

ORIGINAL ARTICLE

Synchronous laparoscopic low anterior and transanal endoscopic microsurgery total mesorectal resection

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Abstract

Background: Laparoscopic low anterior resection (Lap LAR) and total mesorectal excision (TME) is the standard minimally invasive surgery (MIS) for mid and low rectal tumours. However, the pelvic resection in particular for bulky tumour in the narrow male pelvis has always been a challenge for surgeons. Transanal endoscopic microsurgery (TEM) is a well-established technique and synchronous abdomino-perineal excision of rectum (APER) is also a standard procedure. Hence, we applied the same concept to Synchronous Lap LAR and Transanal-TME. **Material and methods:** Transanal TME was carried out with TEM instruments and rectoscope. Synchronous Lap LAR was performed and dissection joined to the pelvic part. The specimen was then retrieved via extension of the left lower quadrant port. An anvil was inserted into the proximal colon and intracorporeal transrectal anastomosis was performed to reconstitute the continuity of the bowel. **Results:** We reported the feasibility of transanal total mesorectal excision (TME) by combination of Synchronous Lap LAR and TEM. We operated on three cases, two male patients and one female patient. We performed an intracorporeal transanal stapled coloanal anastomosis in all of them using the KOL perineal set (Touchstone, Suzhou, Jiangsu, China). The trans-abdominal and transanal dissection can be joined together with ease and accuracy. **Conclusions:** Transanal total mesorectal excision (TME) by synchronous Lap LAR and TEM is feasible. We combine operative techniques which are well established, currently available and cost-effective for bulky tumour in the narrow pelvis.

Key words: *Transanal endoscopic microsurgery, total mesorectal resection*

Introduction

Laparoscopic low anterior resection (Lap LAR) and total mesorectal excision (TME) (1) is the current gold standard of minimally invasive surgery (MIS) for mid and low rectal tumours. However, pelvic resection, in particular for bulky tumour in the narrow male pelvis, has always been a challenge for surgeons.

Due to the curvature of the pelvis, when we perform Lap TME, we are working at a difficult angle-up position, in particular at the prostate level or at the Pouch of Douglas. Transanal TME (2), as a bottom-up approach, provides a straight end-on view for the distal part of TME which makes pelvic dissection much easier.

Transanal endoscopic microsurgery (TEM) (3) is a well-established technique for local excision of early rectal tumour. In fact, it is also single port surgery (4)

as well as natural orifice transluminal endoscopic surgery (NOTES). We made use of TEM (5) to serve as an endoscopic platform for total mesorectal excision (TME).

Synchronous abdomino-perineal excision of rectum (6) (APER) is also a standard procedure. The abdominal and the perineal surgeon could often guide each other in the dissection at the “Holy plane” in a “rendezvous” manner, i.e. meet each other in the middle. It saved quite significant operation time. Hence, we applied the same concept to Lap LAR and TEM-TME.

Material and methods

Our technique was divided into peranal part, synchronous transanal part and trans-abdominal part.

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Subsequently the specimen was retrieved and inspected along with the doughnuts. Then routine covering ileostomy was performed.

Peranal part

With the patient in lithotomy position, the rectum was irrigated with Betadine solution. Then a purse-string suture was applied at the distal rectum to prepare for transanal anastomosis. The perineal set of KOL (Touchstone Suzhou, Jiangse, China) was used.

After gentle digital dilatation of the anus, the circular anal dilator was inserted. The semi-circular anoscope was then used to place our purse-string suture as in stapled haemorrhoidopexy. Double purse-string suture (Figure 1) was placed as a safeguard as it is easy to break after insertion of the TEM rectoscope. They would serve as the purse-string for our distal doughnut of anastomosis.

Transanal part

Then the patient was put in the Lloyd Davies Position. A transanal endoscopic microsurgery (TEM) resectoscope was inserted and the level of the tumour identified. Full thickness excision of at least 2 cm distal to tumour was performed. This distal margin was sutured up with continuous stitch by endoluminal TEM techniques as in the usual fashion. Dislodgement and implantation of tumour cells was prevented. Further irrigation of the distal stump with Betadine solution was performed.

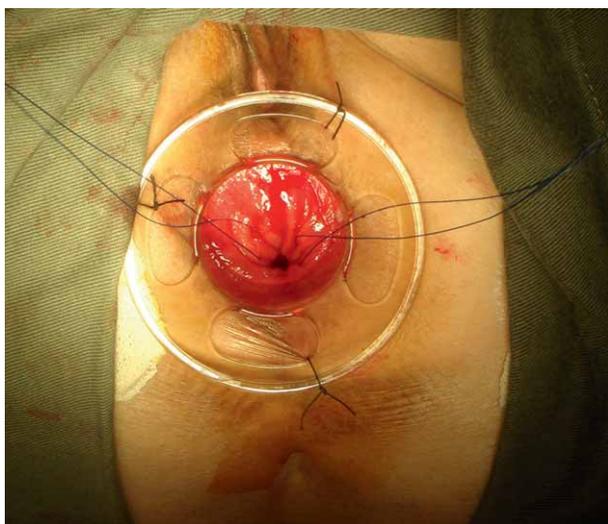


Figure 1. Double purse-string suture with anoscope and anal dilator.

Transanal total mesorectal excision (TME) was carried out with angulated TEM instruments and an ultrasonic dissector. The pneumorectum helped considerably in the exposure and dissection along the correct plane. Firstly, posterior dissection was performed to identify the “Holy plane” and was then followed proximally.

Anterior dissection along the Denonvillier fascia with the prostate as our landmark was carried out. In the female, along the rectovaginal septum, the landmark would be the vagina. The anterior dissection was extended proximally and since we had an excellent end-on view, the peritoneum could be reached with ease. By that time, we had joined the trans-abdominal and the transanal dissection together.

After completing both anterior and posterior dissection distally, we proceeded with the lateral dissection and took care of the middle rectal ligaments. A gauze was inserted as a guide for further dissection towards the pelvis by the abdominal surgeon.

Transabdominal part

Lap LAR was performed by the abdominal surgeon synchronous to our transanal dissection (Figure 2). We used standard techniques with four working ports with one camera port. As usual practice in oriental patients, we would perform mobilization of sigmoid, descending colon and splenic flexure if indicated. The inferior mesenteric artery was transected flush to the aorta with preservation of the nerve plexuses and the inferior mesenteric vein was transected with high tie. A trial descent was performed before we retrieved the specimen via the left lower quadrant port.

The tumour was resected and the anvil was placed at the proximal colon. This was then returned into the peritoneum. Pneumoperitoneum was re-established and the anvil was delivered through the distal purse-



Figure 2. Synchronous approach of Lap LAR with TEM assisted transanal total mesorectal excision (TME).

string prepared at the beginning of the operation. It was joined up with the KOL stapling device. The intraluminal purse-string can be pulled through the KOL device providing extra tension ensuring a complete doughnut (Figure 3). Intracorporeal transrectal anastomosis was performed to reconstitute continuity of bowel.

After firing the staples, we inspected the anastomosis with the aid of the anoscope. By putting saline in the lumen, we could inspect the anastomosis and if there were bubbles coming out, we could put in a stitch to ensure no leakage. This is the so-called “reverse leak test” using the pneumoperitoneum and fluid in the anorectal region.

Results

We reported the feasibility of our technique in three patients. The first, a 76-year-old man, suffered from rectal carcinoma at 4 cm from the dentate line, MRI revealed T3 and he underwent chemoradiation. Bowel preparation was very poor and we had to perform lavage intraoperatively. The operation time was prolonged to 400 min. There was turbid fluid from the drain initially, but it cleared up a few days later. We left the drain in for a longer period and finally discharged the patient on day 8. Pathology revealed pT3N0M0 moderated differentiated adenocarcinoma with clear margin.

The second patient was an 82-year-old man with a giant villous adenoma extending from 4 to 10 cm from the dentate line. Biopsy revealed severe dysplasia and he insisted to have major resection instead of a hybrid procedure of TEM and perianal resection. Pathology showed intramucosal adenocarcinoma arising from

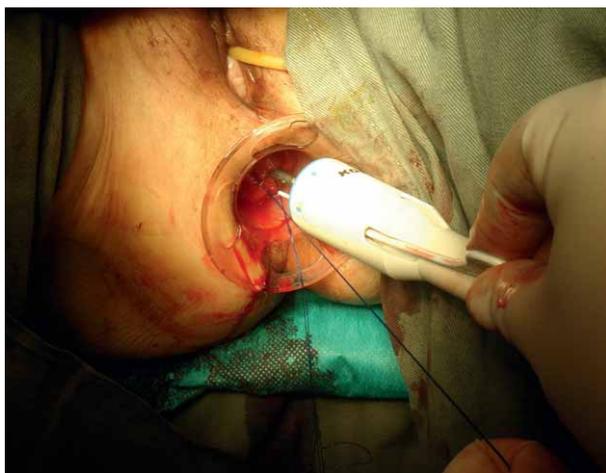


Figure 3. The intraluminal purse-string can be pulled through the KOL device providing extra tension ensuring a complete doughnut.

villous adenoma (pTisN0M0) with clear margin. The post-operative course was uneventful.

The third patient was an 82-year-old woman with a circumferential bulky rectal carcinoma at 5 cm from the dentate line. She had been denied pre-operative chemoradiation by her oncologist in view of her age. We had to spend time for adhesiolysis due to a previous abdominal operation and she was also detected to have surgical emphysema intra-operatively. Despite the long operation time of 330 min, she enjoyed a smooth recovery. Pathology revealed pT3N2M0 moderated differentiated adenocarcinoma with clear margin. She was discharged on day 5.

Discussion

Laparoscopic low anterior resection (Lap LAR) and total mesorectal excision (TME) is the current gold standard of treatment of mid and low rectal tumours. However, bulky tumour in the narrow male pelvis has remained a challenge. Robotic assisted surgery was in vogue but recent data indicate that it was too expensive to be cost-effective.

Due to the curvature of the pelvis, when we perform Lap TME, we are working at a difficult angle-up position, in particular at the prostate level or at the Pouch of Douglas. Our practice of rotating our 30° lens to “look upwards” may help but was not ideal. Furthermore, our usual laparoscopic instruments were all straight.

By thinking out of the box, the solution appeared to be transanal TME. This “bottom-up” approach provided a straight end-on view for the distal part of TME which made the pelvic dissection much easier. However, the limited space in the anorectal region and the difficulty in reaching up through the anal sphincters were hindrances.

Transanal endoscopic microsurgery (TEM) is a well-established technique for local excision of early rectal tumour. In fact, it is also single port surgery as well as natural orifice transluminal endoscopic surgery (NOTES) (7).

Modification included transanal endoscopic operation (TEO) (8), transanal minimally invasive surgery (TAMIS) (9) and also different kinds of single port devices were used via the transanal approach. However, TEM is the best in terms of the dedicated electrosurgical unit with direct feedback of intraluminal pressure, the articulated instruments (10), and the special skill set of endoluminal dissection. Hence, we selected TEM (11) as our endoscopic surgery platform for transanal TME.

Synchronous abdomino-perineal excision of rectum (APER) is also a standard procedure. The abdominal

and the perineal surgeon could often guide each other in the dissection in a "rendezvous" manner, i.e. meet each other in the middle. It saved quite significant operation time. Hence, we applied the same concept to Lap LAR (12) and TEM-TME. The technique of leaving the gauze in the pelvis was a useful measure. The gauze serves as a guide to direct the dissection by the abdominal surgeon. When we identify the gauze, it confirms that we are in the correct plane. Hence we can continue with our circumferential total mesorectal excision (TME) confidently. It is particularly useful for pelvic dissection in the narrow male pelvis. The dissection plane may be obscured due to the angulation of the pelvis and blood-stained fluid. The gauze serves as a guide to direct our dissection and also helps in absorbing excess fluid.

The intracoporeal endolumenal coloanal anastomosis (CAA) was made feasible by the KOL (Touchstone, Suzhou, Jiangsu, China) stapling gun. The mechanism was like that used in stapled haemorrhoidopexy whereby the purse-string and the additional anchorage suture can be pulled from within the ring of staples. On the other hand, it was designed to accommodate full-thickness stapling and cutting, thus ensuring complete doughnuts. It also avoided the potential risks of "dog ears" as a result of double stapling. As only one stapling gun was used, it was translated into cost-saving advantage.

Conclusion

Transanal total mesorectal excision (TME) by synchronous Lap LAR and TEM is feasible. We combine operative techniques which are well established, currently available and cost-effective. Most important of all, it complies with the oncological principles. We are looking forward to more developments in ports and instruments for Transanal minimally invasive surgery (TAMIS) or NOTES as well as dedicated circular staplers.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

References

1. Heald RJ. The "Holy Plane" of rectal surgery. *J R Soc Med.* 1988;81:503-8.
2. Heald RJ. A new solution to some old problems: transanal TME. *Tech Coloproctol.* 2013;17:257-8.
3. Meng WCS, Lau PYY, Yip AWC. Treatment of early rectal tumours by transanal endoscopic microsurgery in Hong Kong: prospective study. *Hong Kong Med J.* 2004;10:239-43.
4. Wong CS, Meng WCS. Feasibility study on single-port access (SPA) laparoscopic cholecystectomy using transanal endoscopic microsurgery (TEM) instruments. *Minim Invasive Ther Allied Technol.* 2010;19:364-6.
5. Sylla P, Lacy AM. NOTES transanal rectal cancer resection using transanal endoscopic microsurgery. *Eur Surg.* 2011;43:146-52.
6. Roberts JBM. Synchronous Combined Abdomino-perineal Excision of Rectum. *Br Med J.* 1961;25:1388-91.
7. Zhang H, Zhang YS, Jin XW, Li MZ, Fan JS, Yang ZH. Transanal single-port laparoscopic total mesorectal excision in the treatment of rectal cancer. *Tech Coloproctol.* 2013;17:117-23.
8. Leroy J, Barry BD, Melani A, Mutter D, Marescaux J. No-scar transanal total mesorectal excision: the last step to pure NOTES for colorectal surgery. *Arch Surg.* 2012;19:1-5.
9. Atallah S, Albert M, deBeche-Adams T, Nassif G, Polaverapu H, Larach S. Transanal minimally invasive surgery for total mesorectal excision (TAMIS-TME): a stepwise description of the surgical technique with video demonstration. *Tech Coloproctol.* 2013;17:321-5.
10. Buess G, Bercerra-Garcia F, Misra MC. Instruments for transluminal surgery or "NOTES". *Minim Invasive Ther Allied Technol.* 2008;17:331-5.
11. Rimonda R, Arezzo A, Arolofo S, Salvai A, Morino M. TransAnal Minimally Invasive Surgery (TAMIS) with SILSTM Port versus Transanal Endoscopic Microsurgery (TEM): a comparative experimental study. *Surg Endosc.* 2013;27:3762-8.
12. Lacy AM, Adelsdorfer C, Delgado S, Sylla P, Rattner DW. Minilaparoscopy-assisted transrectal low anterior resection (LAR): a preliminary study. *Surg Endosc.* 2013; 27:339-46.