



Transanal Minimally Invasive Surgery (TAMIS) Using Single Incision Laparoscopic Surgery (SILS) Port for the Management of Benign Rectal Neoplasms: a Single Center Study

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ABSTRACT

Aim: Conventional transanal excision was described decades ago for treatment of benign rectal neoplasms. However, the challenge of this technique leads to use alternative approaches. We evaluated the results of TAMIS (Transanal minimally invasive surgery) with SILS (Single incision laparoscopic surgery) port in treatment of benign rectal neoplasms. **Material and Methods:** Data of the patients who underwent TAMIS with SILS port in one center were retrospectively analyzed. SILS port was placed through the anal canal and ultrasonic harmonic scalpel device was used for excision the tumors. Complications during or after surgery were reported. Patients were followed-up by rectal examination with rectoscopy and recurrences were evaluated.

Results: Between July 2015 and March 2020, 20 patients underwent TAMIS at one center. The median age of the patients was 67 (37-79). The procedure was performed in all of the patients with a lithotomy position. Full-thickness defect after complete resection of the lesion was observed in 5 (25%) patients. However, abdominal cavity was not exposed through the TAMIS procedure in any of the patients. The rectal wall defect was not repaired in any of the patients. No major complication occurred in the patients. The hospital stay was 1 (1-4) days. The surgical margin was negative in 19 patients (95%). After the follow-up period of 9 (1-43) months, 3 (17%) patients had a recurrence and further surgery was performed.

Conclusion: TAMIS using SILS port for the management of rectal neoplasms is a safe and effective for treatment benign rectal lesions.

Keywords: Rectal adenoma, Single-incision laparoscopic surgery port, Transanal minimally invasive surgery

Introduction

Transanal excision (TAE) was described decades ago for treatment of early-stage rectal cancers and benign neoplasia of the rectum. However, this conventional approach has some limitations such as difficult accessibility in some tumors locations and difficulties may occur during the surgical procedure [1]. This approach limited the surgeon's ability to perform high-quality oncological excisions. Therefore minimal invasive techniques were introduced as an alternative approach aimed to overcome the disadvantages of conventional TAE. One of the minimally invasive techniques was transanal endoscopic microsurgery (TEM) which was introduced early in 1980s and then after it was showed that it is more effective than traditional transanal excision for resection of rectal masses [2]. However, some limitations and disadvantages like cost-effectiveness and specialized instrumentations requirement are still a problem for wide spread use of this technique. Therefore more cost-

effective technique with similar function has been described recently as another approach called transanal minimally invasive surgery (TAMIS) [3]. Intraluminal full-thickness excision of rectal neoplastic lesions can be achieved easily by TAMIS technique. This technique especially solves the cost effectively without need for special instruments thus it was described as a giant leap forward in this field [4]. In this study, we evaluated the short-term results of patients with benign rectal neoplasms who underwent transanal minimally invasive surgery (TAMIS) using single incision port in a single center.

Material and Methods

Data of the patients with benign rectal neoplasm who underwent rectal lesion excision using TAMIS technique in one center were retrospectively analyzed. Patients who have colonoscopic evaluation and pathological confirmation for adenoma that cannot be removed with colonoscopy were

included in the study. Patients who have previous rectal surgery, rectal cancer diagnosis and who did not accept operation by TAMIS technique were excluded. Preoperative workup including digital rectal examination, complete blood count, liver function tests, coagulation profiles, and total colonoscopy was performed for all the patients. The distance from the anal verge was measured during colonoscopy. All procedures were carried out after obtaining informed consent from the patients. Antithrombotic prophylaxis by low molecular-weight heparin and mechanical bowel preparation was applied in all patients before surgery. This study was approved by XXXXXXXXXXXX Ethics Committee, and all patients provided written informed consent.

TAMIS Technique

After the lithotomy position was given to the patient under general anesthesia, anal dilatation was performed. SILS (single incision laparoscopic surgery) port (Covidien, Mansfield, MA, USA) was placed through in the anal canal and fixed to the anoderm by 4 stiches with no:1 silk sutures in 4 different sides (figure 1). Pneumorectum was established with co2 insufflation through in the SILS port. A 5-mm 30-degree laparoscopic camera was inserted through in a 5 mm trocar. The rectum was explored up to the upper part. Then after the mucosa adjacent to the tumor was grasped by a non-rotaticulated grasper to elevate the lesion (figure 2). Laparoscopic harmonic scalpel (Ultracision™, model HAR 36, Ethicon Endo-surgery, Cincinnati, Ohio, USA) was used for dissection and excision the tumors (figure 3). After hemostasis was completed, the specimen was removed together with the single port (figure 4 and 5). Demographic characteristics, tumor localization, pathological features,

postoperative mortality, morbidity and recurrence rates were analyzed. Patient follow-up was performed according to specimen pathological results. Patients with benign pathology were followed-up by rectal examination and rectoscopy every 3 months in the first year and every 6 months in the second year. Annually colonoscopy was performed after the second year for patients without any recurrences. Patients who have cancer diagnosis at the definitive pathological report or who have developed recurrent adenoma have undergone further surgery by low anterior resection or abdominoperineal resection (APR).

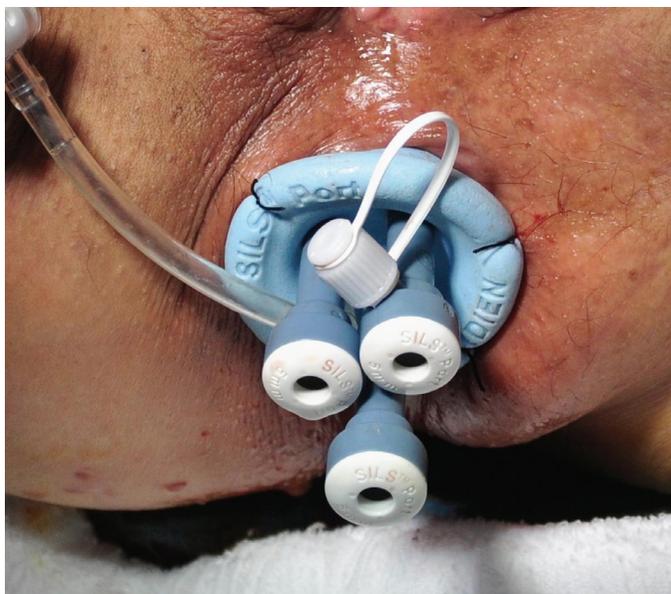


Figure 1. SILS (Single incision laparoscopic surgery) port was placed through in the anal canal.

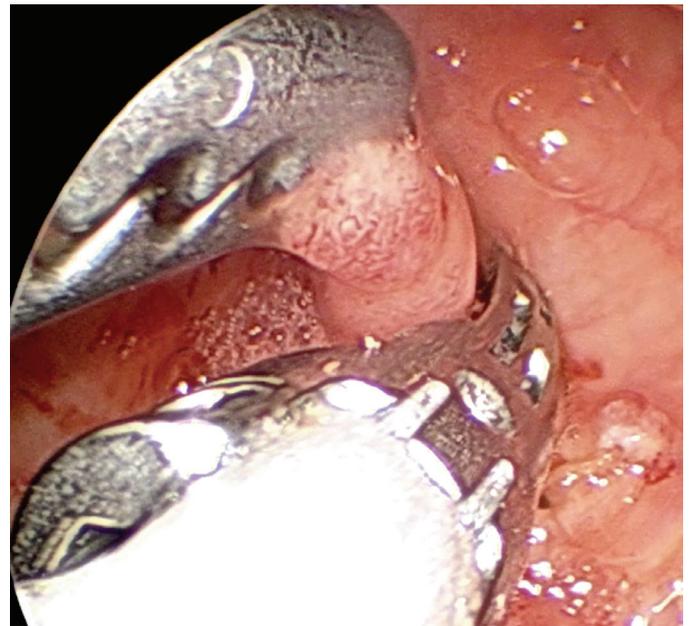


Figure 2. Elevation of the lesion using a non-rotaticulated grasper.

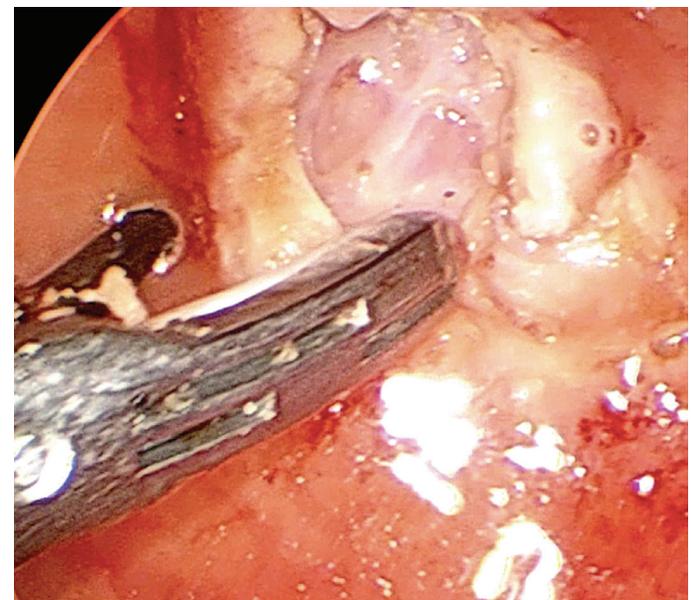


Figure 3. Dissection and excision the tumor using laparoscopic ultrasonic sealing device.

Results

Between July 2015 and March 2020, 20 patients who admitted to XXXXXX University General Surgery Department with rectal adenoma were eligible for TAMIS technique. The median age of the patients was 67 (37-79) and 10 (50%) were male. The most common presentation of the patients was rectal bleeding (n=9, 45%) followed by constipation and anemia. Tenesmus, pain, and mucus defecation were less common presentation symptoms. The median distances of the rectal tumors from the anal verge were 6.4 (2-10) cm. The median tumor diameter was 3 (2-5) cm. Pathology reports of colonoscopic biopsies revealed tubulovillous adenoma in all the patients. ASA (the American Society of Anesthesiologist) score was 1 or 2 in the majority (82%) of the patients. Full-thickness defect after complete resection of the lesion was described as the exposing of the perirectal



Figure 4. After completed excision the tumor was grasped to be removed together with the single port.



Figure 5. The macroscopic view of the specimen

adipose tissue and it was observed in 5 (25%) patients (Figure 6). However, abdominal cavity was not exposed through the TAMIS procedure in any of the patients. The rectal wall defect was not repaired in any of the patients. Postoperative CT of the cases with full-thickness defects showed free air at the perirectal area, but free abdominal air was not observed in any of them. No conversion from TAMIS to open or laparoscopic surgery was performed. Oral nutrition was started on the first postoperative day in all patients. The median hospital stay was 1 (1-3) days. Scrotal emphysema occurred in 2 patients which resolved spontaneously. Definitive pathology reports showed the diagnosis of adenocarcinoma in 2 (10%) after TAMIS. APR was performed in one patient and its final pathology reported as ulcer, fibrosis with tumor negative 9 lymph node. In the other one, tumor was found with stage T1 and follow up without surgery was preferred due to the old age and bad general condition. Positive surgical margin was reported in 1 (5%) patient. The median follow-up of the patients was 9 (1-43) months. Three (15%) patients had a recurrence of the adenoma without cancer during the follow-up. However, we did not try re-TAMIS because we thought that re-TAMIS will be high risky procedure. Therefore, low anterior resection was performed for all of them (Table1)

Discussion

In this study of 20 patients who underwent TAMIS procedure using SILS port for treatment benign rectal tumor in one center, it has been shown that this approach is safe, effective and has a favorable outcome after a short term of follow up. Including consecutive patients to prevent selection bias, standard using of SILS port and using single energy source in all patients are considered the strengths of this study. In the literature, there is no distinction in terms of age, gender or ASA classification for TAMIS procedure. Patients up to 90 age can successfully operated with TAMIS [5]. Previous studies with high volume series showed 4% to 20% of positive surgical margin after TAMIS procedure



Figure 6. Full-thickness defect after complete resection of the lesion

[6]. It was reported that positive surgical margin was observed particularly in patients with anterior lesions under lithotomy position and the first cases performed during learning curve [7]. In this study we observed that positive margin rate was low (5%) which was compatible with the literature. Recent studies showed a rate of 6% to 22 % of recurrence after TAMIS procedure [3, 5, 6, 8]. In this study recurrence was observed in 3 (15%) patients, which is similar to rates reported before. Previous studies reported that TAMIS procedure can be performed for the lesions between 3 and 15 cm to the anal verge [8–11]. However in this study TAMIS procedure was performed for lesions including those which was close 2 cm to anal verge. There was no consensus about the size of lesions which could be eligible for TAMIS procedure. Previous studies with big number of patients reported a median lesion diameter of

3.1 cm (0.8- 4.75) [4]. Similarly, in this study the median lesion diameter was 3 cm (2-5).

Because of the possibility of an invasive component, full-thickness excision is believed to be necessary when local excision is performed for malignancy [7]. Some authors in previous studies suggested that lesions with malignant characteristics should be treated with full-thickness resection without compromising the deep plane of the tumor, while they suggested that 1 mm negative margin is sufficient for adenomas. Therefore, preoperative evaluation of the lesions is important [12]. Strict patient selection is required to optimize results. Lee and colleagues developed an algorithm and TAMIS were performed for curative purposes if the lesion was benign or had no high-risk features [6]. In this study there was no attempt to perform full-thickness excision since all of the patients including into the study have rectal adenoma diagnosis confirmed by colonoscopy with biopsy. Full thickness excisions can be sewn using TAMIS technique even if the peritoneum is entered. Full-thickness resection for neoplasms located in anterior wall of the upper-third of the rectum (above the peritoneal reflection), inevitably leads to penetration into the peritoneal cavity. Chen et al. reported 4 patients (16%) had an intraoperative peritoneal cavity penetration through in the anterior rectal wall [7]. In another study therefore, these patients should be informed that trans abdominal access may be required to close the defect [6]. In this study none of the patients had perforation into the peritoneal cavity. Therefore, neither trans abdominal access nor defect closure was required in any of the patients. Fortunately, full thickness defect which was observed in 5 patients was under peritoneal reflection. Despite of closure the defect with clip or suture has been suggested in various small series, a meta analyses, evaluated 489 patients, showed that outcomes was not different between the patients with or without closure [13]. In this study we favor do not stitch up the defect after the resection. In previous studies, some of the patients discharged on the surgery day. On the other hand, some were discharged on the 25th-day due to complications [5]. However, in this study the median hospital stay was 1(1-3) day which was sufficient and cost effective for that kind of procedures. Postoperative morbidity was recorded up to 11% of patients in large series that include hemorrhage, urinary retention, scrotal or subcutaneous emphysema and perirectal abscess [6]. TAMIS was performed for 20 patients in this study and no major complication occurred in the patients. TAMIS procedure can be performed either by lithotomy or prone position of the patient [14]. We preferred lithotomy position in all patients since this position was also mostly preferred by anesthesiology team and we thought that using 30 degree camera facilitate the excision of the

Table 1. Demographic Features and Outcomes of the Patients

	n=20
Median Age (years)	67 (37-79)
Gender	
Male	10 (%50)
Female	10 (%50)
ASA score	7 (%35) 11 (%55) 2 (%10) 0
Presentation symptom	
Rectal bleeding	9 (45%)
Constipation	5 (25%)
Anemia	5 (25%)
Abdominal pain	4 (20%)
No symptom (diagnosis during Screening colonoscopy)	3 (15%)
Weight loss	1 (5%)
Anal pain	1 (5%)
Tenesmus	1 (5%)
Median tumor distance from the anal verge (min -max) (cm)	6.4 (2-10)
Complications	
Hemorrhage	0 (0%)
urinary retention	0(0%)
perirectal abscess	0(0%)
scrotal emphysema	2 (10%)
Median length of hospital stay (min-max) (days)	1 (1-4)
FollowUp (Months)	9 (1-43)
Positive surgical margin	1(5%)
Tumor recurrence	3 (15%)

rectal lesions in any location of the lesion irrespective of the patient position. Retrospective design, small sample size and short follow-up period are the limitations of this study.

Conclusion

Transanal minimally invasive surgery (TAMIS) using single incision laparoscopic surgery (SILS) port is a safe and effective technique for benign rectal lesion excision. Furthermore, defect closure is not usually necessary. Further studies with more patients and long-term follow-up are needed.

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