Transanal Total Mesorectal Excision of Rectal Carcinoma: Evidence to Learn and Adopt the Technique

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Dr Fernandez-Hevia et al1 and Dr Tuech et al2 are to be congratulated upon their very innovative approaches of transanal total mesorectal excision (TaTME) for the treatment of rectal cancer. The senior authors are internationally renowned, innovative, technically gifted, minimally invasive surgeons. Professor Lacy was the first surgeon in the world to publish a large, single-surgeon, randomized, controlled trial comparing laparoscopic colectomy with the traditional colectomy performed for the cure of colon cancer by laparotomy.3 He very clearly demonstrated findings that would subsequently be reproduced in the CLASSIC, COLOR, and COST trials. As had been shown by Professor Morino,4,5 Professor Lacy demonstrated certain advantages of laparoscopy whereas all of the other trials merely demonstrated equivalence. Perhaps, because of the advantages inherent in a single-surgeon study design, when that surgeon is both technically superlative and working with a high volume of cases with the same team, certain results can be achieved. In this manner, both Professors Lacy and Morino showed benefits of laparoscopy; in the former case being decreased rates of recurrence and increased survival with laparoscopy, and in the latter, improvement in lymph node yield and increased survival with laparoscopy versus laparotomy for rectal cancer. Professor Michot is one of the most renowned colorectal surgeons in the world for a variety of problems including pelvic floor disorders. He and his team have been pivotal in the evaluation and subsequent education of surgeons around the world in the entire gamut of new procedures for fecal incontinence. Specifically, Professor Michot has been a leader in evolution of the artificial bowel sphincter, sacral neuromodulation and radiofrequency, and treatment of fecal incontinence. In addition, he is known for his expertise with the stapled transanal rectal resection (STARR procedure) and the surgery of rectal cancer. His clear expertise and developmental leadership in the evaluation and management of diseases within the pelvis have been well established and are certainly beyond refute. Therefore, it is not surprising that Professors Lacy and Michot, both simultaneously, have taken center stage with this newest innovation.

Between the acceptance of laparoscopy for colon cancer and the current time, an evolution in the use of laparoscopy for the treatment of rectal cancer has occurred. Because of some of the challenges in using laparoscopy deep in the pelvis, as noted in the CLASSIC trial6 wherein the rates of positive circumferential margins were 16% in the laparoscopy group and 14% in the laparotomy group, minimally invasive TME has been approached with what engineers term a “workaround.” Specifically, many hospitals throughout the world have invested many millions of dollars in both capital acquisition and marketing costs to allow their surgeons to use the Intuitive da Vinci (R) [production team: include registered symbol] platform to perform TME. Numerous studies have failed to show any benefit of this platform as compared with standard laparoscopy. On an equivalent but much earlier path, Drs Gerald and subsequently John Marks demonstrated the transanal/transabdominal (TATA) technique initially without and subsequently with the use of the laparoscope.7 Their local recurrence and survival rates are exemplary and show that much of the operation can be performed from below. The common denominator of all of these approaches is whether by laparotomy, laparoscopy, robotic, TATA, or TaTME is to fulfill the important principles of an adequate distal margin, a tumor-free (by at least 2 mm) radial margin, and a complete TME with a minimum of 12 lymph glands for assessment. It has been consistently demonstrated that achieving a good quality of surgery is of paramount importance in the outcomes for rectal cancer. The plane at which the surgical dissection is performed will influence the rates of both local and distant recurrences.8 Furthermore, the plane of surgery directly impacts the status of the circumferential margin of resection that, when involved, is a major contributor to pelvic relapse.9

Although the initial data comparing pathological outcomes between open and minimally invasive surgery were conflicting,10 more recent studies have shown that parameters reflecting the quality of surgery, including mesorectal integrity, margins of resection, and lymph node harvest, are similar.
in both groups. Within the minimally invasive procedures, no significant differences have been identified among laparoscopy, hand-assisted laparoscopy, or robotic surgery. Furthermore, in our experience with laparoscopic TME, the number of lymph nodes identified after laparoscopic TME was significantly greater than the number following open TME with no significant differences in radial margins. The introduction of novel surgical procedures should not only offer clinical advantages related to the intraoperative and immediate postsurgical phases but also require validation at the pathological level through evaluation of the quality of the specimen. In this regard, the technique described by the authors does not seem to differ from the conventional laparoscopic TME procedure, as no differences were observed in the integrity of the mesorectum, rate of positive circumferential resection margin, and lymph node yield. It is not surprising that the innovative Professors Lacy and Michot working with their respective teams have continued to pioneer methods for improving the quality of the operation. Both groups have clearly shown that without the use of a multimillion dollar platform, a high-quality TME can be undertaken in less time than it can be by standard laparoscopy, perhaps, as they surmised because of the 2-team approach. The use of transanal carbon dioxide insufflation and maintenance of pneumoperitoneum by the transanal device, the addition of 3-dimensional endoscopy, and the use of flexible endoscopy are all modifications of the standard TATA procedure. Moreover, as opposed to turning the patient between prone jack knife and lithotomy, the operation is performed in the lithotomy position utilizing a 2-team approach, at least one advantage of which, as discussed earlier, is a shorter operating time.

However, there are certain fundamental differences between the designs of the studies by Fernandez-Hevia et al and Tuech et al. Although the former study is a single-center study, it compares 2 groups of patients, one of whom underwent standard laparoscopic resection whereas the other group had combined laparoscopy with TaTME. No follow-up oncological or functional data were included in this study design. In contrast, the latter study was multicentered, and, although not designed as a comparative study between 2 groups, it did include both oncological and validated functional follow-up data. In addition, there were several technical differences between the studies. The Spanish group performed a synchronous operation, whereas the French surgeons commenced with the transanal approach and then proceeded to the transabdominal operation. While Fernandez-Hevia et al relied upon standard laparoscopic procedures and favored stapled anastomoses, Tuech et al used a variety of single-port, multiport, and opened abdominal procedures and also handsewn or even delayed coloanal anastomoses. While the former differences may be strictly predicated upon personal preference, the latter differences may well be due to the fact that it seems that the French group operated upon a greater number of more distal lesions, as the median tumor height was 4 cm ranging from 0 to 5 cm and all lesions were located in the lower third of the rectum. In comparison, the Spanish study included 70% of tumors in the mid-rectum and only 30% in the lower rectum in the transanal group. Therefore, the height of the distal edge of the tumor in the study of Fernandez-Hevia et al was 8.1 cm in the mid-rectum and 3.5 cm in the lower rectum. Although both groups relied upon flexible transanal access, although the French study seemed to use any 1 of 3 platforms whereas the Spanish study uniformly used a single device. It is interesting to note that neither group used a rigid reusable transanal endoscopic surgery platform as initially advocated by Buess et al and subsequently by many others. One minor technical difference is that the French surgeons commenced the dissection anteriorly whereas the Spanish surgeons preferred an initial posterior entry. Professor Michot and his disciples offered detail as to who graded the mesorectum and how that grading was undertaken.

As previously mentioned, they also included both oncological and functional follow-up data.

There are several points beyond the obvious technical ones that we believe are worthy of further reflection. First, the significantly increased use of neoadjuvant therapy in the transanal group (73%) versus in the laparoscopy group (57%) in the study of Fernandez-Hevia et al may well have facilitated or at least contributed to facilitating the dissection. Despite this difference, the tumor sizes were equivalent at a mean of 2.6 and 2.7 cm, respectively, as were the number of millimeters in the circumferential margin at 12 and 11 and the delivery of a complete or almost complete specimen in 36 and 37 cases, respectively. Moreover, the number of lymph nodes was similar between the 2 groups whether or not radiation was administered (14.3 and 16.4 in the transanal group and 14.7 and 17.6 in the standard laparotomy group). The fact that the anastomotic leak rate was 5.4% in the TaTME group and 11% in the laparoscopy group may be attributable to several factors. Specifically, the splenic flexure was mobilized significantly more frequently in the transanal group (38% vs 13%, respectively) and far more handsewn coloanal anastomoses were performed in the transanal versus laparoscopy group (43% vs 16%, respectively). These 2 technical differences may well have accounted for the difference in leak rates. The fact that the transanal group experienced a 6% readmission rate versus 22% in the laparoscopy group may again attest to these differences, such as variations in the rates of anastomotic leakage. It is interesting to note that the anastomotic leak rate in the study of Tuech et al was 5.3% strikingly similar to the anastomotic leak rate in the TaTME group of Fernandez-Hevia et al of 5.4%. However, it is important to bear in mind that the contrast that the Spanish surgeons performed stapled anastomoses often after a resection of more proximal tumors whereas the French surgeons relied upon a handsewn or even a delayed anastomosis after resection of more distal tumors.

Perhaps, because of these differences in tumor height, anastomotic technique, and the use of neoadjuvant therapy, all of the patients in the study of Tuech et al and 86% of patients in the study of Fernandez-Hevia et al underwent diverting loop ileostomy construction. One significant difference seems to be the seemingly significantly higher number of T3 lesions in the study of Fernandez-Hevia et al at 67% of patients in the TaTME arm of the Spanish study had T3 lesions whereas only 37.5% of patients in the French study had similar T-stage lesions. However, the percentage of patients within pN0 node status was strikingly similar at 73% in the French study and 70% in the Spanish one. Unfortunately, the long-term effects of the difference in stages could not be appreciated because long-term follow-up data were not provided by the Spanish group. Information about long-term oncological follow-up data was indeed provided by the French group at a median follow-up of 29 (ranging from 18 to 52) months. This group is to be commended for the fact no patient was lost to follow-up. They are also to be commended that their overall survival rate was 96.4% and there was only 1 local recurrence for a highly impressive local recurrence rate of 1.7%. Moreover, one can surmise that given the more distal levels of tumor and the routine use of handsewn or even delayed coloanal anastomosis in the French study, the functional outcomes if anything would be worse in that group than in the somewhat more proximal stapled anastomoses undertaken by Fernandez-Hevia et al. It is therefore again impressive to note that the median Wexner score was 5 (range from 3 to 18), with only 3 patients (5.7%) requiring a colostomy because of fecal incontinence. In a subset analysis were the 49 patients who did not undergo the formation of a permanent stoma, the median Wexner score was 4 (range from 3 to 12), with 28.5% of patients having a score greater than 7 and 28% having fragmentation and difficult evacuation. Again, this type of function might have been ameliorated by...
the routine use of a transabdominal or transperineal leak constructed J-pouch as noted later.

Furthermore, it is difficult to interpret the number of patients who received neoadjuvant therapy in either of the studies. The morbidity rates were virtually identical at 26% in the French study and 32% in the Spanish one. Lymph node retrieval was also rather similar at a median number of nodes of 12 in the French study and 14.3 in the TaTME publication. Again, the number of nodes must be taken in the context of not only the prowess of the surgeon(s) but also the technique, skill, and the dedication of the pathologist(s) and the use of neoadjuvant therapy and perhaps the height of the tumor. A complete or near-complete TME was achieved in 100% of cases in the French study and similarly in 97% of cases in the Spanish study. This message is quite clear in that the TaTME regardless of the specific equipment utilized the performance of a sequential or synchronous technique, the initial entry anteriorly or posteriorly, the height of the tumor, or the use of neoadjuvant therapy seems to influence the ability to achieve a complete or near-complete TME.

Both of the articles from Fernandez-Hevia et al1 and Tuech et al2 are highly intriguing and thought-provoking. Since Sylla and colleagues3 first published their experience with this approach, collaboration and confirmation have been noted from North and South America, Asia, and Europe.4-21 In addition, some surgeons perform a TaTME without specialized equipment. As already noted, Professors Gerald and John Marks and others22 perform TaTME without the additional instrumentation as a metachronous 1-team procedure rather than a synchronous 2-team procedure. In addition, personal preference (S.D.W.) is to add a transperineally constructed colonic J-pouch, whether restoration of continuity is performed as a circular stapled, or handsewn colonoanal anastomosis. The common denominator in both studies is that they are based upon the platform of transanal endoscopic microsurgery originally introduced by the late Professor Gerhard Bues in 1985.23 Although there should be no differences between the 2 groups, Fernandez-Hevia et al did not address functional outcomes in these patients, nor is the follow-up long enough to afford any oncological evaluation relative to either local recurrence or survival. Nonetheless, given the surrogate markers of distal and radial margins, quality of mesorectal excision, and the number of nodes, there is no reason to believe that the techniques will not be at the very least equivalent if not potentially superior.

Fernandez-Hevia, Lacy, and the other pioneers in this methodology including Sylla, Rattner, Swansom, Whiteford and Albert must be congratulated upon their work. It is imperative to interject a note of caution: clearly, these high-volume, technically adept, minimally invasive surgeons can produce these results. We must recall that the early days of laparoscopy were fraught with not only increases in organ injury and septic complications but also significant compromises of oncological principles. Through measured growth governed by appropriate education, skills acquisition, proctorship, mentorship, and credentialing, we can now deliver to our patients not only the short-term perioperative benefits of laparoscopy but also, in many instances, additional long-term oncological benefit. Although we have no doubt that TaTME will allow us to avoid the costly expenditures of a robotic platform, reduce operative time, and improve our ability to cure patients of these malignancies, rapid adoption by inadequately trained low-volume surgeons may sadly jeopardize the ultimate achievement of this result. Fortunately a myriad of educational opportunities enable surgeons to avail themselves of these techniques in a structured environment.

REFERENCES