Combined transanal excision (TAE) and transanal minimally invasive surgery (TAMIS) for a full thickness excision of a giant tubulovillous adenoma

Adam Studniarek[1], Daniel J. Borsuk[2,3], Kunal Kochar[2], John J. Park[2], Slawomir J. Marecik[1,2]

[1]Division of Colon and Rectal Surgery, University of Illinois at Chicago, Chicago, Illinois, USA; [2]Division of Colon and Rectal Surgery, Advocate Lutheran General Hospital, Park Ridge, Illinois, USA; [3]Department of Surgery, Michigan Medicine, University of Michigan, Ann Arbor, Michigan, USA

Correspondence to: Adam Studniarek, MD. Division of Colon and Rectal Surgery, University of Illinois at Chicago, 518 E CSB, (MC 958) 840 S. Wood St. Chicago, IL 60612, USA. Email: astudnia@uic.edu.

Abstract: Transanal minimally invasive surgery (TAMIS) is a rapidly developing minimally invasive method for high quality excision of rectal polyps and early rectal neoplasia. Treatment via TAMIS offers more advantages over other surgical modalities including endoscopic submucosal dissection (ESD), endoscopic mucosal resection (EMR), or a conventional transanal excision (TAE). We present a case of a successful excision of a giant 10 cm × 8 cm tubulovillous adenoma (TVA) with high grade dysplasia (HGD) located in the mid and low rectum using the TAMIS technique after an initial debulking. A 69-year-old male was found to have a large mid and low rectal polyp with raised components, located 1–1.5 cm from the dentate line, encompassing the lateral and posterior aspects of the rectum. Biopsy revealed a TVA with HGD. After colorectal evaluation and endoscopic rectal ultrasound (ERUS), no submucosal invasion was found, and the patient was offered a TAE via TAMIS. During the procedure, snare polypectomy was initially used to decrown the raised components of the polyp, so that the distal boundaries of the lesion could be identified and the TAMIS port inserted. Full thickness excision of the polyp with primary closure of the remaining rectal defect was successfully performed thereafter using a combined TAMIS and transanal technique. Follow up flexible sigmoidoscopy demonstrated no recurrence at the excision site.

Keywords: Transanal minimally invasive surgery (TAMIS); early rectal cancer; transanal excision (TAE); full-thickness excision; rectal polyp

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Introduction

Historically, surgeons believed that the cost and complex learning curve associated with transanal endoscopic microsurgery (TEM) limited its utilization, therefore a search for a new surgical modality began. Transanal minimally invasive surgery (TAMIS) was developed by Atallah *et al.* as an alternative to TEM. TAMIS is a minimally invasive technique used for transanal excision (TAE) of benign rectal lesions and early rectal neoplasia. First described in 2010, TAMIS takes advantage of the development of single-incision laparoscopic surgery ports to increase access to and decrease the cost of transanal endoscopic surgery (TES) (1). This technique offers numerous advantages in comparison to TEM. Easy port insertion and rapid assembly time increase surgeon comfort and procedure cost-effectiveness, while maintaining the same patient safety profile. The key limitation of TAMIS is the increased difficulty in accessing the distal rectum due to a lack of visualization of the last few centimeters—as the access port obscures the view (2). In general, TES is particularly useful for large, sessile rectal adenomas, recurrent rectal adenomas, or adenomas that

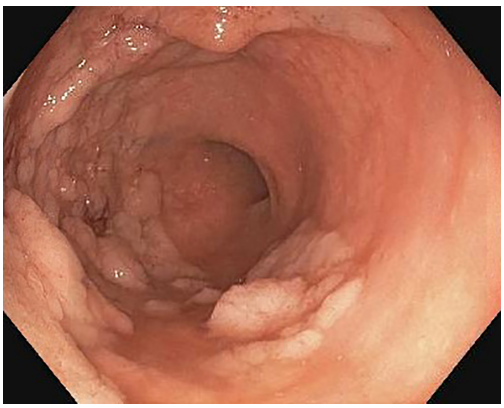

Figure 1 Flexible sigmoidoscopy with a large rectal polyp encompassing 75% of rectal circumference.

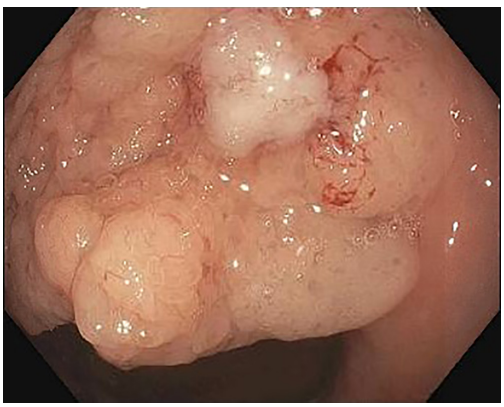

Figure 2 Flexible sigmoidoscopy demonstrating a large polypoid mass with flattened and raised components.

are not endoscopically resectable. Retrospective studies demonstrate that TES offers better outcomes—including negative resection margins, specimen fragmentation, and recurrence—when compared to conventional TAE (3,4). Reported recurrence rates after TES for benign polyps range from 4% to 7.6% (5-11).

The main indications for TAMIS are early rectal tumors including Tis, T1, and adenomas that are not accessible via conventional TAE and thus are unsuitable for endoscopic resection (12). Both the TEM and TAMIS operative techniques have been described as especially versatile for lesions in the middle and upper rectum or as an extended approach to lower sigmoid lesions, with successes reported up to 20 cm from the anal verge (13). TEM has also been indicated for various other rectal pathologies, including rectal carcinoid tumors, rectal prolapse, and palliative resection of rectal cancers (14). The TAMIS platform uses regular laparoscopic instruments to achieve high-quality, local full thickness excision and is considered less traumatic to anal sphincters than traditional TEM. Devices used for TAMIS procedures are more pliable than the 40-mm rigid scope used for TEM and therefore lead to less impairment of the anal sphincter. Furthermore, TAMIS is relatively easy to learn by qualified surgeons due to its simplicity and similarity to conventional laparoscopic surgery (1).

Patient selection and workup

A 69-year-old thin male (BMI: 21.5 kg/m^2) with an extensive past medical history including myocardial infarction, status post coronary artery bypass, and cerebrovascular accident was initially evaluated by the GI service in 2016 when he was found to have a large, flat, benign polyp with raised components in the lower rectum originating approximately 1–1.5 cm proximal to the dentate line.

He was referred to colorectal surgery for an initial evaluation. After a repeat flexible sigmoidoscopy and ERUS, a large 10 cm × 8 cm low rectal polyp was confirmed with no submucosal invasion on rectal ultrasound. Endorectal ultrasound (ERUS) demonstrated thickening of the mucosa, but no evidence of penetration into the submucosa throughout the entire length of the lesion. There was no evidence of lymphadenopathy within the mesorectum. After medical evaluation and risk stratification, the patient was offered a transanal full thickness excision of the polyp via the TAMIS technique (*Figures 1*,*2*).

Pre-operative preparation

Prior to the procedure, complete blood count (CBC), liver function test (LFT), basic metabolic panel (BMP), and carcinoembryonic antigen (CEA) tests were ordered (all presented within normal limits) in addition to a full physical examination and patient history. A mechanical bowel preparation was also completed prior to the procedure. Pre-operative antibiotics were administered within 30 minutes of incision according to the Surgical Care Improvement Project (SCIP) guidelines. Appropriate consent was obtained from the patient per our institutional protocol.

Equipment preference card

- ❖ Flexible sigmoidoscope;
- ❖ Endoscopic snare;

Figure 3 Video of combined transanal excision (TAE) and transanal minimally invasive surgery (TAMIS) for a full thickness excision of a giant tubulovillous adenoma (15).
Available online: http://www.asvide.com/article/view/27215

- 5 mm 30º laparoscopic camera;
- Laparoscopic single incision GelPoint Path port system (Applied Medical, Rancho Santa Margarita, CA, USA);
- Maryland dissector;
- Enseal tissue sealer device (Ethicon, CA, USA);
- Fine-tip and regular-tip electrocautery;
- 2-0 Vicryl sutures;
- Hill-Ferguson retractor;
- Lone Star retractor;
- Suction device;
- Anorectal tray.

Procedure (*Figure 3*)

The patient was initially placed in the supine position. Following induction of general anesthesia, a Foley catheter was inserted, and he was placed in a lithotomy position. The patient was prepped and draped in the usual, sterile fashion. Flexible sigmoidoscopy was performed first, and the large rectal polyp was identified as extending from approximately 1–1.5 cm proximal to the dentate line and ending in the mid/upper rectum. The mass encompassed approximately 75% of the rectal circumference. The sigmoidoscope was removed and a Lone Star retractor was placed for adequate visualization. The lower part of the polyp with its raised component was protruding from the anus making the identification of the distal polyp margin impossible. Using an endoscopic snare with electrocautery, the large rectal polyp was decrowned to provide better visualization and space to insert a TAMIS port. After the initial decrowning of the raised components of the polyp, the distal boundary of the lesion was visualized. The incision was made just distal to the origin of the polyp using electrocautery. The dissection was carried in the standard transanal fashion through full thickness of the rectal wall to encompass the entire polyp. After the initial dissection, there was enough space to insert GelPoint Path single incision port (Applied Medical, Rancho Santa Margarita, CA, USA) into the anus and create a pneumorectum. A 5-mm 30º camera was inserted, and the rectum was re-inspected. A Maryland dissector was used to expose the polyp with care not to grasp the polyp directly, due to a high risk of polyp auto-implantation. Full thickness dissection was continued in order to fully encompass the entire polyp. Once the most proximal extent of the polyp was reached, the rectal wall was transected in this area. The polyp was approximately 10 cm in length and encompassed 75% circumference of the rectal wall including both posterior and lateral aspects. During the excision, a small arterial bleed was encountered which was adequately controlled with bipolar electrocautery. The key point for successful bleeding control was only partial vessel injury and maintenance of tissue tension and exposure. Following excision, the defect in the rectal wall was copiously irrigated and suctioned. The TAMIS port cover was then removed. The proximal edge of the defect was grasped through the TAMIS collar and brought to the anal canal after desufflation. The defect was then evaluated for possibility of successful closure. Interrupted 2-0 and 0-0 Vicryl sutures were used to close the defect. The entire defect was closed with no significant tension. Flexible sigmoidoscopy was performed again at the end of the case with no findings of additional rectal polyps or bleeding following the procedure. The rectum was widely patent, and the entire defect was completely closed. At the end of the case the patient was placed back in the supine position and successfully extubated in the operating room.

Role of team members

Colorectal team, involving the attending colorectal surgeon and the senior general surgery resident performed the entire combined TAE and TAMIS procedure. The attending colorectal surgeon performed the critical aspects of the procedure.

Postoperative management

Following the procedure, the postoperative course was unremarkable except for urinary retention, which is a

known complication following rectal surgery. The patient was discharged home on postoperative day (POD) 1. Final pathology confirmed clear surgical margins and tubulovillous adenoma (TVA) of the resected specimen.

Unfortunately, the patient left the state following his surgery and was initially unable to attend his follow up appointment. One year later, flexible sigmoidoscopy was performed and did not demonstrate a recurrence at the excision site.

Tips, tricks, and pitfalls

- Standard principles used in transanal resection or TEM should be applied to TAMIS resection. It is recommended that the lesion should be marked with electrocautery around its circumference to ensure an adequate margin prior to beginning dissection.
- Benign lesions such as adenomas can be excised in the submucosal plane with negative margins, however, a full thickness excision with a layer of mesorectal fat is preferred for bigger and more advanced lesions.
- ERUS can be a valuable diagnostic modality for superficial tumors including Tis and T1 lesions that could be managed via TAE; however, lesions penetrating through the submucosa, perirectal fat, mesorectal fascia, or invading the peritoneum should be evaluated with magnetic resonance imaging (MRI) with rectal phase.
- For malignant lesions, a 1 cm margin should be marked out around the entire mass during a full thickness resection (16). It is extremely important to remain perpendicular to the tumor so as not to compromise the deep margin.
- Full thickness defects can technically be left open since they are extra-peritoneal; however, it is generally recommended to close all defects in a transverse fashion to prevent narrowing of the rectal lumen (17). Care is taken not to remove all the mesorectum, thus leaving the presacral tissues exposed, in order to facilitate the wound healing.
- Anterior defects in the upper and middle rectum have a higher chance of peritoneal entry, often due to lower peritoneal reflection on the anterior and lateral surfaces of the rectum (18). If intraperitoneal entry does take place, the patient should be placed in a steep Trendelenburg position to allow the abdominal contents to move cranially. Although peritoneal entry can be closed using the TAMIS technique, it can be difficult to maintain pneumorectum and adequate visualization. Therefore, a conversion to a laparoscopically assisted approach may be needed.
- Care should be taken to avoid directly grasping the polyp. This is to prevent auto-implantation in other parts of the rectum and the anal canal. Due to the tumor's high recurrence rate, these polyps should not be palpated or grasped by instruments directly, but rather elevated or exposed via other methods.
- Local hemorrhage during excision may be encountered and can be easily controlled with bipolar electrocautery or a high energy sealing device, as long as the dissection is not carried outside the mesorectal boundaries where iliac vessels can be iatrogenically injured.
- Distal lesions just above the dentate line can be difficult to access with the initial TAMIS technique, therefore a hybrid approach with a standard transanal and TAMIS platform can facilitate resection (19). The distal margin is incised using standard transanal retractors and electrocautery as presented in this case. The TAMIS port can be inserted for the remainder of proximal dissection once an adequate space is achieved.

Technical challenges of suturing within a very confined space via laparoscopic instruments allowed for the development of other suturing methods including clips, beads, barbed sutures and specialized devices such as Endostitch (TM, Covidien). Each method has its own advantages and disadvantages and each method's effectiveness is highly dependent on the surgeon's experience with a particular method.

Conclusions

We have presented a case where a large rectal polyp was excised using an innovative TAMIS platform with initial debulking completed using the conventional transanal approach. The TAMIS platform continues to evolve and gain traction with various applications in the rectum and pelvis, including benign indications. In cases with large rectal polyps and difficult exposure, it is still useful to initiate the dissection with the classic transanal approach (TAE) and continue with a TAMIS technique to achieve the best results. In some cases, the defect closure may turn out to be challenging in the TAMIS technique and knowledge of alternative classic transanal closure is helpful. Despite a paucity of comparative data, TAMIS is a safe and effective method of local resection for benign and favorable

early stage (T1) cancers following adequate workup and multidisciplinary team evaluation.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/jovs.2018.09.05). JJP serves as an unpaid editorial board member of *Journal of Visualized Surgery* from Sep 2017 to Aug 2019. The other authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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