Laparoscopic Reoperative Bariatric Surgery

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Introduction

According to ASMBS, 196,000 bariatric procedures were performed in 2015, 13.6% of which were reoperations. The 2016 statistics have been released and the number has slightly decreased to 9.9%. The rates among the different types of reoperations vary significantly based on the primary operations. The indications for reoperation vary as well, whether it originates from complications or nonresponders of the primary intervention (Table 39.1). The type of reoperation can be classified as revision, conversion, or reversal based on the anatomic result of the reoperation (Table 39.2). Nonetheless, a common strategy to approach these conditions can be identified. This chapter aims to discuss the perioperative and operative steps of laparoscopic reoperative bariatric surgery.

Preoperative Preparation

A meticulous and comprehensive clinical evaluation is essential, regardless of the primary operation. A thorough past medical and surgical history, with particular attention paid to the previous primary operation, is a paramount starting point. Mandatory, in this regard, is to obtain, when possible, all previous operative reports, preoperative assessments, and postoperative charts in order to acquire a rounded impression of the clinical and surgical history of the patient. Also, it is important to review the technical details such as previous surgical approach, dissection, resection and reconstruction techniques, materials used for stapling, and suturing and reinforcement of anastomosis and staple lines. The postoperative course and potential complications of the primary operation should also be known, as they can influence the reoperation choice and strategy. The clinical assessment should include a comprehensive physical examination with particular attention paid to specific potential signs of previous complications, such as abdominal tenderness (ulcers, abscess, or internal hernia), abdominal distention, discharge from previous wounds or a newly formed cutaneous fistula, signs of bleeding, or sepsis. The assessment should be completed with vital signs and full blood work.

A multidisciplinary team should evaluate patients in order to obtain medical clearance tailored to the previous existing comorbidities. As such, consultations with internal medicine, endocrinology, pulmonology, and cardiology services might be necessary. Also, a dietary and nutritional assessment is advised, since these patients could have been on total parenteral or enteral nutrition for long periods of time, and therefore, are expected to be malnourished in varying degrees. This is especially important to properly select patients for failure of weight loss or weight regain, as many of these failures are not attributable to anatomical derangements of the primary operation. Finally, a psychological/psychiatric evaluation is advised in order to rule out a potential reason of noncompliance.

Finally, it is essential to perform an extensive evaluation of the anatomy and function of the gastrointestinal tract. Investigations such as upper endoscopy, fluoroscopic gastrointestinal series, and CT scan will help understand the postsurgical anatomy, the presence of ulcers, fistulae or other complications, and the potential presence of prosthetic material in order to plan a feasible approach and choose the most reasonable type of reoperation.

Pitfalls and Danger Points

- Disrupted anatomy
- Presence of active foci of infection

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Table 39.1 Indications for reoperative surgery

Indications	*Failures*	Weight regain	Technical
		Nonresponders	Medical compliance
		Recurrence of comorbidities	Metabolic
	Complications	Time of onset	Acute (<7 days)
			Early (7 days–6 weeks)
			Late (6–12 weeks)
			Chronic (>12 weeks)
		Type	Surgical or anatomical
			Nutritional or metabolic

Table 39.2 Types of reoperations

Type of procedures	
Revision	Maintains the basic anatomy of the primary procedure
Conversion	Change of the anatomy to a different operation
Reversal	Restore original anatomy

- Scarred tissue (consider higher staple height, and over sawing suture lines)
- Areas of local ischemia
- Dense adhesions
- Intraoperative and postoperative bleeding
- Poor tissue quality for new anastomosis

Documentation

Given the reoperative nature of the procedure, a brief summary of the primary intervention should be mentioned in the operative note, along with the indication for surgery, preoperative assessment, and imaging.

Every step should be thoroughly described, especially the findings related to the reoperative nature of the procedure. It is important to document the length of intestine bypassed and remaining, in case of gastric bypass. The presence and complete removal of foreign bodies should be also documented.

In case an anastomosis is created, it is important to describe the type and the materials used, such as staple height and/or sutures. Any drain placed should be mentioned.

Operative Strategy

Preoperative Preparation

Bowel preparation is done the day before surgery with mild laxatives and a clear liquid diet. Standard antibiotic and deep venous thrombosis prophylaxis should be implemented.

The patient is positioned supine on the OR table with arms out. Properly pad all pressure points and securely strap the patient to the table. Take care with these steps to avoid neurological pressure injuries and upper extremity overextension.

Abdominal Entry and Initial Exposure

The laparoscopic approach is usually preferred; however, a conversion to a midline laparotomy should be performed whenever safe maneuvers cannot be achieved laparoscopically.

According to the type of intervention, the operative strategy may vary, but we can identify three main steps that should be performed in every reoperative bariatric surgery. In general, gasless supraumbilical optical trocar entry can be safely used. Obviously the presence of previous laparotomy incision, meshes, or previous extensive surgery might require an alternative technique of entry, such us open (Hasson) approach, or a subcostal optical entry. After having safely positioned the first trocar, exploration of the abdomen is carried out in order to choose a safe position for the remaining additional trocars and their insertion under direct visualization.

Adhesiolysis

Due to the reoperative nature of the procedure, adhesions are expected and vary significantly in amount, tenacity, and vascularity. This is often a limiting step in the ability to complete the procedure laparoscopically. The first step is a thorough, sharp adhesiolysis, followed by hemostasis. Energy devices can be safely used in the absence of viscera within the adhesions. Omentoparietal and enteroparietal adhesions should be taken down at least in the supramesocolic area of the abdomen, although an extension to the inframesocolic area may be needed along with a viscerolysis when a Roux-en-Y bypass is sought.

Left Liver Lobe Mobilization

In order to reach a satisfactory exposure of the gastroesophageal junction, the left liver lobe has to be cranially retracted; however, this maneuver is often not possible due to dense adhesions and fibrotic tissue secondary to inflammatory processes involving the area. The adhesions can be dense enough that, in order to avoid gastric or bowel injury, sometimes the dissection has to be carried out within the liver subcapsular space.

Diaphragmatic Hiatus Exposure

Regardless of the type of reoperation planned, the gastro-esophageal junction has to be exposed and mobilized circumferentially. It is imperative that the dissection starts on the lesser curve of the stomach dividing the pars flaccida and pars densa if intact and clearly identifying and dissecting the right crus of the diaphragm. That gives the surgeon situational awareness of major vascular structures, such as IVC and aorta as well as the esophagus. Dissecting the right crus and identifying the left gastric artery may be considered the "Achilles heel" of a reoperation.

The dissection may be extended voluntarily (in case an esophagojejunostomy is planned) or accidentally through the mediastinum; therefore, the surrounding structures have to be respected, such as the aorta posteriorly, the pleura laterally, and the pericardium anteriorly. In the presence of a known or intraoperatively discovered hiatal hernia, posterior approximation of the crura is advised in order to avoid postoperative herniations and to decrease the potential for gastroesophageal reflux.

Avoiding Postoperative Complications

Tactics to reduce postoperative complications include the following:

- Thorough hemostasis, since inflammatory tissue is more prone to bleed
- Resection of any potentially ischemic tissue that can evolve to necrotic and infected areas
- Staple line reinforcement, either by oversewing or buttressing the stapler line, in order to reduce the risk of bleedings and leaks
- Air leak test, either endoscopically or with a gastric tube
- Positioning closed suction drainage to allow any discharge to drain out of healing tissues
- Primary hiatal hernia closure/crura approximation to avoid postoperative herniation

Another aspect that has to be taken into consideration is surgeon's experience, which has been correlated with better outcomes in all surgical fields. It is therefore advisable to refer this type of patients to expert surgeons.

Operative Technique (Step by Step)

Patient Positioning and Trocar Placement

As previously mentioned, place the patient supine with the arms abducted and padded on an armboard. Achieve initial entry by placing a 12-mm trocar through an open Hasson technique at the level of the umbilicus. If the previous scar is well healed, an optical trocar may be used. Alternatively a left upper quadrant gasless optical trocar entry is advised. Insert six additional operative trocars under direct vision: 12 mm in epigastrium, 5 mm subxiphoid, 12 mm right upper quadrant, 12 mm right paramedian middle quadrant, 12 mm left upper quadrant, and 5 mm left flank (Fig. 39.1). This configuration allows excellent visualization and dexterity during all the steps of the surgery, from dissecting the liver attachments to manipulating the gastroesophageal junction.

The surgeon stands on the patient's right side, the second camera assistant to the surgeon's right, and the first assistant to the patient's left side. Two monitors should be placed at each side of the patient at the head level.

Exploration

Begin the procedure with a meticulous exploration of the entire abdomen in order to evaluate the amount and quality of adhesions and the presence of undiagnosed fluid collections. At this point, decide whether to proceed laparoscopically or convert to open, to ensure patient safety.

Fig. 39.1

Critical Anatomy Exposure

Using traction and counter traction, expose adhesions and take the omentum or small bowel off the anterior abdominal wall. Identify the dissection plane, not entering the preperitoneal space (Fig. 39.2).

The presence of multiple trocars allows one to visualize the adhesions from different angles to ensure the best and safest approach.

We recommend performing adhesiolysis using a sharp technique in order to avoid any possible delayed burn injuries to the bowel; energy devices should be used only when nearby bowel is not present. Take down the omental-parietal and enteroparietal attachments at least in the supramesocolic space, to reach an adequate exposure of the liver and the gastroesophageal junction. If a bypass is planned, perform small bowel adhesiolysis to ensure adequate length for a tension-free anastomosis.
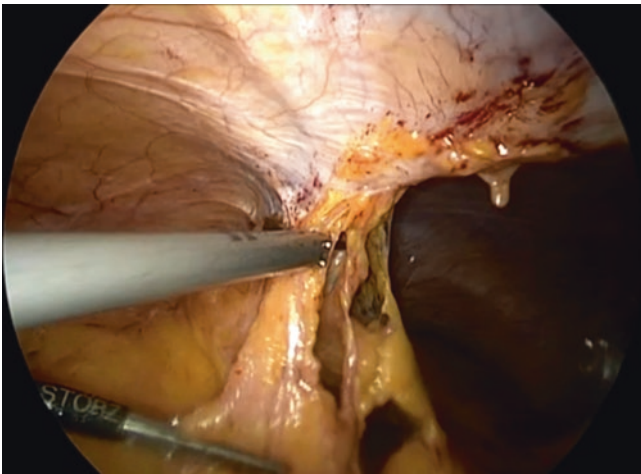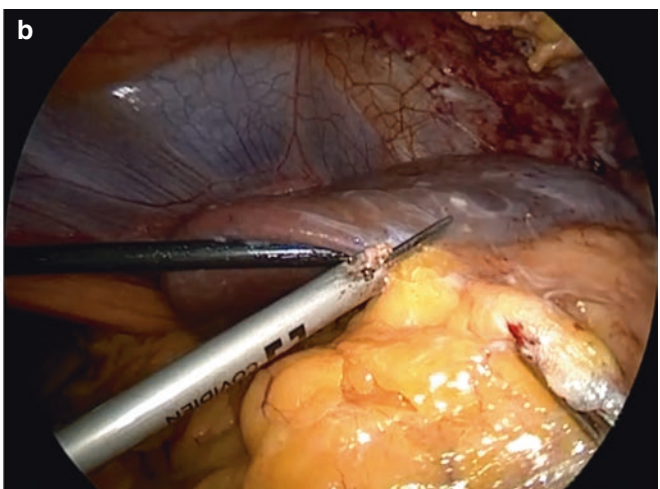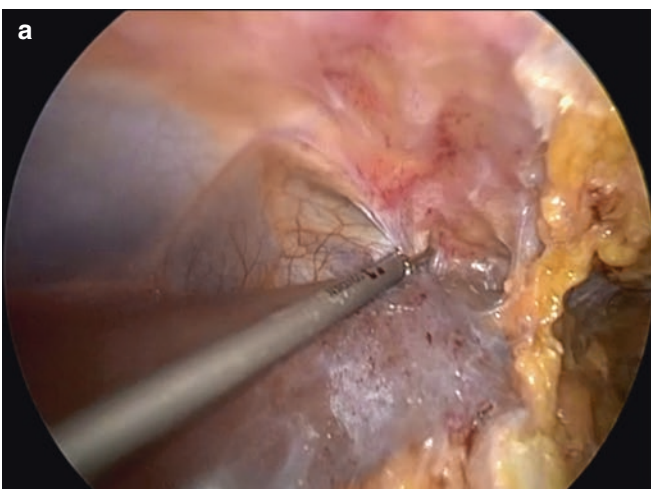

Fig. 39.2

When the supramesocolic space is free of adhesions, mobilize the left liver lobe.

Often the dissection has to be performed along both the superior and inferior surface of the liver. When dissecting along the superior aspect, take care not to injure the diaphragm (Fig. 39.3a). Sometimes the superior adhesions aid in maintaining cephalad retraction of the left lobe of the liver, and thus, it may be advantageous to leave these intact. Along the inferior aspect, avoid gastric and vascular injuries. Next, attain thorough liver hemostasis.

Once the left liver lobe is mobilized, retract it cranially with a liver retractor inserted through the subxiphoid port and secured to the table (Figs. 39.3 and 39.4).

Gastroesophageal Junction Mobilization

At this point, the dissection should proceed to the gastroesophageal junction in order to clarify the anatomy and identify structures like the intra-abdominal esophagus, the aorta, and vena cava.

However, a direct approach to the esophagus may end in a perforation; therefore, it is safer to expose the right crus of the diaphragm as this will allow entrance into the retroesophageal space. The dissection can then be continued between the aorta and the esophagus. The muscular fibers of the right crura should be clearly exposed and the dissection should move slightly toward the arch.

In order to safely create a retroesophageal tunnel, bluntly advance an atraumatic grasper just across the right crus (Fig. 39.5).

During these steps, take care not to grasp the esophagus as it may result in perforation or damage to the vagus nerves. Instead, gently manipulate it with a closed grasper.
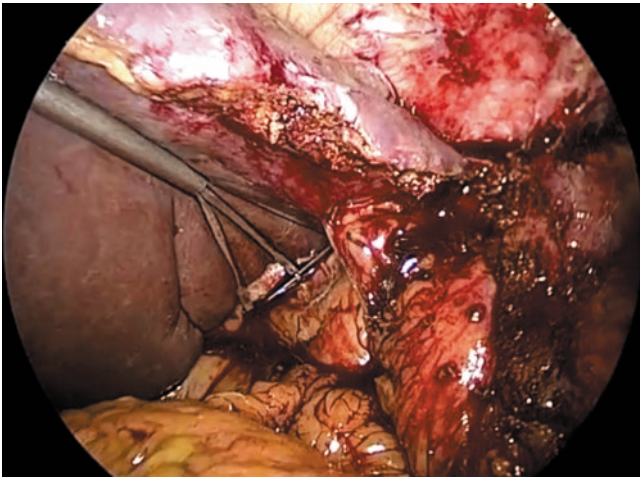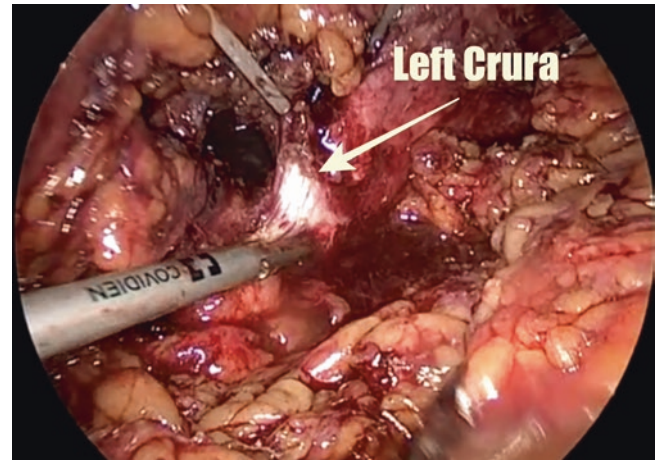

Fig. 39.3
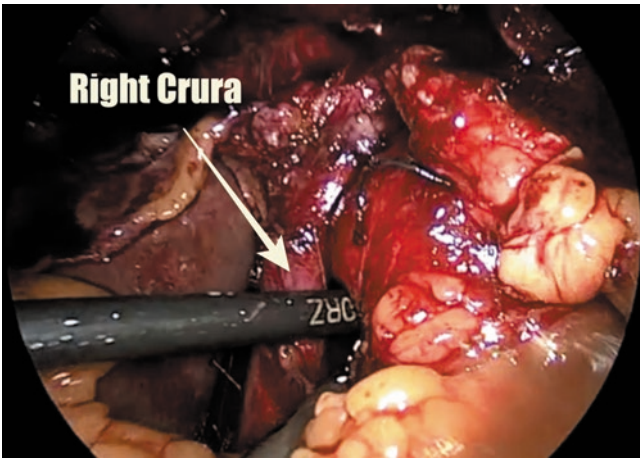
Fig. 39.4

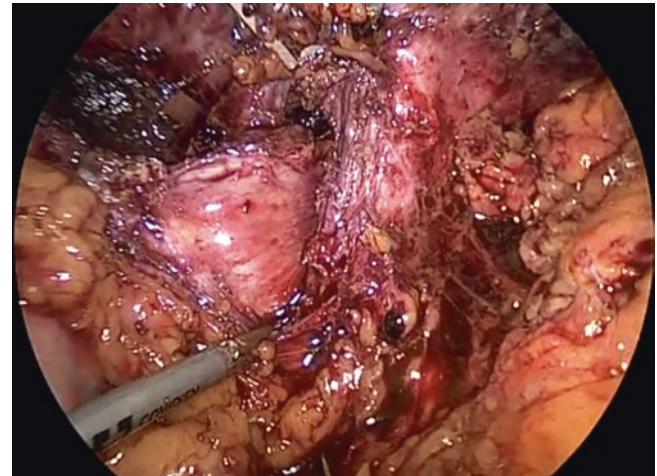**Fig. 39.6**

Fig. 39.5

Fig. 39.7

Intraoperative endoscopies or calibrating tubes can also aid in the recognition and preservation of the gastroesophageal junction, which may be difficult to recognize laparoscopically.

Then continue blunt dissection of the gastroesophageal junction, moving laterally and behind the esophagus. For this purpose, gently retract the esophagus anteriorly with an umbilical tape or a Penrose drain placed around the distal esophagus. This will allow a better visualization of a safe dissection plane between the esophagus and the preaortic fascia.

When a retroesophageal window has been created, the left crus is dissected and exposed (Fig. 39.6).

When dissecting and manipulating the gastroesophageal junction, identification and preservation of the anterior and posterior branches of the vagus nerve may be difficult, and sometimes these must be sacrificed in order to mobilize the esophagus for further maneuvers.

After a complete mobilization of the gastroesophageal junction, evaluate the hiatus for any potential hiatal hernia, and perform a primary repair. This can be achieved with interrupted stitches or with a continuous barbed suture posteriorly.

The following steps depend on what the primary intervention was and the strategy that the surgeon decided to adopt (Fig. 39.7).

Types of Reoperations

As already mentioned, the specific type of reoperation varies depending on several factors.

Regarding purely a revision procedure, where the anatomy of the primary intervention is maintained, most common examples are pouch trimming, redo of the gastrojejunal anastomosis due to stricture and resection of gastrogastric fistula after gastric bypass, and "re-sleeve."
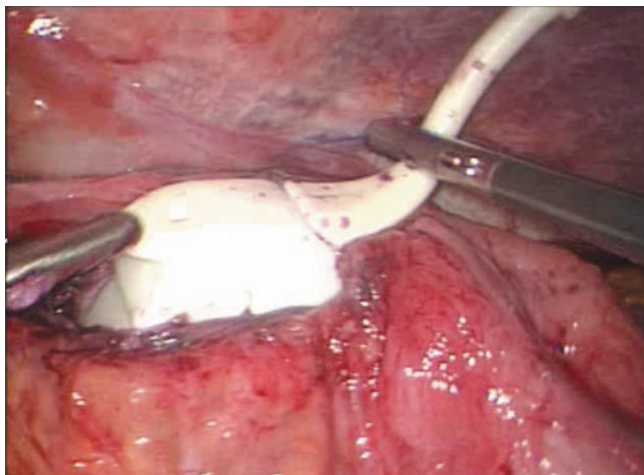
Fig. 39.8

The most common conversion procedures are instead the following:

- Adjustable gastric band to sleeve gastrectomy or gastric bypass: this kind of conversion can be achieved in one or two steps, according to the surgeon's confidence and gastroesophageal tissue scarring. If performed in one stage, the main steps of this reoperation are: dissection of the anterior capsule to both diaphragmatic cruces, takedown of the wrap, band removal and posterior capsule dissection, and stapling according to the procedure previously established.
- Sleeve gastrectomy to gastric bypass: the most common reason for this type of conversion is a new onset of drug-refractory gastroesophageal reflux disease. It is imperative to identify the left gastric artery during the dissection and staple below its entrance into the lesser curvature when creating the pouch.
- Vertical banded gastroplasty to gastric bypass: it can be performed either with or without remnant gastrectomy. Our advice is to perform a simultaneous remnant gastrectomy in order to avoid possible leaks. It is also advisable to maintain the left gastric artery when creating the pouch.

Reversals usually consist of restoring the normal anatomy, due to nutritional or metabolic complications, unless a permanent removal of an organ was performed, such as in sleeve gastrectomy.

A frequent reversal procedure is the removal of an adjustable gastric band. In this particular case, basic steps are: identify the capsule of scarred tissue surrounding the band and the buckle; then carefully proceed to perform a capsulectomy, avoiding injury to the plicated stomach; once the band is exposed, cut it at the level of the buckle and carefully remove it (Fig. 39.8).

Take care in removing all the components of the band, including the connecting tube and the subcutaneous port.

Another described reversal procedure is from gastric bypass, named "SARR procedure" (single-anastomosis reversal of gastric bypass), usually performed because of postgastric bypass dumping syndrome and hypoglycemia. This procedure maintains the restrictive action of the gastric pouch, though restoring the function of the remnant stomach and duodenum, reducing the malabsorptive aspect of the gastric bypass.

Postoperative Care

Standard adequate fluid resuscitation and pain control are advised in the postoperative period. Antibiotic and deep venous thrombosis prophylaxis should be continued as needed, especially if an intra-abdominal infection was found during the intervention.

Since the most frequent and feared acute complications of reoperative surgery are bleeding and leaks, particular emphasis should be put on monitoring the patient's specific symptoms and signs. Heart monitoring is paramount because either complication usually presents with an alteration of the basal heart rate. More specifically, since abdominal symptoms may be underexpressed due to pain control and obesity, an early sign of a leak is often a rapid increase in heart rate, resistant to beta-blockers, and stable, without oscillations. An acute bleed is conversely characterized by an oscillatory increase in heart rate, responsive to fluid resuscitation and beta-blockers.

On postoperative Day 1, an upper GI evaluation can be performed to rule out any leak and consequently allow the patient to start a liquid diet. Depending on the extent of the surgery, the approach used (laparoscopic or open), and patient compliance, the discharge timing may vary according to surgeon's judgment. An enhanced recovery after surgery (ERAS) protocol is not usually adopted due to the nonelective nature of the intervention.

Complications

The complications arising from reoperative bariatric surgery can substantially resemble the complications expected after a primary procedure. However, it should be emphasized that reoperative surgery "pays a price" and the morbidity of these procedures is higher, with series reporting an incidence up to 33%.

Based on the onset time, complications can be described as acute, early, late, and chronic, as listed under "Complications" in Table 39.1.

We can include in the acute/early complications:

- Leaks, either from an anastomosis or from a staple line.
- Bleeding: further divided into intraluminal or intra-abdominal, depending on the source and presenting with different and misleading symptoms. The first (intraluminal) usually manifested with hematemesis or melena, the latter (intra-abdominal) with increased drainage output and hemorrhagic symptoms such as abdominal distension and peritoneal signs.
- Bile leaks can occur after extensive dissection of the liver off the stomach. Often they are not recognized intraoperatively and become evident in the first few days postoperatively.
- Medical complications such as pulmonary embolism and/or deep vein thrombosis are also to be kept in mind in differentiating the origin of tachycardia.

Late/chronic complications include the following:

- Fistulas: depending on the type of reoperation, they can develop after an acute leak or are discovered during routine exams; they usually present with weight regain or nonspecific epigastric symptoms.
- Strictures: can occur at the level of the gastrojejunal anastomosis in the gastric bypass, or at the level of the incisura angularis in the sleeve gastrectomy, usually when the stapler has been applied too close to the lesser curvature of the stomach. Worsening acid reflux (GERD) can be seen in patients after sleeve gastrectomy or bypass with short alimentary limbs.

Further Reading

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