

Reviewer A

The authors aimed to describe a technique for (robot-assisted) laparoscopic jejunostomy tube placement and to report its associated outcomes in patients undergoing minimally invasive esophagectomy. They demonstrated that jejunostomy-related complications occurred in 13 out of 93 patients and all involved infections. Pre-existent comorbidity, and diabetes mellitus in particular, were significantly more common in patients with jejunostomy-related infections compared to patients without such complications. They concluded that minimally invasive jejunostomy tube placement with additional anti-rotation fixation, is a safe and advisable way of establishing the enteral feeding route in patients undergoing minimally invasive esophagectomy. Manuscript was well written to understand. However, there are several concerns to be clarified. Following are the comments.

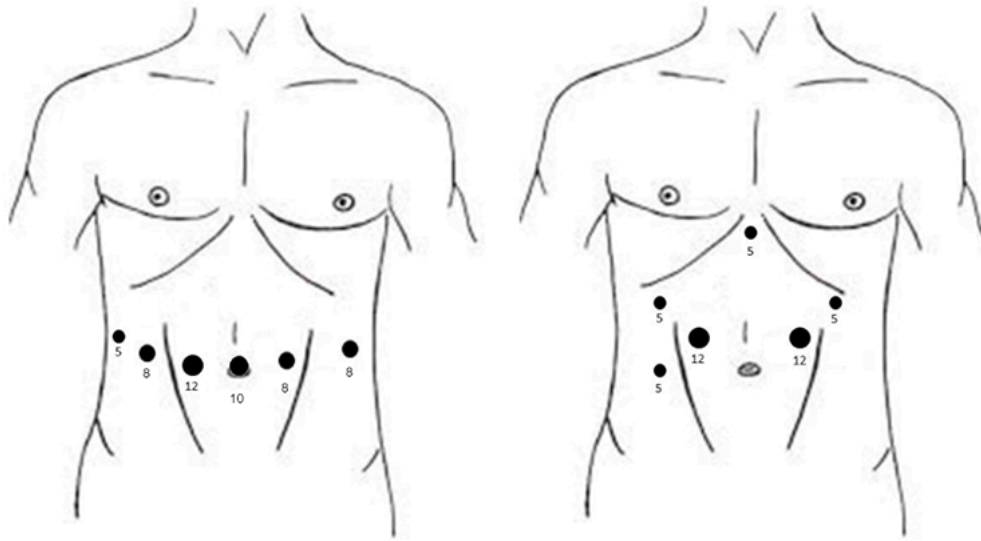
Comment 1: In the Method section, was there any particular position of port insertion to perform laparoscopic jejunostomy?

Reply 1: Figure 1 was added to the manuscript, which shows the trocar port positions. In the robotic approach as performed in the UMC Utrecht, the 5mm port is used for the liver retractor, the 8mm ports are used for the robotic instruments, and the 12mm port is used for the camera throughout the procedure. For jejunostomy tube placement, the instrument in the most lateral 8mm trocar port on the left (from patient perspective) is removed. A Cadiere forceps and large robotic needle driver are introduced through the other 8mm trocar ports while the camera remains in the 12mm port. In the conventional laparoscopic approach as performed in Fundacion Favaloro, the Dorsey grasper and laparoscopic needle driver are used. These clarifications were added to the methods section.

Changes in manuscript

1. *Added to methods:* The trocar port positions are shown in Figure 1. In the robotic approach as performed in the UMC Utrecht, the 5mm port is used for the liver retractor, the 8mm ports are used for the robotic instruments, and the 12mm port is used for the camera throughout the procedure. For jejunostomy tube placement, the instrument in the most lateral 8mm trocar port on the left (from patient perspective) is removed. A Cadiere forceps and large robotic needle driver are introduced through the other 8mm trocar ports while the camera remains in the 12mm port. In the conventional laparoscopic approach as performed in Fundacion Favaloro, the Dorsey grasper and laparoscopic needle driver are used.

Figure 1. Trocar port arrangement in robot-assisted esophagectomy (left) and conventional minimally invasive esophagectomy (right)



Comment 2: The authors named their procedure as seldinger technique using anti-rotation sutures. This technique seems to be very similar to Stamm method. Could the authors describe the differences in the procedures?

Reply 2: Although there are technical similarities between the current technique and the Stamm technique (i.e. purse string suture around the feeding tube followed by fixation of the enteral tissue to the anterior abdominal wall by several stitches), the most important difference is that the Stamm method is mostly known as a technique for creation of a gastrostomy while this paper focusses on creation of a jejunostomy. To avoid confusion, the Stamm technique is not discussed in detail in the manuscript. However, the resemblance to this technique is now mentioned in the introduction and methods sections.

Changes in manuscript

1. *Added to introduction:* Comparable methods are now commonly used (e.g. the Stamm method for gastrostomy creation) and seem solid, but data on the outcomes of these techniques are largely lacking.
2. *Added to methods:* Key elements of the procedure involve a purse string suture around the tube and fixation of the jejunum to the anterior abdominal wall, which are somewhat similar to the laparoscopic Stamm technique for surgical placement of a gastrostomy tube.

Comment 3: Complications have occurred in 14% of patients. Was it lower than that occurred in open surgery? Was there any advantage for laparoscopic procedures compared to open procedures?

Reply 3: This study evaluated a case series of patients undergoing minimally invasive esophagectomy with robot-assisted or laparoscopic jejunostomy placement and found that jejunostomy site infections were the most common complication type. As open abdominal surgery is generally associated with more wound infections than laparoscopy, one could hypothesize that a minimally invasive approach can reduce complications. Since this study did not compare minimally invasive versus open esophagectomy regarding their outcomes, it is impossible to make statements

in terms of superiority to an open technique based on our study. However, a recent retrospective comparative study found that laparoscopy jejunostomy tube placement is associated with less overall jejunostomy-related morbidity when compared to an open approach (20.8% vs 10.5%). This study is now mentioned in the discussion (Davis et al. Surgical Endoscopy 2020).

Changes in manuscript

1. *Added to discussion:* At present, there are no high-quality studies available to determine whether a laparoscopic approach should be preferred over an open approach to jejunostomy placement. However, a recent retrospective study suggested that laparoscopic jejunostomy placement has lower overall morbidity when compared to a mini-laparotomy approach (20.8% vs. 10.5%) (26). Furthermore, multiple laparoscopic techniques have been suggested. In a case series of 206 patients, a laparoscopic double semi purse-string suturing technique for jejunostomy placement was reported to have acceptable overall morbidity (16.5%) with only 1 event of intestinal torsion (0.5%) (27). Although their technique has similarities to our currently reported purse-string technique, no antirotation sutures were placed. Future studies are required to adequately compare laparoscopic versus open jejunostomy placement techniques and to further evaluate the clinical role of antirotation sutures.

Comment 4: Please describe more detail about kind of infection, such as skin infection or abdominal abscess.

Reply 4: In this study, 13 infectious complications were encountered. These infectious complications involved 12 skin infections and 1 abdominal wall abscess.

Changes in the manuscript

1. *Changed in results:* Jejunostomy-related complications were observed in 13 cases (14%), which involved 12 skin infections and 1 abdominal wall abscess.

Comment 5: Intestinal obstruction around jejunostomy site is usually occurred after several months of the surgery. However, the authors stopped to evaluate the complications at postoperative day 30. Could the authors comment on it?

Reply 5: To adequately capture the long-term risk of intestinal torsion, which can occur until many years after surgery, multiple years of follow-up would be needed. However, the presented technique is relatively novel and therefore such follow-up was not feasible for this study, which is further clarified as a limitation in the discussion. Therefore, we chose to focus on the short-term outcomes within the first month after surgery, which is the period in which patients should primarily benefit from jejunostomy tube feeding.

Changes in manuscript

1. *Added to discussion:* In addition, intestinal torsions around the jejunostomy site might occur long after cessation of jejunostomy tube feeding and such events could not be identified with the current follow-up.

Comment 6: The authors assessed the correlation between duration of jejunostomy feeding and postoperative weight. I could not understand why the authors did it. It means jejunostomy is not

necessary after esophagectomy. Please comment on it.

Comment 7: Furthermore, any complications occurred in 67% of patients, and anastomotic leakage occurred in 32% of the patients. It was too difficult to assess the body weight change only from the standpoint of anastomotic leakage.

Reply 6 & 7: This analysis on body weight was meant to provide insight in the postoperative weight curve of patients in relation to their duration of jejunostomy tube feeding. However, as postoperative weight is most likely multifactorial and also determined by factors such as postoperative complications other than jejunostomy tube problems, we understand the reviewer's objections to such an analysis. Therefore, this analysis was removed from the manuscript. In the revised paper, only descriptive data are provided regarding the duration of jejunostomy tube feeding and postoperative weight loss.

Changes in manuscript

1. *Removed from results:* No significant difference in postoperative weight loss was seen among patients who had jejunostomy-related complications and those who had not.

Reviewer B

The authors report on a prospective case series of patients who underwent esophagectomy with (robotic assisted) minimally invasive jejunostomy placement.

With several techniques available for jejunostomy placement, standardisation of techniques could aid in making the jejunostomy safer and improving outcomes for these patients. There are several major problems with the article. The main problem is the narrative and use of English language. The narrative can be summarized into two major problems.

Comment 1: The research aim is not clearly formulated, and this resonates throughout the article. From the presented data it seems the authors wish to present a certain technique for jejunostomy placement. However, the article is written as if it is a superiority article. Whereas no conclusions can be drawn over superiority of this technique in comparison to other techniques.

Reply 1 The aim of this study is not to claim superiority of the described technique for minimally invasive jejunostomy placement in esophagectomy, but rather to describe the technical steps and outcomes. This aim has been clarified further in the manuscript.

Changes in manuscript

1. *Changed in introduction:* The current study aimed to describe the technical elements and outcomes of a technique for jejunostomy tube placement with the essential step of anti-rotation fixation, which is enabled by using an endoscope and (robot-assisted) laparoscopic instruments to fixate the jejunum to the anterior abdominal wall. The jejunostomy is created by placing a purse-string suture around the jejunostomy tube followed by anti-rotation fixation of the jejunal segment to the anterior abdominal wall. This technique might be beneficial in reducing the risk of intestinal torsion and avoids the need for an additional incision, which represents a step forward in minimally invasive surgery.

1. *Changed in discussion:* In this multicenter study that describes a technique for minimally

invasive jejunostomy tube placement with additional anti-rotation fixation, jejunostomy-related complications occurred in 13 patients (14%).

Comment 2: The current narrative focusses mainly on the MI technique. Whereas an important problem is posed with torsion/ileus complications. Focus should be on the anti-rotation suture, and then present the MI technique as a great way to perform this.

Reply 2: The reviewer addresses an important issue, which is the risk of intestinal torsion. Although it cannot be said with certainty that the antirotation stiches reduce the risk of this complication, it has been suggested and seems valid from mechanical point of view. In contrast to an open approach, the (robot-assisted) laparoscopic camera provides the surgeon a clear view of the anterior abdominal wall to which the jejunal segment must be fixated to create a jejunostomy. The robot provides additional technical advantages with its enhanced 3D camera and articulating instruments, which facilitate suturing towards the abdominal wall. These factors are clarified in the revised manuscript to highlight the hypothesized role of the antirotation sutures.

Changes in manuscript

1. *Changed in introduction:* The current study aimed to describe the technical elements and outcomes of a technique for jejunostomy tube placement with the essential step of anti-rotation fixation, which is facilitated by using an endoscope and (robot-assisted) laparoscopic instruments to get overview of the anterior abdominal wall and fixate the jejunum to it. The jejunostomy is created by placing a purse-string suture around the tube followed by anti-rotation fixation of the jejunal segment to the anterior abdominal wall. This technique might be beneficial in reducing the risk of intestinal torsion and avoids the need for an additional incision, which represents a step forward in minimally invasive surgery.
2. *Changed in conclusion:* Minimally invasive surgery, either robotically or laparoscopically, allows the surgeon a clear overview of both the jejunum and the anterior abdominal, which facilitates the placement of a jejunostomy that is additionally fixated to the anterior abdominal wall to reduce the risk of intestinal torsion. This study showed that the presented technique was safe for patients undergoing esophagectomy in this study.

Minor remarks/questions

Comment 3: Is data available on the duration of application of the technique?

Wouldn't it be interesting to compare this technique to the previous technique that was applied by the authors? Or compare to another hospital?

Reply 4: In the UMC Utrecht, the robotic jejunostomy technique was adopted in 2016 while an open technique was used in the years before. In Fundacion Favaloro, the laparoscopic jejunostomy technique was adopted in 2010. Although it would be interesting to compare these techniques to previous techniques that were used in the participating centers or current techniques in other hospitals, the required data are unfortunately not available.

Comment 5: How was the tube fixated on the exterior? plaster or suture? this may affect infection rates.

Reply 5: The jejunostomy tube was fixated to the skin by means of a suture in both centers, which has been added to the revised methods section.

Changes in manuscript

1. *Added to methods:* The jejunostomy tube was fixated to the skin by means of a suture and postoperatively kept in place until the patient could be fed adequately via the oral route or until complications necessitated prompt removal.

Comment 6: Where differences observed between laparoscopy or robotic techniques?

Comment 7: where differences observed between 2 anti rotation sutures versus one running suture? More information on distance of anti-rotation sutures in relation to tube.

Reply 6 & 7: The robotic technique with 2 anti rotation sutured was used in one center, while the laparoscopic technique with a running suture in distal direction was used in the other. Although exploratory analyses do not point towards differences in outcomes between the centers, comparisons between robotic versus laparoscopic or 2 separate sutures versus a running suture cannot be made based on currently available data. The antirotation sutures were created approximately 1-2 centimeters from the tube, which is now clarified in the manuscript.

Changes in manuscript

1. *Added to methods:* The sutures were placed 1-2 centimeters from the tube.

Comment 8: the anastomotic leak rate is very high! and should be addressed

Reply 8: The anastomotic leakage rate is indeed high, which is largely explained by the implementation of the robotic hand-sewn intrathoracic anastomosis in the UMC Utrecht in 2016. The learning curve and outcomes of this anastomotic technique were recently published separately by De Groot et al. The revised manuscript addresses the anastomotic leakage rate in more detail.

Changes in manuscript

1. *Added to discussion:* Lastly, it must be mentioned that the currently reported anastomotic leakage rate was high in relation to recent benchmarks. This can probably be explained by the implementation of a robotic hand-sewn intrathoracic anastomosis in the UMC Utrecht in 2016. As recently published, this anastomotic technique has a substantial learning curve and a leakage rate of around 30% was initially observed (De Groot et al. Dis Esophagus 2020). However, based on the most recent analyses, the technique now achieves satisfactory results with a leakage rate of 14% (De Groot et al., Ann Esophagus 2021).

Comment 9: What is the advantage of MI technique compared to a 4cm laparotomy to perform suture?

Comment 10: would be interesting to compare techniques described in literature. i.e. double semi purse string, open vs MI,

Reply 9 & 10: Although convincing evidence for superiority of either the MI or open technique is lacking, a recent retrospective study (Davis et al. Surg Endoscopy 2020) suggested that laparoscopic jejunostomy placement is associated with less jejunostomy-related morbidity when compared to a mini-laparotomy approach (20.8% vs 14.5%). Although that study did not specify the exact complications that occurred, potential advantages of a minimally invasive approach would be to avoid creating an additional incision with the risks of wound infection and developing into an

incisional hernia. In addition to laparoscopic versus open, there are also differences in laparoscopic techniques that can be used. A recent study reported that a laparoscopic double semi-purse string suturing technique had an overall morbidity rate of 16.5% in a series of 206 patients, of which the majority were mild (Peng et al. J Thorac Dis 2020). These studies have been added to our discussion.

Changes in the manuscript

2. *Added to introduction:* This minimally invasive technique allows the surgeon to create a jejunostomy by means of a (robot-assisted) laparoscopic purse-string suture and anti-rotation fixation to the anterior abdominal wall, which avoids the need for an additional incision and thereby represents a step forward in minimally invasive surgery.
3. *Added to discussion:* At present, there are no high-quality studies available to determine whether a laparoscopic approach should be preferred over an open approach to jejunostomy placement. However, a recent retrospective study suggested that laparoscopic jejunostomy placement has lower overall morbidity when compared to a mini-laparotomy approach (20.8% vs. 10.5%) (26). Furthermore, multiple laparoscopic techniques have been suggested. In a case series of 206 patients, a laparoscopic double semi purse-string suturing technique for jejunostomy placement was reported to have acceptable overall morbidity (16.5%) with only 1 event of intestinal torsion (0.5%) (27). Although their technique has similarities to our currently reported purse-string technique, no antirotation sutures were placed. Future studies are required to adequately compare laparoscopic versus open jejunostomy placement techniques and to further evaluate the clinical role of antirotation sutures.

Overall consideration

Comment 11: The article presents an interesting technique for jejunostomy placement, and could be interesting to fellow upper GI surgeons if the above remarks are addressed correctly.

Reply 11: The authors thank the reviewer for the valuable comments, which were used to improve the manuscript. We hope the comments have been adequately addressed.