

HCA Healthcare

Scholarly Commons

General Surgery

Research & Publications

11-2019

Safe and effective use of a hands-free intracorporeal retractor for suture-based liver retraction during minimally invasive bariatric procedures: results of a large case series

Roger De la Torre

HCA Healthcare, roger.delatorre3@hcahealthcare.com

Matthew Sappington

matthewsappington@gmail.com

Tom Smith

tom.smith@gmail.com

Jeremy Bryner

HCA Healthcare, jeremy.bryner@hcamidwest.com

David Mantilla

HCA Healthcare, david.mantilla@hcamidwest.com

See next page for additional authors

Follow this and additional works at: <https://scholarlycommons.hcahealthcare.com/general-surgery>



Part of the [Digestive System Commons](#), [Equipment and Supplies Commons](#), [Surgery Commons](#), and the [Surgical Procedures, Operative Commons](#)

Recommended Citation

De la Torre R, Sappington M, Smith T, et al. Safe and effective use of a hands-free intracorporeal retractor for suture-based liver retraction during minimally invasive bariatric procedures: results of a large case series. Poster presented at: ASMBS Annual Meeting; November 3-7, 2019; Las Vegas, NV.

This Poster is brought to you for free and open access by the Research & Publications at Scholarly Commons. It has been accepted for inclusion in General Surgery by an authorized administrator of Scholarly Commons.

Authors

Roger De la Torre, Matthew Sappington, Tom Smith, Jeremy Bryner, David Mantilla, and J Stephen Scott

Safe and effective use of a hands-free intracorporeal retractor for suture-based liver retraction during minimally invasive bariatric procedures: **results** of a large case series

Roger A. de la Torre, MD, FACS; Matthew Sappington, MD; Thomas Smith, DO; Jeremy Bryner, DO; David Mantilla, MD; J. Stephen Scott, c, FACS
Bariatric and Metabolic Specialists, Menorah Medical Center, Overland Park, Kansas



Abstract Background

This study evaluated the safety and efficacy of a hands-free intracorporeal retractor in a large series of subjects undergoing minimally invasive bariatric surgery. This method eliminates the need for a subxiphoid incision, enables surgeon autonomy, and allows for adjustments throughout the procedure.

Methods

Retrospective chart review identified all subjects at a single hospital undergoing bariatric surgery over 18 months for whom suture-based liver retraction was selected. In this procedure, the **left lobe of the liver** was lifted by anchoring 1 fixed hook into the right crus and the 2 adjustable hooks into the insufflated abdominal wall to **suspend and retract the liver**.

Results

527 cases were identified. Patients had a high rate of morbid obesity (80% with BMI >40 kg/m²). Only 2 procedures (0.4%) required more than 5 trocars and a subxiphoid incision. Three procedures (0.6%) required a second retractor. No complications involving the technique were identified.

Conclusions

Suture-based liver retraction using the hands-free intracorporeal retractors was found to be safe and effective in this large case series of subjects with morbid obesity.

Introduction

Laparoscopic and robotic bariatric surgical procedures require upward retraction of the **left lobe** of the liver to provide adequate surgical access and operative view.

In this article, we report a large case series of a hands-free suture-based technique using an intracorporeal retractor (FreeHold Trio(R); FreeHold Surgical Inc, **an Orchestra BioMed Company**; New Hope, PA) for sling-based retraction of the **left lobe** of the liver during laparoscopic and robotic bariatric procedures. This retractor is fully adjustable, completely intracorporeal, and allows for full surgeon autonomy.

TABLE 1: PATIENT DEMOGRAPHICS

Characteristic	Value
Age, years Mean (SD) Range	45.6 (12) 18 – 74
Gender, N (%) Female Male	444 (84.3) 83 (15.7)
BMI, kg/m ² Mean (SD) Range Morbid obesity (> 40 kg/m ²), N (%) Super obesity (> 50 kg/m ²), N (%)	46.3 (7.5) 28 – 77 423 (80%) 141 (27%)

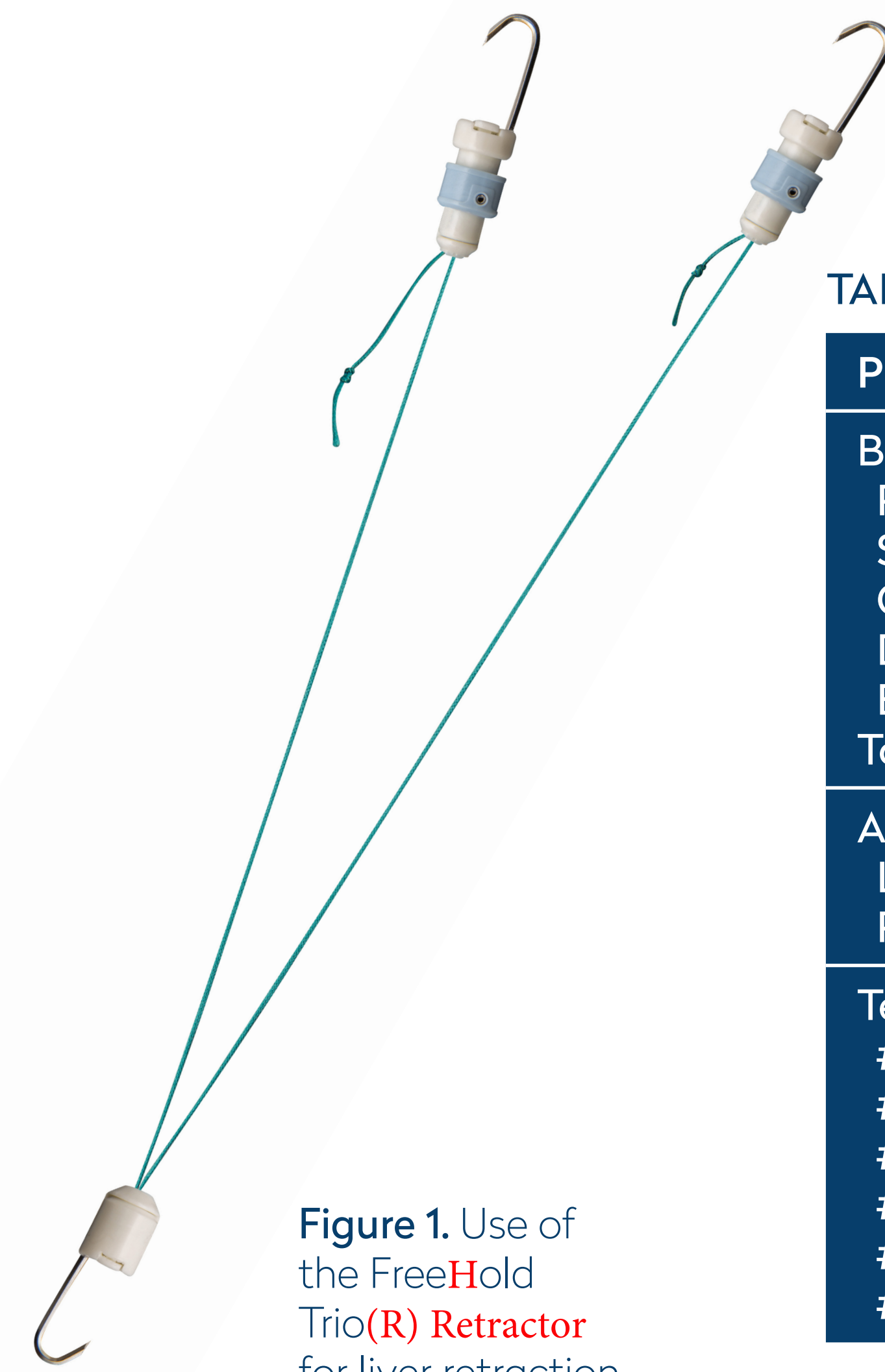


Figure 1. Use of the FreeHold Trio(R) Retractor for liver retraction

TABLE 2: SURGICAL DETAILS OF STUDY SUBJECTS

Procedure	Value
Bariatric procedure, N (%)	
RYGB	263 (49.9)
Sleeve gastrectomy	259 (49.1)
Gastric band to sleeve conversion	2 (0.4)
Duodenal switch	2 (0.4)
Bypass	1 (0.2)
Total	527 (100)
Approach, N (%)	
Laparoscopic	313 (59.4)
Robotic	214 (41.6)
Technical details, per case	
# trocars, mean (SD)	5 (0.06)
# trocars, maximum (N)	6 (2)
# subxiphoid incisions, mean (SD)	0 (0.06)
# subxiphoid incisions, maximum (N)	1 (2)
# retractors, mean (SD)	1 (0.11)
# retractors, maximum (N)	2 (3)

Materials and Methods

A retrospective chart review was performed of consecutive cases using the hands-free intracorporeal retractor by surgeons at Menorah Medical Center, Kansas City, MO. The cases were performed over 18 months (September 2017–March 2019). The hospital's Institutional Review Board approved the study. All subjects undergoing bariatric surgery by the authors for whom suture-based liver retraction using the intracorporeal retractor was selected were included.

Intracorporeal Retractor and Surgical Technique

The FreeHold Trio(R) Retractor is a simple, fully adjustable, hands-free, and completely intracorporeal retractor that allows the surgeon to operate autonomously. The device consists of 3 hook assemblies (2 adjustable, 1 fixed), connected by lengths of suture that can be adjusted to provide appropriate tension. The device can be inserted through an existing 5mm trocar, eliminating the need for an additional incision, trocar, or robotic instrument. The retractor allows the surgeon full use of both hands to perform the procedure, eliminating the need for coordination with an assistant. The retractor can be easily repositioned and the amount of tension adjusted as necessary during the procedure.

Following insufflation of the abdomen and placement of trocars for bariatric surgery, the intracorporeal retractor was introduced into the abdominal cavity. The **left lobe of the liver** was lifted by anchoring 1 fixed hook of the retractor into the right crus and the 2 adjustable hooks of the retractor into the insufflated abdominal wall. The 2 strands of the triangulated retractor were then positioned as needed beneath the liver to form a sling and pulled to provide static retraction (Figure 1...**currently, not the right image...this is the image of the retractor not the retraction...**).

Outcomes

Procedural outcomes included successful completion of the indicated procedure, the need for additional retractors and/or a subxiphoid incision, and any signs of liver damage. Evaluation of liver function or damage was conducted only when signs or symptoms of liver damage were noted.

Results

527 subjects were identified through retrospective chart review (Table 1). Subjects were predominantly morbidly obese (80% with BMI > 40 kg/m²). The most commonly performed procedures were roux-en-Y gastric bypass (RYGB; 49.9%) and sleeve gastrectomy (49.1%). The majority of procedures were performed laparoscopically (59.4%), with the remainder performed robotically (40.6%).

Outcomes of Suture-based Liver Retraction

All indicated procedures were successfully completed. In almost all cases (>99%), the procedure was completed with 5 trocars, 1 retractor, and without a subxiphoid incision. The suture-based technique provided visualization of the gastroesophageal junction, hiatus, and angle of His and sufficient operative space for the indicated procedures. In 3 cases (0.6%), a second retractor was required for liver retraction, all **in** were **in** super-obese individuals (Table 2). In 2 of these cases, a subxiphoid incision and additional trocar were required (0.4%). There were no cases of bile staining of the sutures of the retractor, **no** instances of liver tearing or bleeding, or other indications of liver injury.

Laparoscopic vs. Robotic Procedures

Small but statistically significant differences were identified between laparoscopic and robotic cases (Table 3). A significantly greater proportion of patients in the laparoscopic group underwent sleeve gastrectomy, and patients were significantly younger in the laparoscopic group (44.4 vs. 47.3 years, P=0.007).

Discussion

The findings of this study align with previous reports of suture-based liver retraction and strongly support the ease, safety, and efficacy of this approach.¹ Only 2 cases required more than 5 trocars and a subxiphoid incision, and only 3 cases required a second retractor. These advantages contrast with other alternatives to liver retraction, many of which require additional materials and instruments and may increase operative time, and none of which has gained widespread acceptance, due in part to their technical challenges, limited evidence, and other considerations.^{2–15} To our knowledge, the more than 500 cases described in this study represent the largest case series describing methods of liver retraction during laparoscopic and robotic bariatric surgery reported to date in the literature.

Although liver function tests were not assessed in this study, there were no cases of observable damage to the liver and no evidence of bile staining of the sutures or liver tearing or bleeding from the retractor, despite the high prevalence of morbid obesity. More than one quarter of subjects in this study consisted of the “super obese” (ie, BMI >50 kg/m²; N=141, 27%), who commonly have very large and fatty livers that can be a challenge to retract. In all subjects in this case series, adequate visualization and surgical access were achieved using the hands-free intracorporeal retractor, regardless of BMI.

Only 2 cases required a subxiphoid incision (0.4%). While postoperative pain was not evaluated, previous studies suggest that the elimination of the subxiphoid incision can reduce postoperative pain.² Finally, analysis identified a greater proportion of sleeve gastrectomies in the laparoscopic group and a significant difference in patient age (Table 3). Differences in type of procedure may be due to surgeon familiarity and experience using these approaches. The age difference between groups (44.4 vs. 47.3 years) was small and likely due to the large sample size, which allowed for small differences to reach statistical significance. Although all 3 cases requiring a second retractor were in the laparoscopic group, statistical analysis did not identify a significant difference in the number of retractors used between the 2 approaches (P=0.156).

TABLE 3. COMPARISON OF LAPAROSCOPIC AND ROBOTIC CASES.

Characteristic	Laparoscopic	Robotic	P-value*
Age (years), mean (SD)	44.4 (11.9)	47.3 (12.1)	0.007
BMI (kg/m ²), mean (SD)	46 (7)	46.7 (8.1)	0.291
RYGB, N Sleeve gastrectomy, N	134 178	128 81	<0.00035**
# retractors, mean (SD)	1.01 (0.1)	1 (0)	0.156
> 1 retractor, N	3	0	NA

* two-tailed t test, unless otherwise noted; **chi-square test; RYGB: Roux-en-Y gastric bypass; NA: not applicable

Limitations

Limitations include the retrospective design and lack of a comparator group. The study also did not evaluate the learning curve for use of the intracorporeal retractors, operative time or associated costs, or outcomes such as liver function tests, pain, wound complications, or patient satisfaction. In the authors' experience, liver retraction using the intracorporeal retractor requires less than 2 minutes to complete and is unlikely to significantly affect overall operative time. The technique does have a learning curve and may require repetition to be performed safely and effectively, especially in morbidly obese patients.

Conclusions

In this large case series of subjects with a high rate of morbid obesity, we demonstrated the safety and efficacy of a hands-free intracorporeal retractor for liver retraction during laparoscopic and robotic bariatric procedures. There were no liver injuries due to the retraction method used in this study.

References

- de la Torre R, et al. A suture-based liver retraction method for laparoscopic bariatric procedures: results from a large case series. *Surg Obes Relat Dis*. Nov-Dec 2015;11(6):1377–1382.
- Goel R, et al. Randomized controlled trial comparing three methods of liver retraction in laparoscopic Roux-en-Y gastric bypass. *Surg Endosc*. Feb 2013;27(2):679–684.
- Woo Y, et al. Minimizing hepatic trauma with a novel liver retraction method: a simple liver suspension using gauze suture. *Surg Endosc*. Dec 2011;25(12):3939–3945.
- Zachariah SK, et al. The “T-suspension tape” for liver and gallbladder retraction in bariatric surgery: feasibility, technique, and initial experience. *J Laparoendosc Adv Surg Tech A*. Apr 2013;23(4):311–315.
- Galvani CA, et al. Single-incision sleeve gastrectomy using a novel technique for liver retraction. *JLSLS*. Apr-Jun 2010;14(2):228–233.
- Sakaguchi Y, et al. New technique for the retraction of the liver in laparoscopic gastrectomy. *Surg Endosc*. Nov 2008;22(11):2532–2534.
- Shibao K, et al. Disk suspension method: a novel and safe technique for the retraction of the liver during laparoscopic surgery (with video). *Surg Endosc*. Aug 2011;25(8):2733–2737.
- Takemura M, et al. A novel liver retraction technique for lateral lobe of the liver during laparoscopic surgery using silicone disk. *J Laparoendosc Adv Surg Tech A*. Oct 2011;21(8):729–732.
- Soeki H, et al. Newly developed liver-retraction method for laparoscopic gastric surgery using a silicone disc: the phi-shaped technique. *J Am Coll Surg*. May 2013;216(5):e43–46.
- Gan P, Bingham J. A clinical study of the LiVac laparoscopic liver retractor system. *Surg Endosc*. Feb 2016;30(2):789–796.
- Huang CK, et al. A novel technique for liver retraction in laparoscopic bariatric surgery. *Obes Surg*. May 2011;21(5):676–679.
- Fan Y, et al. Transumbilical single-incision laparoscopic fundoplication: a new technique for liver retraction using cyanoacrylate. *J Laparoendosc Adv Surg Tech A*. Apr 2013;23(4):356–360.
- Ahmad A, et al. A percutaneous technique of liver retraction in laparoscopic bariatric & upper abdominal surgery. *Surg Obes Relat Dis*. Sep – Oct 2016;12(8):1626–1629.
- Genser L, et al. Minimal Invasive Internal Liver Retractor in Conventional and Trans-umbilical Single-Incision Laparoscopic Sleeve Gastrectomy: Video Report. *Obes Surg*. Mar 2016;26(3):704–705.
- Shimizu H, et al. Clinical experience with a port-free internal liver retractor in laparoscopic bariatric surgery. *Obes Surg*. Mar 2014;24(3):478–482.