J Minim Invasive Surg Sci. 2016 May; 5(2):e34095. doi: 10.17795/minsurgery-34095.

Published online 2016 May 16. **Case Report**

Robotic Transanal Endoscopic Submucosal Dissection (RTESD) of Large Rectal Tumor in Prone Position

Sepehr Seyed Lajevardi,[1,*] Zufar Tameev,[1] and Gary McKay[1]

[1]Westmead Private Hospital, Department of Colorectal Surgery, Westmead, New South Wales, Australia

[*]*Corresponding author*: Sepehr Seyed Lajevardi, Westmead Private Hospital, Department of Colorectal Surgery, Westmead, New South Wales, Australia. E-mail: sepehrlaj@gmail.com

Received 2015 October 27; **Revised** 2016 May 08; **Accepted** 2016 May 09.

Abstract

Introduction: Endoscopic submucosal dissection (ESD) of large tumors of the rectum is particularly challenging using colonoscopy or with laparoscopic instruments. More recently robotic assisted technique has been described.
Case Presentation: We describe the first reported case of robotic transanal endoscopic submucosal dissection (RTESD) in Australia for a large circumferential laterally spreading tumor of the rectum using the da Vinci® Si system with the patient in the prone position. The case took 145 minutes and the authors found good manoeuvrability due to the intuitive nature of the robot's endowristed miniaturised graspers. The prone position facilitated robot docking and reduced the external robotic arm clashing. This procedure was safely performed and the patient was discharged the following day. Colonoscopic follow up to one year revealed no recurrence of disease.
Conclusions: RTESD in the prone position is safe and presents a feasible alternative for management of large rectal tumors. We also anticipate the technique to further improve with the advancement of robotic technology.

Keywords: Robotic Transanal Endoscopic Submucosal Dissection, Large Rectal Tumor

1. Introduction

The approach to the management of neoplasms of the rectum has been evolving over the past few decades. Endoscopic submucosal dissection (ESD) is most widely used for removal of large rectal tumors. It requires first the injection of a lifting agent typically normal saline or Gelofusin® mixed with a blue dye such as indigocarmine or methylene blue and adrenaline beneath the tumor. Then the lesion is resected at the submucosal plane using specialized electrocautery knives (1). This is technically challenging and time consuming, with lower rectal lesions difficult to resect due to failure to maintain an adequate pneumorectum seal and an unstable platform.

Laparoscopic transanal approaches with the Gelpoint® port have been described using either straight or angled graspers. More recently the use of da Vinci® robotic system has been described for excision of rectal neoplasms (2, 3). We describe the first reported case of a robotic transanal endoscopic submucosal dissection (RTESD) in Australia for a large circumferential laterally spreading tumor of the rectum using the da Vinci® Si system with the patient in the prone position.

2. Case Presentation

A 81-year-old female, with multiple comorbidities presented with 3-month history of mucous discharge from the rectum. Physical examination and colonoscopy revealed a large circumferential laterally spreading tumor of granular mixed type, carpeting most of the mid rectum extending distally to the dentate line (Figure 1A). Snare biopsy of the largest and most suspicious portion of the tumor showed a benign serrated adenoma with focal low to high grade dysplasia. Given this biopsy results no further investigations was undertaken and decision was made for surgical resection of the tumor.

The setup for the RTESD was done by positioning the patient prone on the operating tabulation in the jack-knife position with the legs at a perpendicular to the axis of the trunk. The tumor was first inspected with flexible sigmoidoscopy and elevated in the submucosal plane using 8: 1: 1 solution containing Gelofusin®, indigocarmine blue and 1: 100,000 adrenaline. For trananal accces, the Gelpoint® (applied medical, Rancho Santa Margarita, CA, USA) platform was used to achieve pneumorectum. Three 8 mm ports for each robotic arm and an additional 5 mm port for suction inserted into the Gelpoint® platform. The three arms of the da Vinci® robot were docked from the leg end of the operating table using the side-docking approach

Copyright © 2016, Minimally Invasive Surgery Research Center and Mediterranean & Middle Eastern Endoscopic Surgery Association. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (http://creativecommons.org/licenses/by-nc/4.0/) which permits copy and redistribute the material just in noncommercial usages, provided the original work is properly cited.

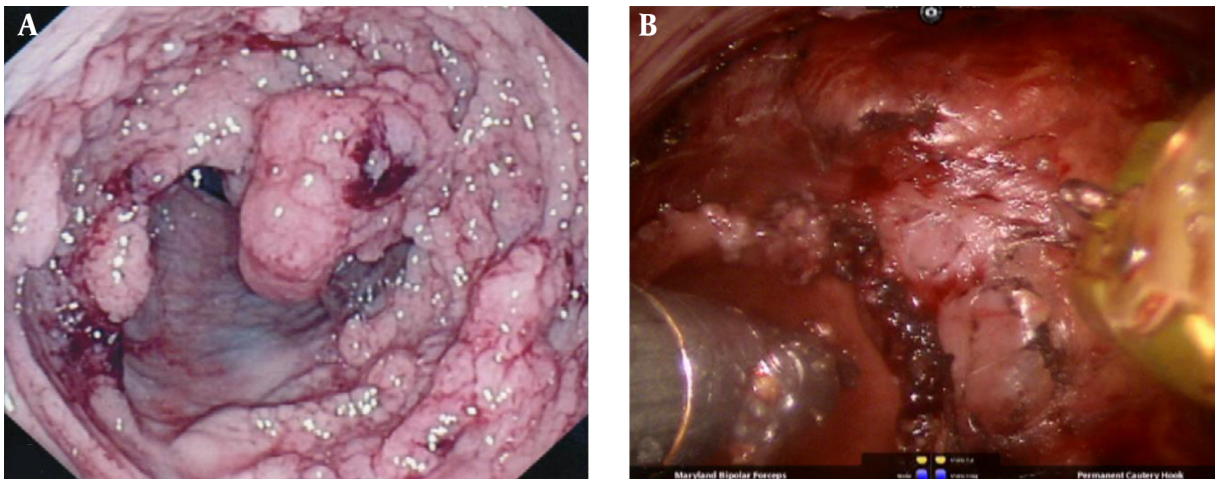
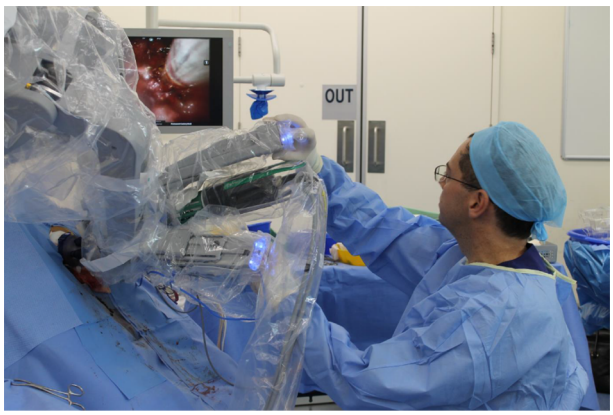


Figure 1. A, Intraoperative photograph of the large circumferential laterally spreading tumor of the rectum extending distally to the Dentate line; B, rectum post robotic transanal endoscopic submucosal dissection of the poly.

(Figure 2) with an 8 mm camera superiorly, and 8 mm endowrist Merrylands and diathermy hook used via the left and right port. Inferiorly a 5 mm suction port was inserted with conventional laparoscopic 5mm sucker used intermittently to remove buildup of smoke and fluid. Most surgical dissection was performed using diathermy in cutting mode to avoid the buildup of smoke, with selective coagulation when bleeding vessels were encountered. The lesion was completely removed in piecemeal fashion. The mucosal defect was subsequently partially closed with 2.0 Vicryl® (Ethicon, USA) continous suture.

Figure 2. The Setup for the RTESD With the Patient Prone on the Operating Board in the Jack-Knife Position With the Legs at a Perpendicular to the Axis of the Trunk



The three arms of the da Vinci® robot are docked from the leg end of the operating board using the left side-docking approach with the surgeon sitting at the end of the operating board and the screen positioned on the right side of the patient.

Total operating time was 145 minutes, with complete removal of the tumor in a submucosal plane (Figure 1B). No complications were encountered and the patient was discharged home the next day. The lesion was completely resected using the RTESD technique and the pathology was consistent with serrated adenoma with focal low to high grade dysplasia. Colonoscopic follow up to one year revealed no recurrence of disease.

3. Discussion

Endoscopic submucosal dissection (ESD) of large tumors of the rectum is particularly challenging using colonoscopy or with laparoscopic instruments. Transanal endoscopic micro-surgery (TEMS), was first described by Buess in 1985 allows for removal of the rectal tumor using long straight or angled instruments passed down a 10 - 20 cm micro-proctoscope inserted via the anus (4). This had the benefit of a stable anal platform allowing for more controlled pneumorectum and the ability to use surgical instruments under 3D magnified view. Unfortunately, parallel use of long instruments inserted via a long narrow proctoscope made for cramped operating with clashing of instruments due to the loss of space between port sites. To overcome this difficulty, the transanal minimally invasive surgery (TAMIS) procedure was devised, whereby conventional laparoscopic instruments are inserted via the anus through a much shorter and wider Gelpoint® platform. This allows establishment of controlled pneumorectum and much greater space between port sites, with improved triangulation of instruments compared to the TEMS approach (5).

Robotic surgery using the da Vinci ® surgical system (Intuitive Sur- gical, Inc, Sunnyvale, CA), has only emerged in the last few years within colorectal practice in Australia. This has been mainly used as a replacement for laparoscopic surgery for trans-abdominal or pelvic surgery. Atallah described in 2012 the world's first robotic transanal resection of a benign rectal tumor in which the small 8 mm endo-wristed instruments are inserted transanally to resect the tumor (2). This is technically easier than using straight or curved laparoscopic instruments, and allows a greater degree of freedom for fine movements within the confined space of the rectum. It is particularly advantageous when sutured closure of the rectal defect is required, and the endowrist instruments lend themselves particularly well to this technically challenging procedure. This procedure does however require a general anesthetic which may be of higher risk compared to ESD procedures done with sedation only. Another potential challenge with this approach issues relating to docking and external robotic arm clashing with the transanal approach in the lithotomy position are common with some suggesting the lateral approach to overcome this problem (3). At this point, the higher costs involved with performing robotic procedures make the wide application of this technique inhibitory. However as with all new technology, cost will reduce over time, and it is hoped in the near future the differences in cost will be less. This case was done in a shorter time compared to our previous experiences for a tumor of such size with either colonoscopic ESD or TEMS procedures and the shorter operative time may reduce the overall associated cost with this procedure.

To our knowledge, we describe the first reported Australian RTESD which was for a large circumferential laterally spreading tumor of the rectum. This was performed in the prone jack-knife position which facilitated the robot docking and helped avoid external robot arm clashing with the patient's legs. We suggest that RTESD is safe and an acceptable technique for management of rectal tumors. It overcomes many of the technical difficulties encountered with colonoscopic ESD and other transanal surgical techniques such as TEMS. In our experience, the prone position allows for improved access by the robotic arms and reduced clashing. Future advances in robotic technology with smaller instruments, robotic arms and overhead booms, as well as new single port-technology, increasing availability and lowering of costs are likely to further establish the role of RTESD.

Acknowledgments

None.

Footnotes

Authors' Contribution: All authors have been involved in preparation of this manuscript.

Conflict of Interest: The authors declare explicitly that there are no conflicts of interest in connection with this article.

Funding/Support: No specific funding.

References

1. Asge Technology C, Kantsevoy SV, Adler DG, Conway JD, Diehl DL, Farraye FA, et al. Endoscopic mucosal resection and endoscopic submucosal dissection. *Gastrointest Endosc.* 2008;**68**(1):11–8. doi: 10.1016/j.gie.2008.01.037. [PubMed: 18577472].
2. Atallah S, Parra-Davila E, DeBeche-Adams T, Albert M, Larach S. Excision of a rectal neoplasm using robotic transanal surgery (RTS): a description of the technique. *Tech Coloproctol.* 2012;**16**(5):389–92. doi: 10.1007/s10151-012-0833-6. [PubMed: 22584407].
3. Buchs NC, Pugin F, Volonte F, Hagen ME, Morel P, Ris F. Robotic transanal endoscopic microsurgery: technical details for the lateral approach. *Dis Colon Rectum.* 2013;**56**(10):1194–8. doi: 10.1097/DCR.0b013e3182a2ac84. [PubMed: 24022537].
4. Buess G, Theiss R, Gunther M, Hutterer F, Pichlmaier H. [Transanal endoscopic microsurgery]. *Leber Magen Darm.* 1985;**15**(6):271–9. [PubMed: 4079630].
5. Atallah S, Albert M, Debeche-Adams T, Larach S. Transanal minimally invasive surgery (TAMIS): applications beyond local excision. *Tech Coloproctol.* 2013;**17**(2):239–43. doi: 10.1007/s10151-012-0945-z. [PubMed: 23207713].