + 14	4.0 (0.2)
Anastomotic stenosis	1	1	1	2—endoscopic balloon treatment 1—RY laparoscopic conversion	3	0.4
Steathorrea/excessive weight loss	1	3	1	2—conservative treatment 1—restaurative laparoscopic surgery 2—loop resizing	5	0.7
Internal hernias	0	0	(1)	1—laparoscopic repair	1	0.1
Gastric leak	0	0	1	1—conservative treatment	1	0.1
Weight regain	4 + (3)	3	1	4—laparoscopic pouch resizing 7—loop resizing	11	1.6
Anemia	0	8 + (4)	0	12—drug therapy	12	1.7
Total	20/65 30.7%	35/226 15.4%	14/392 3.5%	69	69/683	10.1

International Journal of Surgery Publish Ahead of Print
DOI:10.1097/JS9.0000000000000346

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MANAGEMENT OF LEAKS FOLLOWING ONE ANASTOMOSIS GASTRIC BY PASS: AN UPDATED SYSTEMATIC REVIEW AND META-ANALYSIS OF 44318 PATIENTS

Mohammad KERMANSARAVI [1 2], Radwan KASSIR [3 4], Rohollah VALIZADEH [5 6], Chetan PARMAR [7], Amir Hossein DAVARPANAH [5], Shahab Shahabi SHAHMIRI [6], Marine BENOIS [3]

There were 410 leaks reported in 44318 patients of OAGB published in the literature, which represents a prevalence of 1% of leaks after OAGB.

62.1% of patients with leaks had to undergo another surgery due to leak.

Medical treatment with antibiotics, with or without total parenteral nutrition alone was conducted in 13.6% patients.

The mortality rate related to leak was 1.95% and the mortality due to leak in the population of OAGB was 0.02%.

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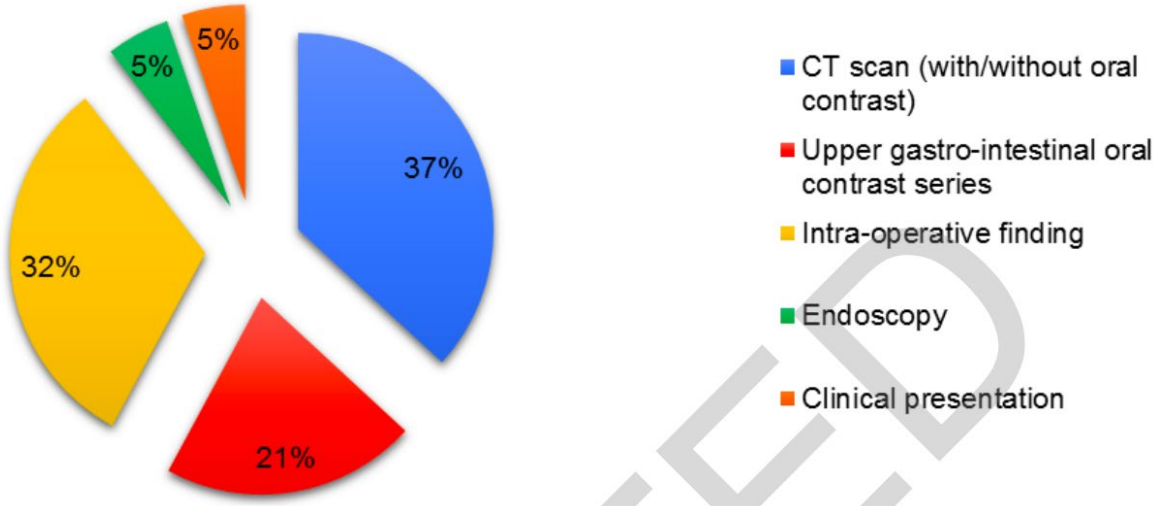
Figure 4: Diagnostic approach of leak after OAGB



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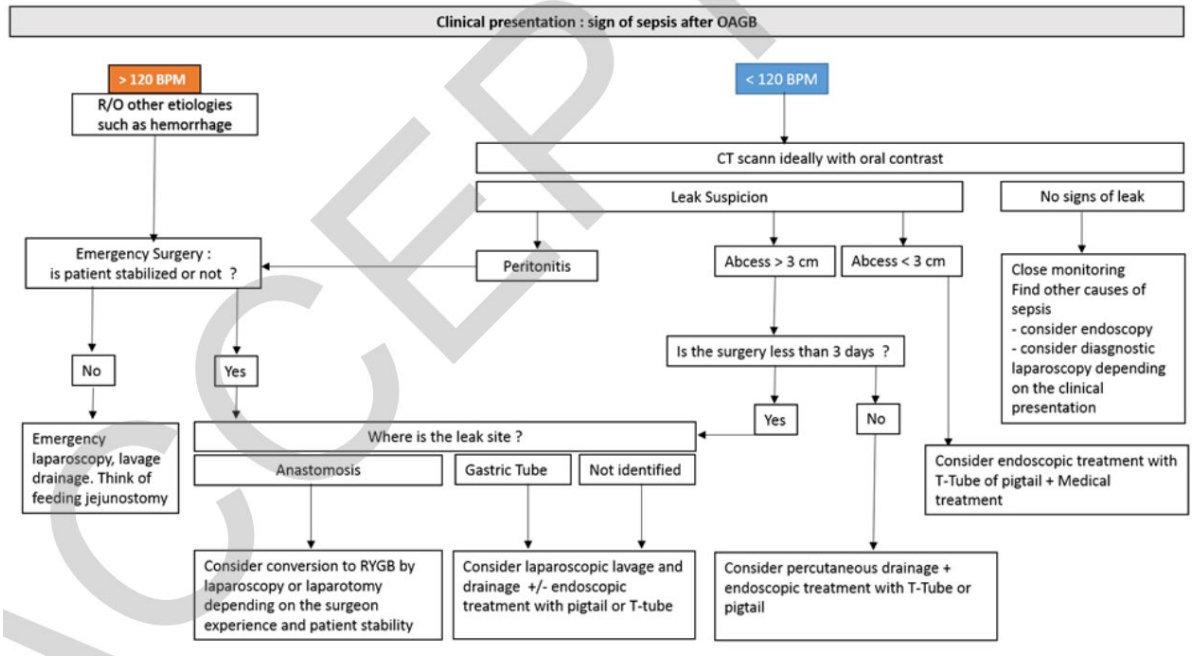
62.1% of patients with leaks had to undergo another surgery due to leak. The most commonly performed procedure was peritoneal washout and drainage (with or without t-Tube placement) in 30.8% patients, followed by conversion to RYGB in 9.6% patients.



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Management of Leak after Single Anastomosis Duodeno-Ileal Bypass with Sleeve Gastrectomy

Arturo Cirera de Tudela, MD,[1] Ramon Vilallonga, MD, PhD,[2,3] Elena Ruiz-Úcar, MD,[4] Jorge Pasquier, MD,[1]
José María Balibrea del Castillo, MD, PhD,[5] Anamaria Nedelcu, MS,[3]
José Manuel Fort, MD, PhD,[2] and Manuel Armengol Carrasco, MD, PhD[1]

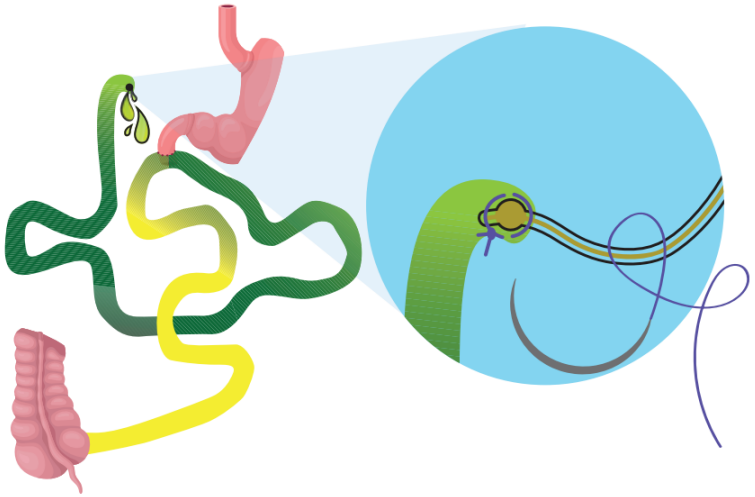

FIG. 1. The placement of a Foley probe to treat leak from the duodenal stump.

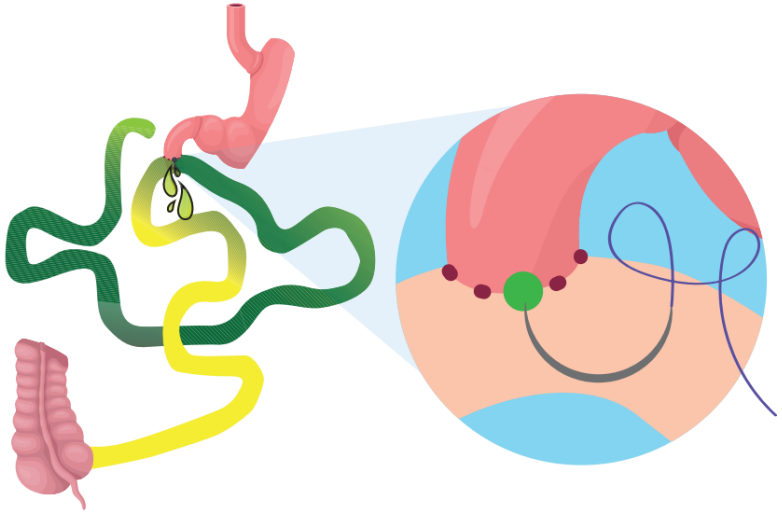

FIG. 2. A leak at the level of the duodeno-ileal anastomosis. Treatment is performed by a single stick suture.

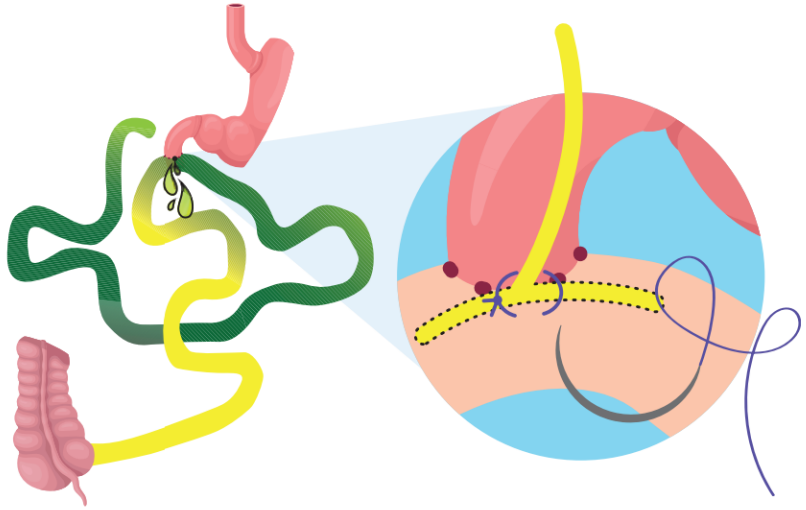

FIG. 3. A T-tube placement through the hole and simple suturing of the anastomosis.

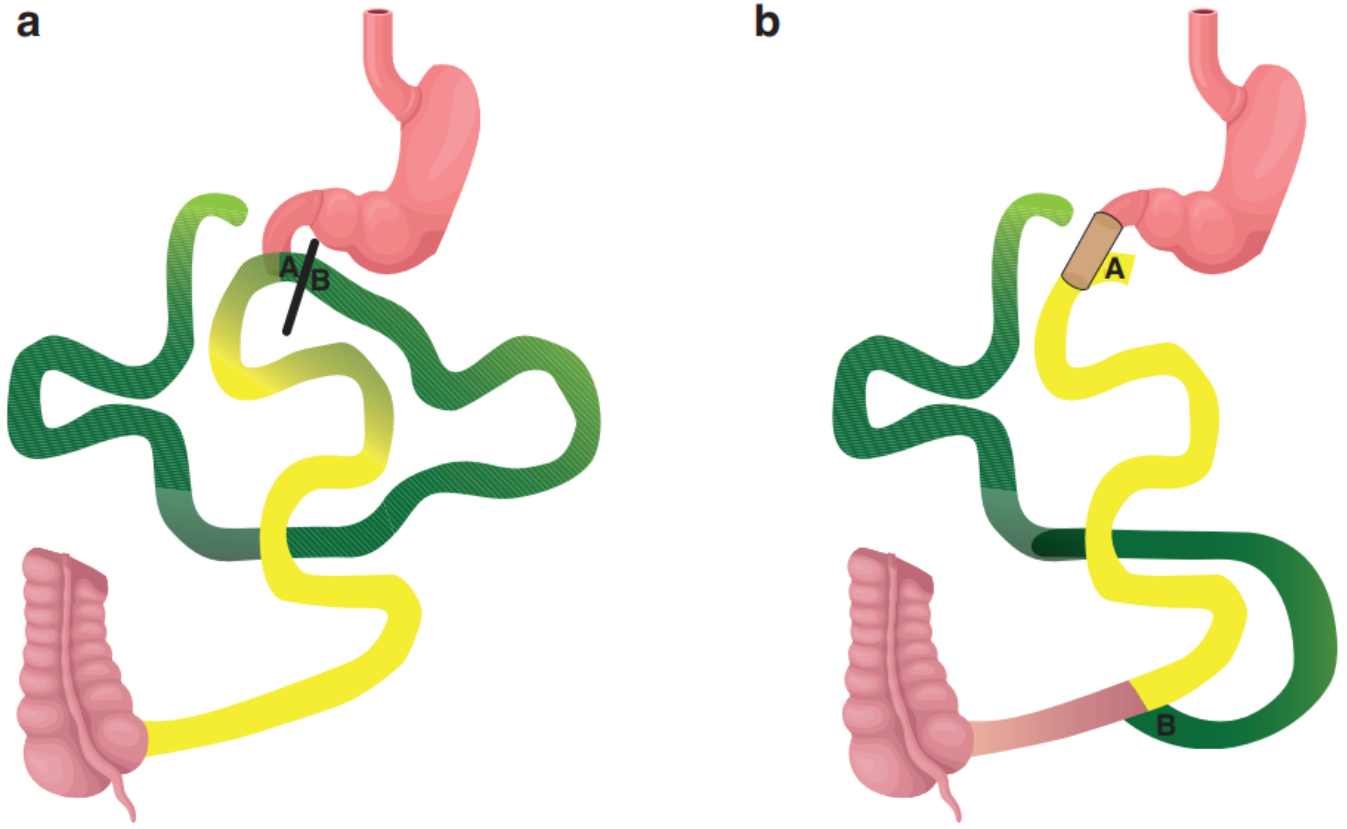

FIG. 4. The conversion of the single anastomosis duodeno-ileal bypass **(A, B)** with sleeve gastrectomy to a duodenal switch **(a)**, including a stent **(A)** placement **(b)**.

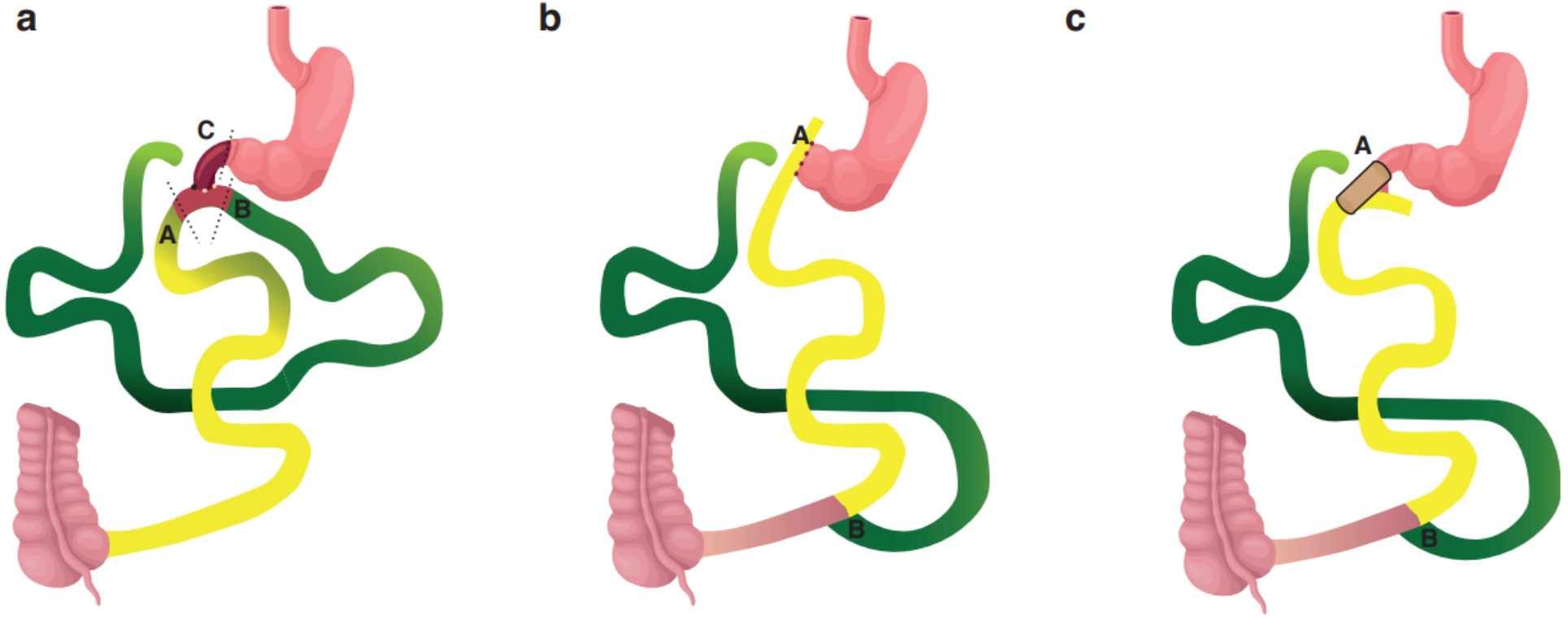

FIG. 5. A conversion to DS and a stent placement with resection of the anastomosis. A complete resection of the anastomosis **(A, B, C)** should be performed **(a)**. A complete DS confection **(A)** is done **(b)**. This conversion allows a stent **(A)** placement **(c)**. DS, duodenal switch.

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DYNAMIC MANUSCRIPT

Intraluminal indocyanine green for intraoperative staple line leak testing in bariatric surgery

Christopher L. Kalmar[1] · Christopher M. Reed[1] · Curtis L. Peery[2] · Arnold D. Salzberg[1]

Total of 59 patients underwent bariatric surgery with intraoperative leak testing using the intraluminal ICG method; of these, there was 1 true positive, 1 false positive, 0 false negatives, and 57 true negatives.

Indocyanine green leak testing had a sensitivity of 100.00% and specifcity of 98.28%

	RYGB	SG	Total		
Intraluminal ICG via orogastric bougie					
True positives	1	0	1	Sensitivity	100.00%
False positives	1	0	1	Specificity	98.28%
False negatives	0	0	0	Positive predictive value	50.00%
True negatives	28	29	57	Negative predictive value	100.00%
Gastroscopy with Insufflation					
True positives	0	0	0	Specificity	100.00%
False positives	0	0	0	Negative predictive value	98.47%
False negatives	2	1	3		
True negatives	117	76	193		

RYGB Roux-en-Y gastric bypass, *SG* Sleeve gastrectomy

Prof. Mario Musella

Fistola: Classificazione ed Inquadramento Clinico

See you in Naples!