Tissue Reinforcement in Bariatric Surgery

An Interview With:

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Introduction

Bruno Dillemans, MD was introduced to the Duet TRS™ Reload system in July 2008 at Covidien's European training center, Elancourt. He received thorough training with the instruments before participating in a clinical evaluation. "We [went through] not only theoretical and skillful lessons, but also went on to use the instrument on animals, in the wet lab at Elancourt," he said.

From the beginning, it was clear to Dr. Dillemans that the Duet TRS™ Reload had an advantage over other systems in terms of ease of use. Connecting it to the firing instrument is no issue," he said. His surgical team also has been pleased with the simplicity of the Duet TRS™ Reload (Figure 1). They see it as important in comparison with what we have seen in the past," he reported. "The box has to be opened, they take out the cartridge, and put it on the firing instrument."

After the training at Elancourt, Dr. Dillemans participated in a clinical evaluation in December 2008. "We used it [the Duet TRS™ Reload] in a sort of clinical premarket trial and I have to say we were very pleased," he noted.

There is a slight increase in the amount of material being stapled to the tissue, so a slight increase in firing force is to be expected. However, when compared with using no reinforcement, the increase was minimal. "It is limited, not out of control," he said. Sometimes tissue slippage occurs, and due to the initial hydrophobic nature of the synthetic material, a grasper is sometimes required to help position the tissue and provide gentle proximal traction when deploying staples. "The surface of the tissue-reinforced staplers is a bit slippery, and we have encountered the possibility of tissue slipping out of the Duet TRS™ Reload—mainly in the stomach or small bowel," Dr. Dillemans said. In addition to the ease with which the Duet TRS™ Reload is assembled, the quality of the transection "looks great and is very clean," Dr. Dillemans said.

By June 2009, Dr. Dillemans and his team had used the Duet TRS™ Reload on 25 patients undergoing gastric bypass surgery and 4 patients who received a gastric sleeve, and they continue to use Duet TRS™ Reload in appropriate situations. At this point, Dr. Dillemans, his colleagues, and the hospital have been discussing the most appropriate applications for the Duet TRS™ Reload.

Nonetheless, Dr. Dillemans is starting to use Duet TRS™ Reload in a more standardized, systematic way for bariatric conversion surgeries—usually for patients converting to gastric bypass. Dr. Dillemans believes that the Duet TRS™ Reload will be of benefit in other bariatric procedures—such as creation of the gastric sleeve—"because there you have a very long transection line."

Figure 1. Duet TRS™ 3.5mm Reload.

Laparoscopic Gastric Bypass With Duet TRS™ Reload and Endo GIA™ Reload with Endo GIA™ Universal

Patient Positioning and Trocar Placement

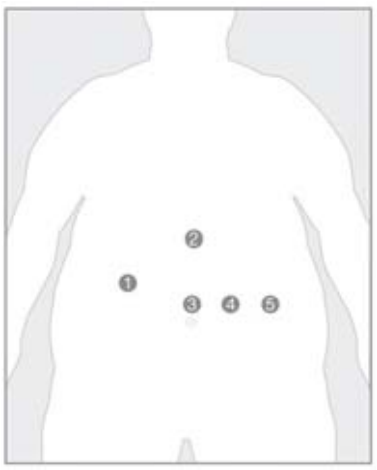
The patient is placed in the supine, reverse Trendelenburg split-leg position with hips flexed to maximize the abdominal surgical workspace. The surgeon stands between the patient's legs, a video monitor is placed to the left of the patient's head, and a 30-degree angle scope is used. The patient's abdomen is insufflated with CO_2 via Veress needle, and intra-abdominal pressure is maintained at 15 mm Hg.

Dr. Dillemans' team places 5 ports: one 10mm port that is from 10 to 15cm below the xiphoid process, one 5mm port high epigastric on the midline, one 12mm port in the upper right quadrant above the line of the 10mm port, and two 12mm ports in the upper-left quadrant on the same line as the 10mm port (Figure 2).

Creation of the Gastric Pouch

A small window between the lesser omentum and the lesser curvature of the stomach is created in order to enter the lesser sac 5 to 6cm below the gastroesophageal junction (Figure 3A). The Endo GIA™ Universal Stapler system with Duet TRS™ Reload—usually loaded with a blue 60mm, 3.5mm stapler—is then introduced through this window and the stomach is cut horizontally over a distance of 50mm (Figure 3B). A second, linear, 60mm, 3.5mm stapler is then introduced to vertically transect the stomach, using a 34 Fr bougie as a guide (Figure 3C).

The next steps concern the dissection



Trocars	Instruments
1 (12mm)	Liver retractor, grasper, laparoscopic linear stapler
2 (5mm)	Grasper
3 (10mm)	Scope
4 (12mm)	Hand instruments, ultrasonic instrument, laparoscopic linear stapler
5 (12mm)	Hand instruments, laparoscopic linear stapler, circular stapler

Figure 2. Trocar placement in laparoscopic gastric bypass.

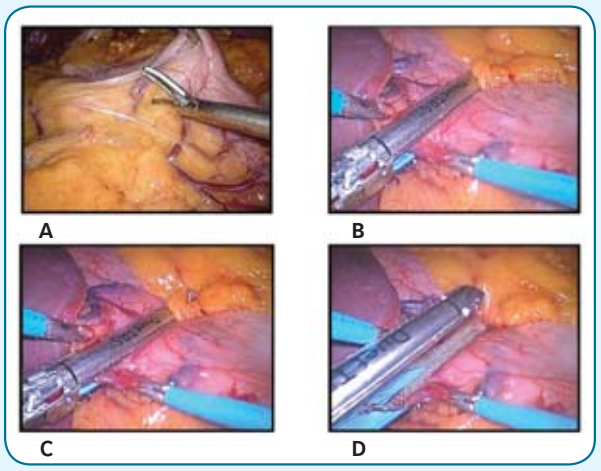


Figure 3. Transection of the stomach and creation of the gastric pouch with a (blue) 3.5mm Duet TRS™ Reload.

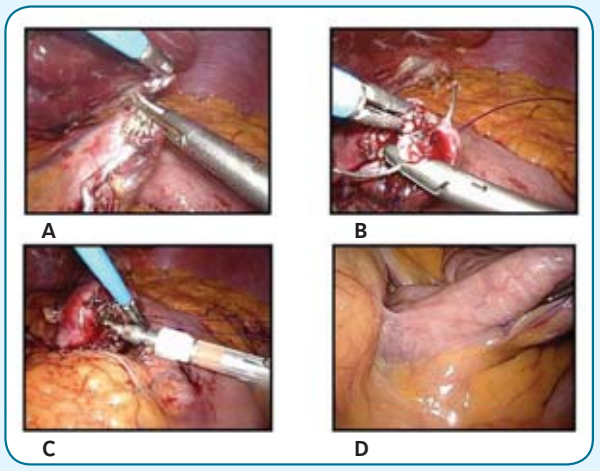


Figure 4. Creation of the gastrojejunostomy.

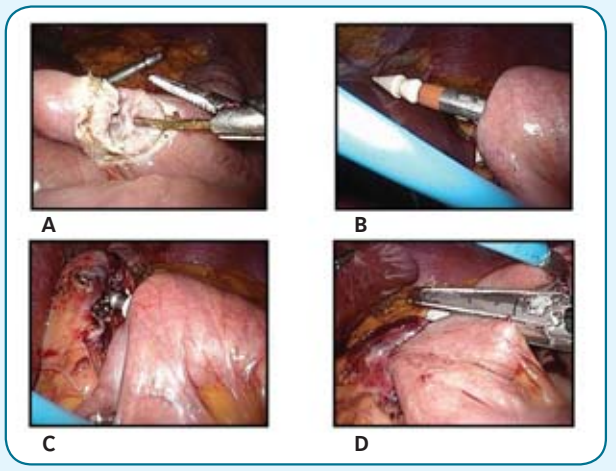


Figure 5. Anastomosis via transection with an Endo GIA™ (white) 2.5mm Reload.

and creation of an opening at the angle of His. Posterior to the stomach, a complete dissection creates a window at the angle of His. The pouch is completed via vertical firing of 1 to 2 additional 60mm cartridges in the direction of and through this window, along the gastric tube (Figure 3D).

Creation of the Gastrojejunostomy

A small opening is then made in the lower left corner of the pouch. The opening is stretched and sewn with a purse-string suture using absorbable monofilament (Figure 4A, 4B). A 25mm single-use stapler (Premium Plus CEEA™, Covidien) is introduced via the farthest left lateral, manually dilated trocar opening, and the anvil is brought into the gastric pouch and tied with a purse-string suture (Figure 4C). The greater omentum is then lifted and divided to the left side of the transverse colon.

Next, the ligament of Treitz is identified and a loop of jejunum is pulled antecolically from this point to the gastric pouch (Figure 4D). An enterotomy is created between 30 and 50cm from the ligament of Treitz, and the Premium Plus CEEA is introduced over 5 to 6cm in the jejunal loop in the distal direction via the enterotomy. The jejunum is then perforated—under slight traction—with the spike. The spike is removed and the stapler is connected to the anvil (Figure 5A-5C). The instrument is fired, completing the anastomosis. The remaining small bowel loop is transected via its prior opening 1cm proximal to the gastrojejunostomy using a linear stapler with a 60mm, white cartridge to avoid leaving a long blind loop of jejunum (Figure 5D).

Creation of the Jejunojejunostomy

The standard length of the alimentary limb is approximately 130cm. In patients with a body mass index greater than 50 kg/m^2, Dr. Dillemans measures 200cm, where an antimesenteric opening in both the alimentary and the biliopancreatic limbs is then created. A 60mm stapler with a white cartridge is introduced to both openings in order to establish a side-to-side anastomosis (Figure 6A, 6B). The resulting enterotomy defect is then lifted with 3 holding stitches and closed longitudinally with a similar stapler (Figure 6C). In the final step, the remaining blind loop of the biliopancreatic limb is transected with a linear stapler and that piece of bowel is removed (Figure 6D).

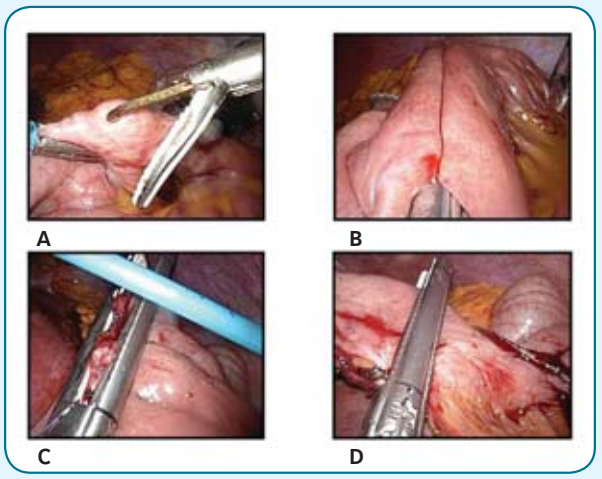


Figure 6. Creation of the jejunojejunostomy and transection of the biliopancreatic limb with an Endo GIA™ (white) 2.5mm Reload.

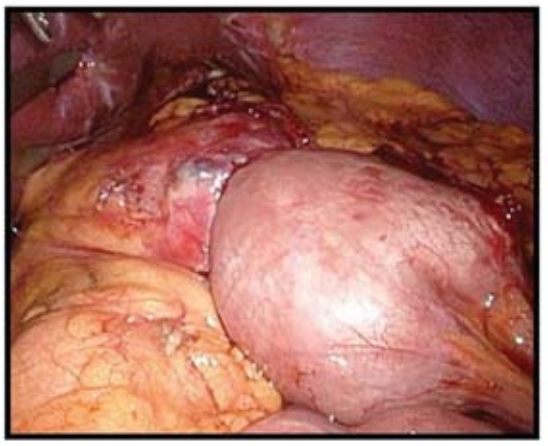


Figure 7. Inspection of the anastomotic staple line.

Testing the Gastrojejunostomy

To test for leaks, the team forcefully injects methylene blue through the orogastric tube at the level of the gastrojejunostomy anastomosis (Figure 7). If necessary, the gastrojejunostomy is reinforced with additional absorbable monofilament sutures. To guard against postoperative bleeding, all staple lines are inspected under elevated systolic arterial pressure—greater than 140mm Hg.

Finally, the team closes the left lateral trocar port site—which was enlarged to introduce the Premium Plus CEEA™—with the help of the Endo Close™ Trocar Site Closure Device (Covidien, USA).

Suggested Reading

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3. Nguyen N, Longoria M, Webourne S, Sabio A, Wilson S. Glycolide copolymer staple-line reinforcement reduces staple site bleeding during laparoscopic gastric bypass: a prospective randomized trial. *Arch Surg*. 2005;140(8):773-778.
4. Shikora SA, Kim JJ, Tarnoff ME. Reinforcing gastric staple lines with bovine pericardial strips may decrease the likelihood of gastric leak after laparoscopic Roux-en-Y gastric bypass. *Obes Surg*. 2003;13:37-44.
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6. Angrisani L, Lorenzo M, Borrelli V, Ciannella M, Bassi UA, Scarano P. The use of bovine pericardial strips on linear stapler to reduce extraluminal bleeding during laparoscopic gastric bypass: prospective randomized clinical trial. *Obes Surg*. 2004;14:1198-1202.
7. Miller KA, Pump A. Use of bioabsorbable staple reinforcement material in gastric bypass: a prospective randomized trial. *Surg Obes Relat Dis*. 2007;3:417-422.
8. Jimenez RE, Mavanur A, Macaulay WP. Staple line reinforcement reduces postoperative pancreatic stump leak after distal pancreatectomy. *J Gastrointest Surg*. 2007;11:345-349.

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