

Overcoming Complications in Laparoscopic Low Anterior Resection with the Endo GIA™ Radial Reload with Tri-Staple™ Technology



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Introduction

Low anterior resection (LAR), a surgical procedure commonly performed in the treatment of rectal cancer and diverticulitis, is generally preferable to an abdominoperineal resection (APR). LAR has advantages over APR, particularly in terms of patient quality of life due to the avoidance of a permanent stoma from the preservation of the anal sphincter muscle.¹ Despite important progress made in the past decade with regard to surgical staplers, surgical techniques and perioperative management, patients who undergo LAR for rectal cancer may still inevitably experience surgical complications.

With the lower levels of colo-rectal and colo-anal anastomoses and the increasing demands for anal-sphincter preservation, risks such as anastomotic leaks, are still the major concern of the surgeons.² The laparoscopic approach has been regarded as an attractive and equivalent surgical alternative for mid to low rectal cancer resections because it offers better visualization, more precise dissection and allows adequate rectal mobilization and total mesorectal excision down to the pelvic floor, with a better preservation of the hypogastric plexus and erigent nerves.³ This results in improved functional and oncological outcomes, even when the anastomoses are fashioned lower than ever, and a reduced occurrence of complications.^{2,3}

Dr. Charles Tsang and Dr. Dean Koh, both Adjunct Associate Professors of Surgery at Yong Loo Lin School of Medicine at the National University of Singapore, are senior colorectal surgeons who work closely together as partners at Colorectal Clinic Associates in Mount Elizabeth Novena Hospital, Singapore. They are both trained in an ACGME Colon and Rectal Surgery Residency program in the USA and collectively have over 20 years of experience in laparoscopic LAR. Both Dr. Tsang and Dr. Koh are experts in handling the Endo GIA™ Radial Reload.

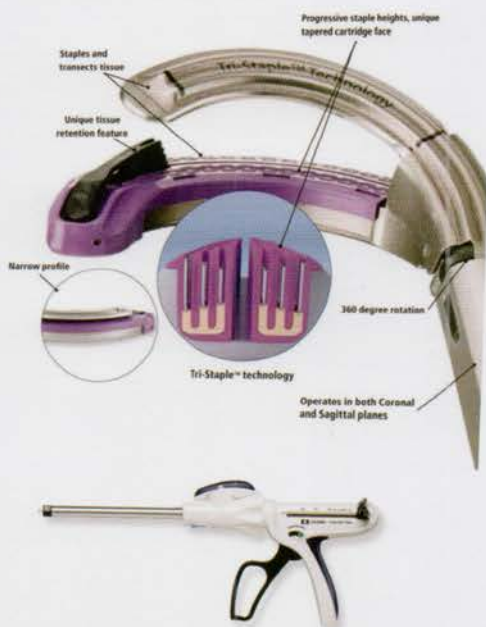
Challenges of Laparoscopic LAR

As with most surgeries that can be performed with either an open or laparoscopic approach, the latter has been conclusively proven to be associated with less postoperative pain and shorter hospitalization stays, with a quicker return to normal life functions.^{4,5} The ability of surgeons to perform laparoscopic LAR was made possible in part by the availability of surgical staplers.⁶ However, the procedure can still be quite challenging because of the anatomy of the pelvis, which hinders visibility and maneuverability of the surgeon's instruments. "The pelvis is very narrow, especially in males, with bone and vital neurovascular structures on either side, giving you much less space to work with" said Dr. Koh.

"Compared to open resection, laparoscopic surgery has certainly increased visibility with better optics and precision in the dissection; however, there are still issues with exposure, especially around the distal rectum and anorectal junction," said Dr. Koh. Distal rectal stapled transection remains one of the most difficult challenges in laparoscopic LAR surgery. The pelvis is restricted by its bony confines, and within this space exist other structures such as the bladder, prostate, uterus, and vagina. This complexity is further magnified in a narrow, heavy-set male pelvis.

"One of the main problems surgeons face is getting low enough in the pelvis, below the tumor and stapling distally. It has been shown in computer simulation studies that in order to get a truly perpendicular staple line using the standard laparoscopic endostaplers, you would need to go through the pelvic bone" said Dr. Koh. Dr. Tsang agreed, "A proper stapling device must have a small profile, be small enough to be passed around a bulky rectal tumor within a fixed space, yet be large enough to occlude the entire rectum and divide it accurately at a right angle." A stapler that reliably and uniformly reaches the most distal aspect of the rectum will have major impact on surgical outcome and surgeon satisfaction, reducing the level of frustration associated with a critical part of an already difficult operation.^{7,8}

Figure 1. Endo GIA™ Radial Reload With Tri-Staple™ Technology⁹



Compatible with all Endo GIA™ Universal, Endo GIA™ and Ultra Universal handles¹

Endo GIA™ Radial Reload with Tri-Staple™ Technology

To address the challenges faced by surgeons performing laparoscopic LAR, Covidien has developed the Endo GIA™ Radial Reload, the latest of the company's staplers with Tri-Staple™ technology, and the newest instrument in the company's portfolio of colorectal surgical devices.

The Endo GIA™ Radial Reload's curved shape and narrow profile are designed to allow better access, greater maneuverability, and enhanced visibility, while the Tri-Staple™ technology, with its progressive staple heights and stepped cartridge face, ensures a secure staple line (Figure 1). The Endo GIA™ Radial Reload can accommodate a wide range of tissue thicknesses, can rotate 360 degrees, is compatible with all Covidien universal handles, and can achieve depths of up to 2 cm lower than conventional staplers.⁹

Clinical Experience

Between them, Dr. Koh and Dr. Tsang have used the Radial Reload in 10 laparoscopic LAR cases since it became available earlier this year. They both appreciate the narrow profile and curved design, which allows increased accessibility and maneuverability. "We were very excited when the Radial Reload was launched as it ensures that your staple line is as perpendicular to the rectum as possible, allowing you to come transversely across the bowel. This enables us to reproduce what we were doing previously with open transverse staples, only now, we can do that laparoscopically," remarked Dr. Koh.

"The great thing is surgeons do not need to change their normal laparoscopic procedure when using the Radial Reload. I prefer to use the right lower quadrant port when using the standard endostaplers and I decided to do the same when using the Radial Reload (Figure 2). The Radial Reload has also allowed for a coronal (antero-posterior) staple line position, which cannot be done with previous linear staplers unless the device is inserted in a lower suprapubic port."

Dr. Tsang concurs that the curved shape of the Radial Reload allows him to place the stapler transversely across the rectum rather than having to angulate the instrument into place, as done previously with linear staplers. Furthermore, the unique tissue retention feature allows him to achieve complete division across the rectum in a single firing. "Often, with linear staplers, the bowel can extrude slightly at the distal end when the stapler is closed. However, the tissue retention tab on the Radial Reload

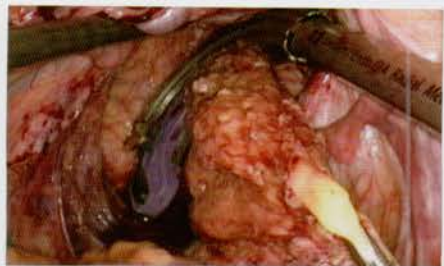
Figure 2. Performing a laparoscopic LAR with the Endo GIA™ Radial Reload with Tri-Staple™ Technology



A. Dr. Koh 'horseshoeing' the Radial Reload through a right lower quadrant port site (without the trocar)



B. Back loading Versaport Bladeless 15 mm trocar into Endo GIA™ Ultra Universal Stapler and connecting it to the Radial Reload



C. Complete rectum transection with one firing



D. Strong and reliable staple line

Images courtesy of Colorectal Clinic Associates

keeps the bowel in place in the firing zone without the need of another cartridge, which is a very nifty feature to have and something we have never seen before in previous devices. This allows you to transect the rectum with one, or at the most, two fires. From experience, when performing laparoscopic LAR on a narrow male pelvis with a conventional endostapler, it is not uncommon to need to use up to three cartridges."

"This is important" said Dr. Koh, "you shouldn't fire more than twice. The ideal situation is a single fire, like we used to do in open cases. Anytime you fire more than twice, the staple line is crossed and jagged and you run the risk of complications to the anastomosis."

The universal handle also allows the surgeon to reload, if necessary, into the same handle with a short straight cartridge, proving advantageous over the traditional linear device in which a different cartridge is needed for each different handle. "You only need to store one handle, which fits many types of cartridges. It makes life much easier," said Dr. Tsang.

The capacity to deploy a stapler safely below the tumor with adequate margins is largely determined by how low the rectum can be dissected and one of the major challenges of laparoscopic LAR surgery is the ability to dissect very low in the pelvis. Dr. Tsang finds that he can get much lower in the pelvis using the Radial Reload, stating "the curved design is one of the features that initially drew me to the Radial Reload. With a linear stapler, due to angulation in the narrow space, to staple below the tumor you would have to move the rectum to one side and take it step by step, which requires firing multiple reloads. However, as the Radial Reload is already curved, this allows for the transection to be almost at a 90 degree angle to the pelvic floor."

Dr. Koh recalled a recent case in which he would have had to perform a trans-anal distal division if he had not been using the new technology. "We were able to get the staple line down to about 2 cm from the anal verge. This was very exciting and is something I have never been able to do before with other staplers."

Dr. Tsang credits the Radial Reload for its ease of use. "Although the device is curved and the port is straight, we found that we had no issue maneuvering the device down, even for the first time. The curved jaw is manipulated through the abdominal wall via the trocar site, without the trocar of course (Figure 2). Once that bit is in the abdominal cavity, it is docked with the handle externally and the rest is really directing the jaw down into the deep recesses of the pelvis. It is quite intuitive."

Dr. Koh recommends that surgeons new to or sceptical of the Radial Reload to try it a few times with good assistance to get a feel for the instrument. "It is a little larger (15 mm compared to 12 mm) due to the curved end. The trick is to make sure that there is adequate cephalad retraction of the mobilized rectum and creation of space with good retraction all around so that you can maneuver the device around the distal rectum. Once you are able to get around, the placement of the jaws deep down into the pelvis is easy. Once you have mastered the insertion, you will find it beneficial in cases low in the rectum."

Conclusions

The Radial Reload's exclusive design allows for better visibility and greater access, even very low in the rectum. Surgeons now have the ability to complete a safe, sphincter preserving resection laparoscopically, without firing multiple loads to achieve division of the rectum. Dr. Tsang said, "although there is an extra step using the Radial Reload (with linear staplers it is just one shot in then you angulate), the unique tissue retention feature and the ability to get much lower in the pelvis is worth the trade off. We have both had good experiences with the Radial Reload and it is our choice of stapler for tumors low in the rectum." Dr. Koh concluded, "the Radial Reload is a novel device. The question that every surgeon has been asking since laparoscopy started: how do you come up with a device that allows you to go that far down [in the rectum] and divide comfortably? The Radial Reload answers this question."

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