

Use of the barbed suture (V-loc™) in the laparoscopic gastroyeyunal by-pass: experience in 354 intervened patients

Homero Beltrán-Herrera¹, Manuel Laguna-Sastre¹⁻², Karina Maiocchi¹, Miguel Ibañez¹, Laura Granel¹, Raquel Queralt¹, Javier Escrig-Sos¹⁻².

* 1 Department of General Surgery and Digestive Diseases. Castellón General University Hospital (Spain).

* 2 Associate Professor. Jaime I University of Castellón (Spain).

E-mail: homerobel@hotmail.com

Received (first version): August 21, 2020

Accepted: January 04, 2021

Published online: March 2021

Abstract:

Introduction: The barbed suture is a device developed in recent years to simplify the intracorporeal suture and improve safety in laparoscopic surgery. We describe our experience in the use of V-Loc™ in Laparoscopic Roux-en-Y gastric bypass (LRYGB). This suture has been used for the closure of enterotomy after mechanical lateral J-J anastomosis (bile limb-alimentary limb), for the closure of the mesenteric defect and, occasionally, for the closure of the Petersen space. It is presented as an observational study from 2012 to 2019 with the results of 354 patients undergoing bypass.

Objective: To evaluate the safety of this type of suture by demonstrating the absence of leakage, bleeding, stenosis or other complications associated with its use in bariatric laparoscopic surgery.

Material and Methods: Between June 2012 and July 2019, a total of 746 bariatric surgeries were performed in our unit. Of all of them, 354 corresponded to bypass in which barbed suture (V-Loc™ 3-0 6 "15cm, non-absorbable Polybutester (PBT), Covidien™) was used in different phases of surgery. The results of the series are analyzed retrospectively.

Results: Of the 354 surgical procedures performed, only one case underwent urgent laparoscopic examination within the next 24 hours after surgery due to a defect in the closure of enterotomy in the J-J anastomosis. There were no short-term or long-term postoperative complications in the rest of the patients operated on.

Conclusion: The use of V-Loc™ is safe, effective and reproducible applied to bariatric surgery, especially LRYGB.

Keywords:

- Barbed Suture
- Bariatric Surgery
- Laparoscopic Anastomosis
- GYB
- V-Loc™

Introduction

Bariatric surgery has shown to be the most effective long-term method for treating morbid obesity. Laparoscopic gastro-jejunal bypass (LGBP) is a technique that, used in bariatric surgery, has achieved optimal results compared to other techniques in terms of weight loss and remission of comorbidities, with a low rate of complications [1].

An important step within the LGBP technique is the jejunal-jejunal anastomosis, which can be performed mechanically or manually [1]. Early complications related to this anastomosis are rare and are usually due to technical failure. The most common early complications are bleeding, obstruction, and anastomotic leak. Anastomotic obstruction is the most frequent late complication due to the absence of closure of the mesenteric defect at this level (internal hernia), and more rarely perforations and abscesses [2].

Therefore, every bariatric surgeon should have sufficient qualification and knowledge to be able to perform different anastomosis methods with the devices and materials that exist today for surgical practice and thus have different technical resources available.

The V-Loc™ (Covidien™) is a non-absorbable unidirectional barbed suture, self-locking in continuous suture, and provided with a loop at the end of the suture that avoids the need for knotting (Fig. 1).

The effectiveness of the barbed suture has been demonstrated in dermatology, orthopedic, plastic, gynecological and urological surgery [3,4,5], as well as the optimal results and complications of its use in general and bariatric surgery [4- 6].

Without making comparison with techniques or suture materials used prior to the introduction of the barbed suture in our unit, the main objective of this retrospective observational study is to demonstrate the absence of anastomotic complications, the efficacy, ease of handling and safety offered by the use of V-Loc™ in the closure of the jejunal-jejunal anastomosis and mesenteric defects, presenting our experience in bariatric and metabolic surgery with the use of this device during the last 7 years.

Material and Method

From 2002 to July 2019, a total of 1043 patients have been operated on in our Bariatric and Metabolic Surgery unit.



The monitoring and control of our patients follow the bases of the multi-modal recovery program (ERAS: Enhanced Recovery After Surgery) in bariatric surgery, in which a multidisciplinary team composed mainly of bariatric surgeons, anesthetists, endocrinologists, nutritionists and specialized nurses, participate in an active way in the postoperative control of the patient during their hospital stay, which in 90% of cases is 72 h (Me = 72 h, range 48-168).

In June 2012 we started using V-Loc™ (Covidien™) in different phases of the LGYB technique. From then, until July 2019, a total of 746 patients have been operated on in our unit, with a total of 354 patients having been performed LGYB.

The surgical procedure of LGYB performed in our center is done by means of a mechanical end-to-side gastro-jejunal (GY) anastomosis with 25 mm DST according to the Whittgrove technique modified with the OrVil EEA device (Covidien™) [9]. Very occasionally and due to technical necessity, linear mechanical gastrojejunal suture was performed with 45 mm ENDOGY (n = 18).

The length of the biliopancreatic loop (BPL) from the Treitz angle is 100 or 70 cm depending on the association or not of metabolic syndrome. The length of the alimentary loop (AA) starting from the GY anastomosis ranges between 150 and 200 cm depending on the degree of obesity and the malabsorptive component that the case requires.

In general terms, the rule of 70 - 150 (BPL - AA respectively) is applied in patients without diabetes mellitus, in whom the performance of another technique is not indicated and 100 - 150 for patients with established metabolic component (metabolic syndrome or DM2 of long evolution / poor control). Roux-Y loop foot anastomosis is performed with linear mechanical lateral suture (ENDOXY 45 mm).

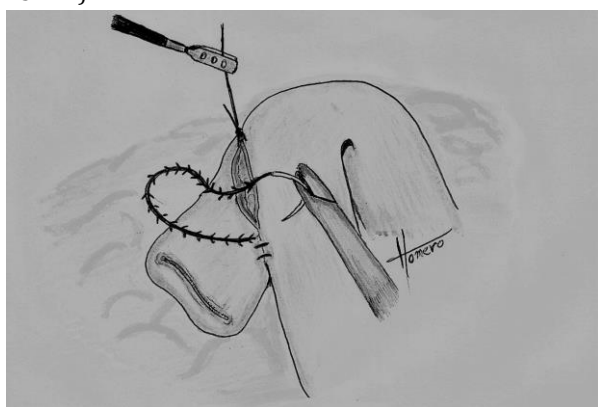


Figure 1: Closure of the enterotomy of the jejune-jejunal anastomosis

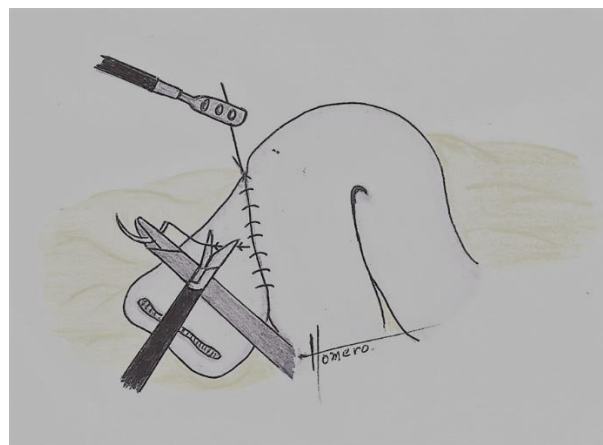


Figure 2: Completion of anastomotic suture in the reverse direction

The data correspond to 354 patients (99 men and 255 women) who underwent LGYB with a median body mass index (BMI) of 42.5 Kg / m² (range 35-50), and a median age of 42 years . The most relevant clinical data of the patients are shown in Table 1.

Observation period	June 2012 - July 2019
Population	N = 354 cases
Men	99 (28%)
Women	255 (72%)
*Age	42 (27-58)
*Weight Kg	120 (98-135)
*BMI Kg/m ²	43 (35-50)
Suture	V-Loc™ (Covidien™) 3-0. Non absorbable. 15cm
Petersen's closure	N=286 (June 2012- December 2017)
Associated metabolic comorbidity:	
*HTA	98 (31,4%)
*DM	85 (27,2%)
*SAOS	130 (41.6%)
*Hospital stay (hours)	72 (48-168)
*Follow-up (months)	36 (12-60)

BMI Body Mass Index

*Average (interquartile range).

Table 1. Demographic and preoperative comorbidity factors.

V-Loc™ suture (VLOCN0604; taper point, ½ circle / 26 mm; size 3-0; length, 15 cm; non-absorbable; Covidien™) was used in all patients to close the loop foot enterotomy hole (Fig. .1), and jejunal mesenteric defect. At the end of the closure of the enterotomy, we made two or three sutures in the reverse direction with the same suture (Fig. 2). Depending on the size of the mesenteric defect, a continuous Petersen orifice (286 patients 2012-2017) was sutured with V-Loc™.

Results

After analyzing our database, in 354 patients who experienced LGYB using V-Loc™ for closure of loop foot enterotomy and mesenteric defect after anastomosis, the complication rate found was 0% for dehiscence / fistula, hemorrhage, visceral stenosis / perforation, intestinal occlusion and mortality, adding 0.2% due to a case of intestinal occlusion of different origin in this same group of patients.

Out of the 354 cases subject to study (LGBP), only one had to be reoperated by laparoscopy urgently within 24 postoperative hours due to occlusion of the loop foot, not attributable to the type of suture used, but to a defect in the technique that caused twisting at that level of the food handle.

The remaining cases (353) did not present any type of complication, during the postoperative period between 12 to 60 months, (Me = 36) related to the use of V-Loc™, which suggests the safety of the use of this suture applied to this technique, compared to that described in the literature: dehiscence / fistula 0.3-4%, hemorrhage 1-2%, intestinal obstruction 0.5-6%, stenosis or visceral perforation 0.8-3% and mortality 0.6-5% [18-24]. The results of the study are shown in Table 2 together with those of other reference series.

Complications	Study Results
Hemorrhage	0 %
Leak /fistula	0 %
Stenosis/Perforation	0 %
Occlusion	0 %
Mortality	0%
Reoperation (torsion A.A)	0.2 %

Table 2: Most common complication rate related to the use of V-Loc™ in LGYB in our case series.

Discussion

We acknowledge that the main limitation of this study derives from the use of the barbed suture exclusively for the closure of the enterotomy of the jejunum-jejunal anastomosis and in mesenteric defects resulting from the intervention, without including its participation in the gastro-jejunal anastomosis. because, as previously

described, it is of the mechanical circular type and is probably the subject of another comparative study.

The barbed suture has been proposed over the years to facilitate suturing in laparoscopic surgery. The favorable results of its use in different specialties and surgical techniques have been demonstrated in the medical literature [3-7].

However, in recent years its efficacy and safety in bariatric surgery have not been studied in the long term or with a sufficient number of patients to conclude on its efficacy and reproducibility by the different teams of surgeons who are dedicated to this surgical practice worldwide [6-8].

Independently, several studies have demonstrated the efficacy of the use of V-Loc™ in bariatric surgery (LGYB). All these works, and some others, seem to point towards an improvement with the use of this suture in terms of shorter surgical time, shorter learning curve, shorter hospital stay, and absence of complications compared to other techniques with different types of suture, for example, braided sutures or other monofilaments [3-6].

With technological advances and the appearance of new barbed suture materials, the combination of both has contributed to improving the results in performing laparoscopic anastomoses. In particular, laparoscopic suturing is technically challenging, even for experienced surgeons in this field, due to the learning curve it requires.

The dramatic and dreaded results in terms of morbidity and mortality that can condition a suture failure in bariatric surgery make it necessary to continue advancing in suture techniques that are increasingly safer and easier to handle [8,10,11,12]. The V-Loc™ facilitates the practice of laparoscopic suturing, avoiding the need to perform intracorporeal knotting and maintaining the tension of the suture throughout its entire trajectory, without requiring the participation of an assistant in this step [8,12]. Another advantage is that the usual manual anastomosis technique does not change with the use of this suture.

Currently there are cost-effectiveness studies in favor of this type of suture, referring to operative time and a lower rate of complications [13-17]. Even so, the advantages provided by this material do not justify the lack of knowledge in performing anastomosis in both open and laparoscopic surgery by surgeons in training, and the use of other suture devices.

It should be noted that other studies evaluating the use of V-Loc™ and another type of barbed suture on the market, support its safety and reproducibility in gastro-jejunal and jejunal-jejunal anastomoses in LGYB, performed completely by hand without intervention. of other devices for use in anastomosis [13-17].

Milone [6] reported a case of anastomotic leakage at enterotomy closure with the use of V-Loc™ in a prospective study of 30 patients who underwent LGYB. However, no cases of stenosis or fistulas were reported in the same study using this suture material with a six-month postoperative follow-up. In our series, the patient who presented with occlusive bowel symptoms underwent urgent laparoscopic surgery within the first 24h postoperatively, the cause of the occlusive condition was attributed to torsion of the alimentary loop close to the anastomosis (loop foot) and an anastomotic hole with a diameter less than 2.5 cm, thus excluding the barbed suture used as a cause of acute occlusion. A new linear

anastomosis was performed (45mm loop foot end stapler) using the same type of V-Loc™ to close the enterotomy hole. The postoperative period was uneventful, and she was discharged from hospital within 48 hours.

Conclusion

With the results obtained, the use of V-Loc™ is as safe as other commonly used sutures, with no complications attributable to its use in closing loop foot enterotomy and mesenteric defects, and in accordance with the recommendations reported in the literature for its use, we consider that this type of suture should be included in the standard procedure when performing LGYB.

Bibliography

1. Schauer P, Ikramuddin S, Gourash W, et al. Outcomes After Laparoscopic Roux-en-Y Gastric Bypass for Morbid Obesity. *Ann Surg.* 2000; 232(4): 515–529. DOI: 10.1097/0000658-200010000-00007
2. Gonzalez-Pezzat I, Soto-Perez-de-Celis E. & Pantoja-Millan J.P. Late Perforation and Abscess Formation at the Site of the Jejunojunal Anastomosis Following Laparoscopic Roux-en-Y Gastric Bypass Surgery. *Obes Surg* 2009;19, 661–663. <https://doi.org/10.1007/s11695-009-9831-9>
3. Kassir R, Blanc P, Breton C, et al. Laparoscopic Roux-en-Y Gastric Bypass with the Absorbable Bidirectional Monofilament Barbed Suture Stratafix®: the Hand-Sewn Technique. *Obes Surg.* 2015; 25: 325-326. DOI: <https://doi.org/10.1007/s11695-014-1437-1>
4. Ferrer-Marquez M, Belda-Lozano R. Uso de las suturas barbadas en cirugía general y digestiva. *Revisión de conjunto.* *Cir Esp.* 2016; 94 (2): 65-69. DOI: 10.1016/j.ciresp.2015.03.007
5. Gys, B, Gys, T. & Lafullarde, T. The Use of Unidirectional Knotless Barbed Suture for Enterotomy Closure in Roux-en-Y Gastric Bypass: a Randomized Comparative Study. *Obes Surg.* 2017; 27: 2159–2163. DOI: <https://doi.org/10.1007/s11695-017-2628-3>
6. Milone M, Di Minno MN, Galloro G, et al. Safety and efficacy of barbed suture for gastrointestinal suture: a prospective and randomized study on obese patients undergoing gastric bypass. *J Laproendosc Adv Surg Tech A.* 2013; 23: 756-759. DOI: <http://dx.doi.org/10.1089/lap.2013.0030>
7. De Blasi V, Facy O, Goergen M, et al. Barbed versus usual suture for closure of the gastrojejunal anastomosis in laparoscopic gastric bypass; a comparative trial. *Obes Surg.* 2013; 23: 60-63. DOI: <https://doi.org/10.1007/s11695-012-0763-4>
8. Tyner RP, Clifton Gt, Fenton SJ. Hand-sewn gastrojejunostomy using knotless unidirectional barbed absorbable suture during laparoscopic gastric bypass. *Surg Endosc.* 2013; 27: 1360-1366. DOI: <http://dx.doi.org/10.1007/s00464-012-2616-6>
9. Wittgrove A.C, Clark G.W. Laparoscopic gastric bypass, Roux-en-Y: preliminary report of five cases. *Obes Surg* 1994; 4: 353–357. DOI: 10.1381/096089294765558331
10. Palmisano S, Giuricin M, Makovac P, et al. Totally hand-sewn anastomosis using barbed suture device during laparoscopic gastric bypass in obese. A feasibility study and preliminary results. *Int J Surg.* 2014; 12: 1385-1389. DOI: <http://dx.doi.org/10.1016/j.ijssu.2014.10.030>
11. Tomoya T, Masahide K, Kinoshita J. Use of Barbed Sutures in Laparoscopic gastrointestinal Single-Layer Sutures. *JLS. Journal of the Society of Laproscopic Surgeons.* 2016; DOI: 10.4293/JLS.2016.00023
12. Kassir R, Breton C, Lointier P, et al. Laparoscopic Roux-en-Y gastric bypass with hand-sewn gastrojejunostomy using an absorbable bidirectional monofilament barbed suture: review of the literature and illustrative case video. *Surg Obes Relat Dis.* 2014; 10: 560-561. DOI: <https://doi.org/10.1016/j.soard.2014.01.029>
13. Sang-Wong L, Masaru K, Keitaro T, et al. Laparoscopic gastrointestinal anastomoses using knotless barbed absorbable sutures are safe reproducible: a single-center experience with 242 patients. *Japanese Journal of Clinical Oncology.* 2016; 46: 329-335. DOI: <https://doi.org/10.1093/jjco/hyv212>
14. Gys B, Gys T, Ruyssers M. et al. Laparoscopic Linear Stapled Running Enterotomy Closure in Roux-en-Y Gastric Bypass Using Absorbable Unidirectional Barbed Suture (Stratafix® 2/0). *Obes Surg.* 2017; 27: 2740-2741. DOI: <https://doi.org/10.1007/s11695-017-2870-8>
15. Costantino F, Dente M, Perrin P, et al. Barbed unidirectional V-Loc 180 suture in laparoscopic Roux-en-Y gastric bypass: a study comparing unidirectional barbed monofilament and multifilament absorbable suture. *Surg Endosc.* 2013; 27: 3846-3851. DOI: <https://doi.org/10.1007/s00464-013-2993-5>
16. Kassir R, Gugenheim J, Blanc P, Tiffet O. The Hand-Sewn Gastrojejunostomy: Braided Suture or Monofilament Suture? *Obes Surg.* 2015; 25: 545-546. DOI: <https://doi.org/10.1007/s11695-014-1453-1>
17. Hany M, Ibrahim M. Comparison Between Staple Line Reinforcement by Barbed Suture and Non-reinforcement in Sleeve Gastrectomy: a Randomized Prospective Controlled Study. *Obes Surg.* DOI: <https://doi.org/10.1007/s11695-018-3175-2>
18. Sung Ho Jang, Yun Kyung Jung, Sung Ji Choi, et al. Postoperative mechanical small bowel obstruction induced by V-Loc barbed absorbable suture after laparoscopic distal gastrectomy. *Ann Surg Treat Res* 2017; 92: 380-382. DOI: <https://doi.org/10.4174/astr.2017.92.5.380>
19. Hsuan Chen, Mun_Kun Hong, Dah-Ching Ding. Acute small bowel obstruction caused by barbed suture on the second day after laparoscopic hysterectomy: A case report and literature review. *Taiwanese journal of Obstetrics and Gynecology.* 2017; 56: 247-249. DOI: <https://doi.org/10.1016/j.tjog.2016.03.008>
20. Segura-Sampedro JJ, Ashrafian H, Navarro-Sánchez A, et al. Small bowel obstruction due to laparoscopic barbed sutures: an unknown complication? *Rev Esp Enf Dig.* 2015; 107: 677-680. ISSN 1130-0108
21. Terrosu G, Cherchi V, Baccarani U, et al. Development of Small Bowel Volvulus on Barbed V-Loc™ Suture: A Rare Complication after Laparoscopic Ventral Rectopexy. DOI: <https://doi.org/10.1155/2018/8406054>
22. Tagliaferri E, Wong S, Abad de Jesus J, et al. Small bowel obstruction SBO after TAPP repair caused by a self-anchoring barbed suture device for peritoneal closure: case report. *JSCR.* 2018; 7: 1-3. DOI: <https://doi.org/10.1093/jscr/rjy165>



23. Salminen HJ, Tan WS, Jayne DG. Three cases of small bowel obstruction after laparoscopic ventral rectopexy using the V-Loc® suture. *Tech Coloproctol.* 2014; 18: 601-2. DOI:10.1007/s10151-013-1074-z

24. Misirlioglu S, Boza A, Arslan T, et al. Unidirectional barbed suture for vaginal cuff clo-sure without backward stitch in total laparoscopic hysterectomy. *J.Obstet Gynaecol Res.* 2018; 44: 1793-1799. DOI: <https://doi.org/10.1111/jog.13696>.

© 2020 seco- seedo. Published by bmi-journal. All rights reserved.