



## Case Series

# Trans-anal minimally invasive surgery: A new technique to avoid peritoneal entry

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## ABSTRACT

**INTRODUCTION:** Transanal minimally invasive surgery (TAMIS) is a valuable surgical option for removal of rectal polyps and early rectal cancers. A potential complication of this technique is abdominal entry if the lesion is located above the peritoneal reflection. We present the first case series describing the use of a laparoscopic stapling device to remove a sessile lesion, and seal the resulting defect simultaneously with full thickness excision of the rectal lesion, avoiding abdominal entry.

**PRESENTATION OF CASES:** Five patients with rectal lesions between 8 and 14 cm from the anal verge are described in this case series. Each underwent a stapled-TAMIS procedure as the lesion was suspected to be above the peritoneal reflection. The goal specimen was achieved in each procedure.

**DISCUSSION:** This article demonstrates the feasibility of a novel technique to remove sessile polyps in the upper rectum using laparoscopic staplers trans-anally through the TAMIS port. More studies and long-term follow-up are needed to evaluate the oncologic outcomes including the recurrence rate for those lesions removed with a stapler.

**CONCLUSION:** For rectal lesions suspected to be above the peritoneal reflection, a stapled resection through a TAMIS port could prove to be a valuable addition to the standard excisional approach to TAMIS.

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## 1. Background

Traditionally, rectal lesions that were not resectable by colonoscopy required a segmental oncologic resection, either an abdomino-perineal or a low anterior resection. These segmental resections come with high risk of operative and post-operative complications [1]. Local resection, including trans-anal minimally invasive surgery (TAMIS), is currently indicated for removal of those unresectable polyps and for select early (T1) rectal cancers [2]. Less than a decade ago, TAMIS was introduced as an alternative to transanal endoscopic microsurgery (TEM) [3]. TAMIS is an excellent alternative to TEM due to ease of set-up and the utilization of standard laparoscopic instrumentation. It has also proven to be a low morbidity procedure [4].

One of the complications of transanal surgery, including TAMIS, is potential abdominal entry, particularly for higher rectal lesions

located above the peritoneal reflection [5]. If this occurs, simple transanal repair through the TAMIS platform can initially be attempted by suturing. Occasionally, if the defect is too large for simple transanal closure, laparoscopic low anterior resection is required and is a significant divergence from the intended minimally invasive approach.

An ideal approach that could prevent this complication is to simultaneously remove the lesion while closing the defect using a transanal laparoscopic stapling device. To our knowledge, this is the first case series describing five cases of removal of rectal sessile lesions in the upper portion of the rectum using a laparoscopic stapler through a TAMIS approach. Atallah, Albert and Larach reported using a stapler in one case to remove a pedunculated polyp [3].

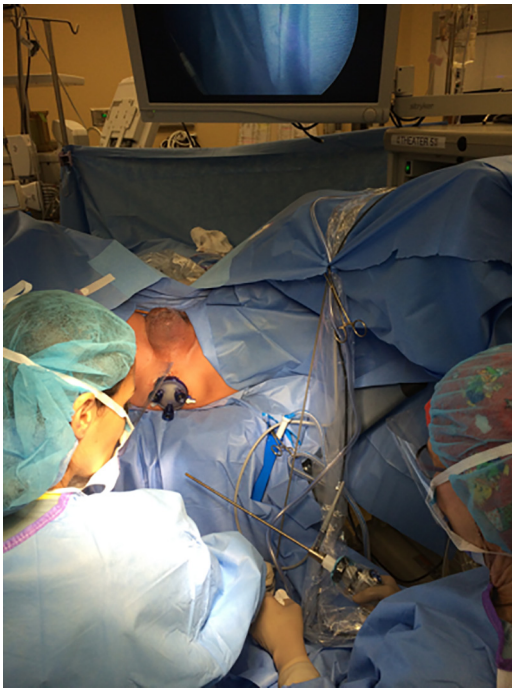
## 2. Methods

This case series has been reported in keeping with the PROCESS criteria [6] for case series. Each patient consented to have their case shared in an anonymous fashion.

After obtaining informed consent for surgery, the patient was brought to the operating room. Intravenous antibiotics were

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**Fig. 1.** Intraoperative setup for TAMIS, including the AirSeal device.



**Fig. 2.** Intraoperative view of the rectal polyp being stapled with a laparoscopic Echelon stapler.

administered: cefazolin 2 g and metronidazole 500 mg. General endotracheal or spinal anesthesia was induced and the patient was positioned in either lithotomy or prone, depending on the location of the rectal lesion. The patient was prepped and draped in the usual sterile fashion.

The GelPOINT path transanal access platform was prepared by inserting two 5 mm ports and a single 8 mm AirSeal access port into the apices of the triangular groove in the GelSeal cap. The GelPOINT access channel was lubricated and inserted into the anal canal with the assistance of the introducer. The AirSeal insufflator was connected and the rectum was insufflated to a pressure of 15 mmHg. The setup is featured in Fig. 1.

Traditionally, when intraabdominal entry is not anticipated, the hook electrocautery is used to mark a margin surrounding the lesion and a circumferential, full-thickness excision along the marked boundary is performed. However, when the polyps are in the upper rectum and the risk of abdominal entry is likely, we devised an approach to remove the lesion using a laparoscopic stapler. The patient is placed in Trendelenbourg position to encourage the small bowel into the upper abdomen. Then the lesion can be grasped with atraumatic graspers with the base well exposed. The laparoscopic stapler can then be inserted directly into the GelSeal cap, or an additional 12 mm port.

The stapler used for all patients was the Ethicon Endopath ETS-Fle × 45 mm Stapler (Device code ATS45, Ethicon, Guaynabo, Puerto Rico, USA) with blue cartridges 3.5 mm Standard 6 Rows (6R45B, Ethicon, Guaynabo, Puerto Rico, USA). However, for the first patient, the first 2 firings were done using the laparoscopic stapler Ethicon Echelon Flex 60 Stapler (PSE60A, Ethicon, Guaynabo, Puerto Rico, USA) with blue cartridges 3.5 mm Standard 6 Rows (ECR60B Ethicon, Guaynabo, Puerto Rico, USA). A combination of the Ethicon Endopath ETS-Fle × 45 mm Stapler and the Ethicon Echelon Flex 60 Stapler were used.

An atraumatic grasper was used to lift the lesion and the stapler was placed 1 cm below the base of the polyp to ensure negative macroscopic margins, as shown in Fig. 2. The stapler was then fired and the specimen removed.



**Fig. 3.** End result of the closure of the rectal defect with a laparoscopic stapler.

The traditional approach uses 3-0 Stratafix intra-corporeal suturing to close the defect. This step of the procedure was omitted as the stapler simultaneously excises the lesion and closes the defect as shown in Fig. 3. An absorbable hemostatic agent was placed in the anus for removal by the patient on post-operative day one.

The duration of each procedure was less than 40 min. All patients were discharged from the hospital on the day of surgery, with no restrictions in diet or mobilization. Their recovery was uneventful, and they were completely asymptomatic in the post-operative period. No complication, including bleeding, or perforation occurred. Follow-up included an office visit two weeks after the procedure, followed by a flexible sigmoidoscopy at 3 months to evaluate the TAMIS site. Fig. 4 displays a typical final result three months post stapled TAMIS. The American Gastroenterology Association Guidelines were used for follow-up of the benign lesions while National Comprehensive Cancer Network guidelines were used for follow-up of the malignant lesions [7].

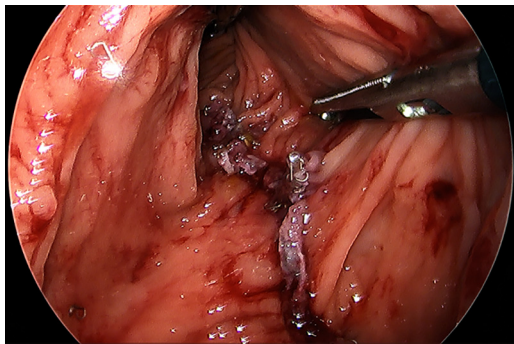


Fig. 4. Flexible sigmoidoscopy three months after a stapled TAMIS.



Fig. 5. Flexible sigmoidoscopy three months after a stapled TAMIS.

### 3. Presentation of cases

The first patient was an 88-year-old male that was referred to our center for a 1 mm neuroendocrine tumor in the upper rectum at 14 cm from the anal verge. This lesion was first diagnosed and biopsied during a routine colonoscopy. This was staged as yT1N0M0 rectal lesion. The patient had no symptoms. Additional histological findings demonstrated a 1 mm lesion without mitoses, a ki67 index at 1.1% and most importantly, positive margins. On follow-up rigid proctosigmoidoscopy, the residual stellate scar, which was less than 1 cm, was confirmed to be at 14 cm from the anal verge in the left lateral position (Fig. 5).

All treatment options were discussed with the patient including laparoscopic low anterior resection versus the less invasive trans-anal minimally invasive surgery. TAMIS procedure was selected for this patient. Given that the lesion was at 14 cm from the anal verge and therefore likely above the peritoneal reflection, a simple local excision could result in entering into the peritoneal cavity. Intraoperatively, the remaining scar was found to be mobile. It was therefore decided to proceed with the residual scar removal using a stapled technique. Echelon 60 and Endopath Flex 45 laparoscopic staplers were used, each with two reloads. The final pathology demonstrated only scar with no residual neuroendocrine tumour. The specimen was reported as full-thickness by the pathologist.

The second patient was a slim 56 years old female with an endoscopically non-resectable tubular adenoma at 12 cm from the anal verge in the anterior position. Stapled TAMIS surgery was proposed for this patient. The Endopath Flex stapler with 2 blue cartridges was used. Due to the anterior position of the lesion, in addition to abdominal entry at 12 cm, another potential complications could be vaginal trauma. A mandatory maneuver in this situation therefore was to include identification of the recto-vaginal septum using digital manual inspection. Prior to firing the stapler, a finger was kept

in the vagina to make sure that it was not pulled into the resection. An additional helpful maneuver is to develop a plane between the vagina and rectum by injecting 5–10cc of saline into the recto-vaginal septum. At the end of the excision in this case, the vagina was intact. Final pathology demonstrated a full-thickness excision, no malignancy and negative margins.

The third patient was a 65-year-old female who had a recurrent serrated adenoma at 8 cm from the anal verge. Multiple attempts for removal under colonoscopy were unsuccessful. A pelvic MRI was performed. The MRI results featured an anterior 1.2 cm rectal lesion with concerns of invasion into the anterior mesorectal fascia (possible stage T4 lesion). However, there was no obvious pelvic lymphadenopathy or evidence of vascular involvement. Furthermore, there was no invasion or malignancy demonstrated on extensive biopsy. On digital rectal examination, the lesion appeared very mobile and smooth. It was therefore believed that the MRI findings could have been secondary to scarring due to prior endoscopic resections and biopsies rather than due to the presence of an advanced cancer. The diagnostic dilemma was discussed in a multidisciplinary meeting and reviewed with the patient. A decision was made to proceed with excision using the TAMIS platform. This was to serve as an excisional biopsy to be followed by further treatment if the lesion was confirmed to be an advanced cancer. This could also be a curative procedure if the final pathology was consistent with an adenoma or a T1 cancer with good prognostic factors.

TAMIS using six laparoscopic stapler firings was performed in order to achieve macroscopically negative margins. The final pathology showed a tubulovillous adenoma with no high-grade dysplasia or malignancy with clear microscopic margins. Pathology confirmed the specimen was removed full thickness so a second procedure was spared.

The fourth patient was a 60 year old male who had a rectal lesion identified on colonoscopy after a positive FIT test. The lesion was located at 12 cm from the anal verge posteriorly and was attached to a relatively narrow pedicle. It was a large lesion which extended an additional 7 cm proximally. It was removed in a piecemeal fashion using 19 firings of the ETS Endo-GIA stapler and 3 firings of the Echelon blue powered stapler. Residual mass was left as the team had used multiple cartridges and felt that removing the distally remaining portion increased the chances of entering into the abdominal cavity. The residual mass appeared to be villous adenoma, which was felt would best be removed at an interval colonoscopy. The final pathology confirmed the specimen as villous adenoma with low-grade dysplasia. The residual lesion will be removed via colonoscopy two months post-operatively.

The fifth patient was an 81 year old, slim female who presented to hospital with hematochezia. She had a colonoscopy which showed a rectal polyp at 9 cm. Biopsy demonstrated severely dysplastic colonic epithelium suspicious for adenocarcinoma. She had a follow up endoscopic ultrasound which identified no obvious mass lesions or perirectal lymph nodes. CT imaging showed no metastatic disease. Interestingly, a pelvic MRI did not identify the lesion nor any lymph nodes of concern. Intraoperative assessment identified the lesion at 9 cm from the anal verge, in the anterolateral position. It was felt to be mobile intraoperatively and that a stapler would be beneficial to simultaneously remove and close the defect to reduce any chance of entering into the peritoneum. Three shots of the Endo-GIA stapler were fired. Final pathology identified multiple foci of well-differentiated invasive colonic adenocarcinoma within the submucosa: this lesion is pT1N0 SM3. At the follow up appointment management options going forward were discussed: full excision (via low anterior resection), which was recommended given the SM3 status, versus close surveillance. The patient wished to pursue close surveillance given her age and comorbidities. As is our standard she will undergo a flexible sigmoidoscopy at 3 months

and a colonoscopy at 1 year post-operatively. She will have a repeat MRI in 6 months time and if any findings, another repeat scope at that time. Her CEA levels will be repeated every 6 months.

#### 4. Discussion

TAMIS is a new, but well-established approach for resection of rectal polyps and early-stage rectal cancers. However, peritoneal violation is a frequent complication described in current literature. Quaresima et al report that peritoneal entry occurred in 16.2% (5/31) of their TAMIS cases. These defects were closed either with the TAMIS port or directly via conventional transanal access [8]. Caycedo et al also describe abdominal entry as one of the possible complications. Their rate of peritoneal entry was 10% (5/50) and all of them were repaired via the TAMIS port [9]. They also suggest that anterior lesions suspected to be higher than the peritoneal reflection should not be resected using the TAMIS platform, unless the surgeon is experienced in laparoscopic suturing through the TAMIS port. Molina et al report a peritoneal entry rate of 28.2% for transanal endoscopic procedures, TAMIS and TEM [10]. In their paper, three entries were closed transanally while two required conversion to abdominal laparoscopy. One was a laparoscopic low anterior resection and the other a laparoscopic Hartmann procedure. Clearly peritoneal violation is a frequent complication that needs to be addressed.

The five cases described in this report demonstrate the feasibility of incorporating a stapled approach to TAMIS surgery in order to remove sessile polyps in the upper rectum, and prevent peritoneal entry. As reported in one case by Atallah, Albert and Larach, a stapler is an option for pedunculated lesions as well [3]. No patient had any complications in the operative and post-operative periods.

In our small case series, each surgery achieved the set goal. In the context of a rectal cancer, intra-operative frozen section would be beneficial to ensure a full thickness excision and negative margins if the intention of the operation was then to convert to a segmental resection. In the fifth case, the goal of the procedure was to achieve a tissue biopsy as this was not sampled preoperatively and therefore a frozen section would not have changed intraoperative management. On pathology, although the specimen was filled with staples making it difficult to sample the margins without disruption, ultimately it was deemed to be SM3 with margins clear of adenocarcinoma. For our patient, given the clear margins for adenocarcinoma, the negative MRI, and the patient's age and preference, she accepted the risk of lymph node involvement and no formal resection was performed. TAMIS may also be undertaken for debulking purposes, as was the case for the fourth patient. With this end goal, negative margins and a full thickness excision, are, again, less important. Stapling can certainly achieve full thickness excision, particularly in pedunculated lesions, but should there be any potential alteration in operative plan, frozen section can be a valuable option.

We acknowledge the limitations of this case series. First, TAMIS is a relatively new technique and continued monitoring of long term oncological outcomes will be necessary. Preoperative assessment by thorough physical examination, and imaging are paramount as not all lesions would be amenable to this technique. Specifically, only mobile, benign or early lesions should be considered for this approach. Furthermore, because of the risk of inadvertent vaginal involvement, anterior stapling in women should be planned with additional caution. In fact, we believe, anterior stapling in women should only be considered if the lesion is above the rectovaginal septum. In rare cases where the proximal margin is above the septum and the distal margin involves a portion of the rectovaginal septum, stapling should only be considered if the thickness of the septum allows for this, as tethering of the vagina would result in a recto-vaginal fistula.

#### 5. Conclusion

TAMIS with the use of laparoscopic staplers is a novel approach that should be considered to avoid abdominal entry in high sessile rectal lesions particularly in patients with a small body habitus and potential for low peritoneal reflections. In these five cases, this technique is demonstrated to be safe and effective with a resection quality comparable to the traditional TAMIS approach.

#### Conflicts of interest

None.

#### Sources of funding

None.

#### Ethical approval

GI stapling and TAMIS platform are both individually standard procedures. We record a novel technique with combination of both and approval was not necessary.

It's a modification of a widely approved technology.

#### Consent

Written informed consent was obtained from the patients for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

#### Author contribution

Anne-Marie Dufresne: Writing the paper, data analysis, study concept (main author).

Rebecca Withers: writing paper, data interpretation.

Jonathan Ramkumar: Writing a portion of the paper.

Shawn Mackenzie: Study design.

George Melich: writing paper.

Elena Vikis: data collection, data interpretation.

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#### Guarantor

Anne-Marie Dufresne.

George Melich.

Elena Vikis.

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