Feasibility of Transanal Minimally Invasive Surgery (TAMIS) for Rectal Tumours and Its Impact on Quality of Life – The Bristol Series

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Abstract. *Aim: We assessed feasibility of the transanal minimally invasive surgery (TAMIS) procedure and quality of life postoperatively. Patients and Methods: A total of 28 patients with rectal lesions were treated using TAMIS at Southmead Hospital, North Bristol NHS Trust. Outcome measures included feasibility of excision, negative margin (R0) resection rate, length of hospital stay, morbidity and mortality, and postoperative quality of life associated with anal incontinence. Results; TAMIS was feasible in 90% of cases. R0 resection was 82%. The mean length of hospital stay was 1.5 days. Six (21%) patients experienced acute urinary retention postoperatively. One (4%) patient was re-admitted with rectal bleeding. One patient experienced a perforation. Mortality was 0%. Postoperative quality of life indicated low severity of symptoms of anal incontinence. Conclusion: This study demonstrates that TAMIS is a feasible option in the treatment of rectal tumours and does not impair quality of life postoperatively.*

Over the past 5 years, transanal surgery has increasingly been described using standard laparoscopic instruments through a single port. This was first described using the single incision port (SILS, Covidien, Minneapolis, MN, USA) (1) and following on from this the Gel Point Path port (Applied Medical, CA, USA) has been adapted specifically for the transanal minimally invasive surgery (TAMIS) technique. The costs are much lower and more accessible for the average colorectal unit than use of transanal endoscopic microsurgery (TEM) (2). The safety and efficacy of the TAMIS approach has been reported in small case series worldwide (3-11). However, the TAMIS approach is currently not yet validated in the treatment of early rectal cancer with larger-scale and longer follow-up studies.

Current national UK guidelines recommend radical total mesorectal excision (TME) as the gold standard of treatment for rectal cancer (12). Trials are underway comparing the oncological outcomes of TME with local excision and radiotherapy (13). Alongside this, use of transanal TAMIS alongside laparoscopic TME (TaTME) is gaining popularity in the treatment of low rectal cancer. These cases are well known to be challenging, particularly in the male irradiated pelvis. The recent Association of Coloproctology of Great Britain and Ireland Consensus Statement of the TaTME technique for low rectal cancer have concluded that there is a steep learning curve associated with transanal laparoscopic surgery (14). The Oxford study reported a mean operative time of 315.3 min and have recommended that only surgeons trained in the laparoscopic transanal platform attempt TaTME surgery (15).

Functional bowel disturbance after rectal cancer surgery has been reported in up to 45% of patients at 12 months (16). Chronic symptoms, such as anal incontinence, can have a significant impact on quality of life. The risk of anal sphincter disturbance with local excision of rectal tumours has been reported (14). The functional outcome of patients undergoing the TAMIS procedure, however, has not been evaluated to our knowledge.

We describe the Bristol TAMIS series and evaluate: i) feasibility of excision of rectal lesions excised using this technique, ii) negative margin resection rate (R0), iii) length of stay, iv) morbidity and mortality, and v) quality of life associated with anal incontinence.

Patients and Methods

A total of 28 consecutive patients underwent TAMIS for excision of a rectal tumour between March 2013 and May 2015. All cases were undertaken by a single surgeon at a teaching hospital in North Bristol, UK. All patients had undergone prior endoscopic evaluation

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of rectal lesions. In benign cases, patients were offered this technique as an alternative to endoscopic mucosal resection (EMR). In malignant cases, the patients were assessed as unfit for TME and offered this procedure as palliation.

All patients received full bowel preparation on the day prior to the procedure (Moviprep, Salix, NC, USA). All surgeries were performed under general anaesthesia in the Lloyd Davies supine position. A Gel Point Path port was used in the majority of cases, a SILS port for the remainder.

Upon insertion, the obturator was removed and the port swiftly inserted with the use of a Hill Ferguson retractor. A pneumorectum was established with 15 mmHg CO_2 and maintained at 40 mmHg per min. A 10 mm 30-degree laparoscope, Maryland forceps, laparoscopic hook diathermy and high-energy device were used. Submucosal dissection was performed en bloc for the larger carpet adenomas. Otherwise, a full-thickness disc resection was performed with a 1 cm margin of healthy tissue. All full-thickness defects were repaired using a continuous locking absorbable suture.

All patients underwent endoscopic evaluation at 3 months. Quality of life associated with anal incontinence was assessed during follow-up using the quality-of-life section (questions 19-23) from the International Consultation on Incontinence Modular Questionnaire (ICIQ) bowel symptoms questionnaire. This questionnaire is patient-reported and has been validated for use in patients who experience faecal incontinence due to solid, liquid or flatus (17).

Results

A total of 28 patients underwent this technique, 50% were females and 50% males (Table I). The median age of patients was 73 years (range=51-91 years). In three cases, it was not possible to remove the rectal lesion successfully using the TAMIS procedure. In one case, a 90-mm carpet adenoma was found to occupy 75% of the circumference of the lumen and so TAMIS was abandoned in favour of a laparoscopic anterior resection. In the second case, a 12 mm rectal cancer was seen above the recto-sigmoidal junction. This lesion was inaccessible using TAMIS and the procedure was converted to a laparoscopic anterior resection. The third case was a planned palliative de-bulking of rectal cancer. This tumour was extensive and remained incomplete (R2) due to extensive size. The patient underwent palliative radiotherapy and died 12 months later.

Benign lesions. Overall, 17 benign rectal polyps were removed. The median size of lesions was 50 mm (range=12-115 mm). Treatment intent was curative in 16/17 cases. Twelve out of 17 (71%) cases had a negative resection margin (R0). There were five patients with a positive resection margin (R1). These cases were the larger carpet adenomas with an average size of 57 mm (range=40-93 mm). At this size, the EMR technique would have been performed in a piecemeal fashion and perhaps over several sittings. Resection margins under these circumstances cannot usually be assessed pathologically.

One patient (6%) was diagnosed with a polyp recurrence at follow-up which was removed endoscopically. One patient declined follow-up.

Rectal cancer. A total of 11 malignant rectal lesions were removed. The median size of lesions was 43 mm (range=12-95 mm). Treatment intent was palliative in 9/11 cases (82%). In one benign case, an unexpected Haggitt 1 cancer was diagnosed with a 12 mm margin (R0). This patient opted for close endoscopic surveillance. One (10%) case had a close resection margin of 0.4 mm. This occurred in a patient with a large adenoma with an unexpected cancer diagnosis. Where lesions were known to be malignant, R0 was 100%. One patient (9%) experienced a recurrence of rectal cancer 11 months after the TAMIS procedure and has been referred for palliative radiotherapy; she is still unfit for radical surgery.

The mean length of stay for patients overall after successful TAMIS procedure was 1.5 days (range=0-4 days). After 15 cases were performed, we found it unnecessary to keep patients in hospital overnight for observation. We are now more likely to perform this operation as a day case procedure.

Two patients (7%) experienced postoperative urinary retention and were discharged home with an indwelling catheter bag. In all cases, successful catheter removal took place at a later date, with one patient needing to undergo a transurethral resection of the prostate. Four patients developed urinary retention postoperatively; all four cases resolved prior to discharge. As a result of these urinary complications, all subsequent patients underwent a one-off 'in-out' catheterisation at the start of the procedure. This modification has resulted in reduced incidence of postoperative urinary retention.

One patient (4%) was re-admitted 2 weeks after the TAMIS procedure with acute rectal bleeding. He underwent an examination under general anaesthesia and no obvious bleeding point was seen. The bleeding resolved conservatively. He was taking oral anticoagulants and so was thought to be at higher risk of bleeding.

One patient (4%) experienced a full-thickness perforation during the TAMIS procedure. The tumour was located at the recto-sigmoidal junction. A full-thickness approach was planned in this case as the tumour was a non lifting polyp. At the time of perforation, it was possible to directly suture the defect without converting to laparoscopic or open abdominal surgery. The patient was discharged as planned the next day, with a 5-day course of broad-spectrum antibiotics. The pathology of the specimen was a 1.5 cm diverticular abscess. The lesion had not been biopsied preoperatively as it was felt to be at high risk for adenocarcinoma.

The 30-day mortality was 0%.

Overall, 50% of patients (13/26) responded to the ICIQ bowel symptoms questionnaire. Two patients (8%) had died

Table I. *Outcome data*.

No.	Gender	Age (years)	Curative intent	Size of lesion	Clear margins	Complications	Follow-up
Benign cases							
1	F	75	Yes	65 mm	Yes	None	Clear
2	M	65	Yes	33 mm	Yes	Urinary leg bag	Clear
3	M	78	Yes	90 mm	Yes	Converted to laparoscopic anterior resection	Clear
4	M	70	Yes	33 mm	Yes	Urinary leg bag	Clear
5	F	82	Yes	115 mm	Yes	None	Clear
6	M	75	Yes	25 mm	Yes	None	Clear
7	M	81	Yes	45 mm	No	Bleed 2 weeks post procedure. Resolved conservatively	Clear
8	F	66	Yes	40 mm	Yes	None	Clear
9	F	86	No	40 mm	No	None	Declined
10	M	81	Yes	62 mm	No	Stricture requiring endoscopic dilatation	Clear
11	M	63	Yes	No residual disease	Yes	None	Clear
12	F	68	Yes	50 mm	Yes	None	Polyp recurrence – snared endoscopically
13	M	74	Yes	45 mm	No	None	Clear
14	M	74	Yes	30 mm	Yes	None	Clear
15	F	62	Yes	93 mm	No	None	Clear
16	M	75	Yes	12 mm	Yes	Sigmoid perforation sutured at operation	Clear
17	M	77	Yes	15 mm	Yes	None	Clear
Malignant cases							
18	F	51	Yes	45 mm	Yes	None	Clear
19	F	79	No	61 mm	Yes	None	Clear
20	F	69	No	28 mm	Yes	None	clear
21	F	70	No	13 mm	Yes	None	Clear
22	F	85	No	43 mm	Yes	Converted to open anterior resection	Recurrent rectal cancer
23	M	75	No	43 mm	Yes	None	Clear
24	M	91	No	95 mm	No	Converted to endoscopic de-bulking	Required further procedures endoscopically
25	F	87	No	30 mm	Yes	Persistent temperature requiring antibiotics	Clear
26	F	57	No	30 mm	Yes	Urinary retention	Recurrent cancer at 11 months. Palliative radiotherapy given as unfit for surgery
27	M	85	No	12 mm	Yes	Failed TAMIS converted to laparoscopic anterior resection	Clear
28	F	52	Yes	52 mm	0.4 mm	Small focus of invasion within carpet adenoma	Early elective laparoscopic anterior resection performed

M: Male; F: female.

before the questionnaire follow-up due to subsequent medical diagnoses. The quality-of-life section of the questionnaire involves answering five questions about self-perceived impact of anal incontinence and symptom severity. A higher score indicates increasing severity of symptoms. The highest possible score is 60. In this sample, the median score was 15 (Table II). A total of 11/13 patients scored under 30, and two patients had scores outlying at 36 and 53.

Discussion

In this all-inclusive transanal series from Bristol, we report increasing success rates of the TAMIS technique in older patients with rectal cancer who were deemed unfit for radical surgery by TME. We report a 90% success rate in the removal of larger rectal lesions that would traditionally not fit the criteria for transanal excision. The benefit to the

Table II. *Individual scores for bowel questions 19-23. Maximum possible score: 60.*

Responder	1	2	3	4	5	6	7	8	9	10	11	12	13
Total score	14	12	36	0	15	26	28	10	53	7	20	10	28

patient is that removal of their rectal tumour can be achieved in one sitting by TAMIS.

Transanal excision of rectal tumours as a definitive treatment option for rectal cancer may only be suitable for a select group of patients. This is due to an unacceptably high rate of local recurrence of up to 47% (18). Radical TME still remains the definitive treatment option for rectal cancer; however, we are increasingly treating older patients who may be too unfit to undergo radical surgery with the possibility of a stoma (19). The GRECCAR 2 trial aims to assess local excision in down-staged T2/3rectal cancer in fit patients. It may hopefully identify a group of patients based on clinical response for whom local excision and neoadjuvant treatment carries the most benefit (20).

Our results compare favourably with endoscopic removal. At 5 cm in size for benign lesions and 4 cm for malignancies, these lesions would be classified as complex according to the British Society of Gastroenterology guidelines (21). In these latest guidelines, removal of tumours over 4 cm in size should only be undertaken by clinicians with sufficient expertise. This is due to the high risk of adverse events occurring, such as bleeding or perforation. Certainly use of the EMR technique would not permit margin assessment and may necessitate multiple procedures to safely remove one larger lesion. For lesions this size, endoscopic submucosal dissection has gained popularity, however, it is a highly specialized procedure that is currently only offered in a few centres in the UK. It is associated with a lower R0 resection rate of 70%, however, risk of perforation is higher than that associated with the TAMIS procedure (22).

Local excision of rectal tumours using TEM has been associated with anal sphincter disturbance (14). Anal sphincter disturbance after TEM may be attributed to the large size of the TEM microscope, however, functional outcome data are mixed, with some studies reporting no disturbance in function (23). Potentially, such disturbance in function may be due to the duration of the operation. For TEM procedures, this has been reported to be103 min (24). All 28 of our cases required less than 60 min transanal operating time.

Our postoperative quality-of-life results demonstrate that the functional outcome after this type of surgery is, overall, within acceptable limits. Ideally, we would have liked an increased response rate to our questionnaire. The majority of non-responders were over 75 years old and may have found that method of communication difficult. One study assessed anal sphincter injury after TAMIS using endo-anal ultrasound and found this to be negligible (4). Quality of life as a result of functional anal disturbance has not been investigated before as far as we are aware, and larger studies with longer follow-up data would need to be undertaken to investigate this question further.

Our study is the first UK series to attempt this technique for all rectal lesions, regardless of size. Our results point towards increasing indications for TAMIS other than a rectal lesion of 3 cm or less in the mid to upper rectum, preferably posteriorly placed. Our series has shown that the TAMIS procedure may be attempted in more extensive lesions when en-bloc removal is desirable. Broadening the indications for this procedure will also have the benefit of gaining valuable laparoscopic transanal operating exposure for colorectal surgeons looking to perform TaTME at a later stage.

Overall the associated morbidity, even in the older patient, appears to be within acceptable limits. Whilst it is exciting to think that this technique may be suitable for definitive rectal cancer treatment, its real advantage is in surgical management of rectal lesions in the older patient where curative intent is not always the main priority. In this group of patients, the inconvenience of multiple snare removals endoscopically or the risks of radical surgery can outweigh the benefits in terms of major morbidity and mortality.

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