

Peer Review File**Article information:** <https://dx.doi.org/10.21037/jtd-22-553>**Reviewer A****Comment :****Abstract**

Authors have graciously shared their initial experience, focusing on Intraoperative complications, of robotic anatomical lung resection. They have started their robotic lung resection program in 2018 and share the outcomes of first 134 cases. They describe the evolution of their program. The manuscript focuses on major Intraoperative complications including pulmonary artery, vein and bronchial injuries and their Intraoperative management without conversion. I congratulate the authors for sharing this as it will help other surgeons to know what to expect when they starting a robotic thoracic program. I recommend to accept the manuscript for publication.

Reply: Thank you for your comments. We have revised our manuscript according to all of the reviewers' comments.

Reviewer B

The authors present a retrospective review of the bronchial and vascular injuries in their early experience of adopting the robotic platform in lung resections.

I commend the authors for 1) their honesty in reporting, and 2) the detailed description of the injuries and how they dealt with them.

I do have the following comments and questions however:

Comment 1:

- While we truly appreciate their honesty, they report quite a high incidence of injuries in 134 cases only (in my humble opinion). Even for an initial experience, this incidence exceeds most what has already been reported in the literature. Can they please expand on the reasons for this high incidence? Besides having a magnified and tunneled vision with the robotic camera, is it mainly the lack of tactile feedback behind these injuries?

Reply 1:

We thank you for your valuable suggestion.

We believe that the high incidence of injuries has three causes.

According to your comment, we added the text in the Discussion section as follows:

Changes in text: (Page 15-16, Line 353-375)

Among the initial 30 cases, seven intraoperative complications occurred. In the subsequent 104 cases, eight intraoperative complications occurred, excluding two minor PA injuries. Although the complication rate decreased with experience, the overall complication rate was higher than that of other studies. We believe that the high incidence of injuries had three causes. The first cause is the lack of tactile sensation, especially for the initial 30 cases. The console surgeon was still learning. It is important to recognize the absence of tactile sensation and strong force of the robotic forceps. During the early period of RATS, it may be better to use a blunt and long bipolar grasper rather than Maryland forceps. The second cause is

insufficient communication with assistant surgeons. The initial 30 cases of RATS were performed by only one certified console surgeon. The assistant surgeons were surgical residents. There were no surgeons available to provide appropriate advice, which may have led to a lack of communication. Thereafter, RATS was performed by two certified console surgeons. Therefore, it was possible to perform RATS with better communication, and more appropriate advice was available. The assistant surgeon should be a senior surgeon if possible. The third cause is different surgical views and organ positioning between conventional VATS and RATS. We performed most anatomic lung resections using VATS. It took time to adjust the differences. Therefore, many misinterpretations of the anatomy (especially bronchial injury) occurred among the initial 30 cases. No bronchial injuries were observed since then. Although both RATS and VATS are classified as minimally invasive, the experience of performing VATS is not always applicable to RATS, especially during the early period of RATS. Because patient safety is the top priority, we believe that there should be no hesitation when conversion is necessary. The primary purpose of our study is to share our experience with RATS among thoracic surgeons so that such problems will not be repeated.

Comment 2

- Can the authors specify whether or not the surgeons had switched from thoracoscopy to robotic surgery? Was it an abrupt conversion or it was performed gradually? Can they also specify how many anatomical lung resections they had performed prior to embarking on robotic surgery? Can they also specify their credentialing process and how they effectively started doing robotic surgery?

Reply 2:

Thank you for your comments.

According to your comment, we added the text in the Methods section.

Changes in text: (Page 6, Line 121-131)

Introduction of RATS

Our two console surgeons switched from thoracoscopic surgery to robotic surgery gradually. Until April 2018, neither of them had any experience performing RATS. One of the console surgeons had experience with approximately 2000 anatomical lung resections using VATS. The other console surgeon had experience with approximately 600 anatomical lung resections. The first console surgeon with the most VATS experience performed RATS for the initial 30 cases. Thereafter, the second console surgeon started performing RATS. Only surgeons who have passed the training program (e-learning, demonstration, e-learning test, case observation, and wet laboratory training) supervised by The Japanese Association for Chest Surgery are allowed to become console surgeons and perform RATS. A proctor surgeon was invited to perform the first case.

Comment 3:

- The authors should really expand on how they changed their practice and what they suggest to effectively do in order to reduce the incidence of these injuries. For example, did they switch from the Maryland bipolar forceps to the “long” forceps which has slightly more blunt tips. Did they stop using the Cadieere forceps and switch maybe to a Fenestrated bipolar which is more gentle and less traumatic on the lung tissue? Did they change the set up or the port placement, mainly having the assistant port be more inferior and caudad to all the robotic ports?

Reply 3:

Thank you for your comments.

The Maryland forceps is capable of delicate dissection, and we preferred to use it because a similar instrument is used in VATS. Injuries caused by these forceps were particularly noticeable during the early cases. As you pointed out, it is a very good suggestion to use blunt long forceps for the initial cases. Although the Cadiere forceps has the least amount of grip force, the lung parenchyma can be damaged with this forceps. At first, the port was placed in the same intercostal space (ICS) as described by Cerfolio et al. However, this port placement sometimes caused interferences with the robotic instruments in patients with a small physique. Therefore, we later changed the port placement to that shown in Figure 1. The approach using the inferior and caudal assistant port is also good. We prefer to use mini-thoracotomy in the fourth ICS for the assistant window because it can be used for tissue removal and also allows for safe and rapid conversion to thoracotomy during an emergency. According to your comment, we added these changes in the Method and Discussion section.

Changes in text: (Page 7, Line 138-141)

At first, the port was placed in the same intercostal space as described by Cerfolio et al (9). However, this port placement sometimes caused interferences with the robotic instruments in patients with a small physique. Therefore, we later changed the port placement to that shown in Figure 1.

Changes in text: (Page 7, Line 140-146)

We prefer to use mini-thoracotomy in the fourth intercostal space for the assistant window because it can be used for tissue removal and also allows for safe and rapid conversion to thoracotomy during an emergency.

Changes in text: (Page 15, Line 359-360)

During the early period of RATS, it may be better to use a blunt and long bipolar grasper rather than Maryland forceps.

Comment 4:

- The introduction is relatively short. I suggest 3 paragraphs, where they can elaborate more on prior literature looking at conversion from robotic or vats to open

Reply 4:

Thank you for your comments.

We added a paragraph and references 7 and 8 to the Introduction section.

Changes in text: (Page 5, Line 94-99)

Conversion to thoracotomy should not be hesitated in the event of catastrophic intraoperative complications during RATS. Several studies of large database analyses showed that RATS lobectomy has a lower rate of conversion than that of VATS (7,8). Vascular injuries are more commonly the reason for conversion from RATS than for conversion from VATS. Emergency conversion is also more common during RATS (8). However, the details of actual surgical procedures for individual cases are unknown.

Changes in text: (Page 18, Line 429-434)

7. Oh DS, Reddy RM, Gorrepati ML, et al. Robotic-assisted, video-assisted thoracoscopic and open lobectomy: propensity-matched analysis of recent premier data. *Ann Thorac Surg* 2017;104:1733-40.

8. Servais EL, Miller DL, Thibault D, et al. Conversion to thoracotomy During thoracoscopic vs robotic lobectomy: predictors and outcomes. *Ann Thorac Surg* 2021;16:S0003-4975(21)02094-4.

Comment 5:

- What do the authors mean by favorable lobulation? Does that mean complete nonfused

fissures?

Reply 5:

Thank you for your comments.

We described “good lobulation” in our manuscript. This means complete nonfused fissures, as you pointed out.

We revised the text as follows.

Changes in text: (Page 6, Line 112-113)

We selected the initial 20 patients who had non-fused fissures, clinical N0 stage, and no other critical comorbidities.

Changes in text: (Page 16, Line 378-379)

We tended to select patients with non-fused fissures and few comorbidities, especially during our early experiences with RATS.

Comment 6:

- The table and the pictures detailing the injuries are quite helpful, but what would be even more helpful if they have any videos of their injuries and how they repaired them,

Reply 6:

Thank you for your comments. We have added the video.

Comment 7:

- Did the surgeon at the console have another fully trained and board-certified surgeon at the bedside or a physician assistant (few places can afford that luxury)? or a surgical resident, or other?

Reply 7:

Thank you for your comments.

For the initial 30 cases treated with RATS, there was only one certified console surgeon. Since then, the number of certified console surgeons increased to two. Bedside surgeons were often surgical residents. We do not have a physician assistant. Because we have a dual console, another board-certified surgeon on the other console advises the console surgeon.

Comment 8:

- Can the authors elaborate more on the need for intraoperative blood transfusions (beyond the median blood loss)?

Reply 8:

Thank you for your valuable comments.

We added the following text.

Changes in text: (Page 8, Line 178-180)

Criteria for Intraoperative Blood Transfusion

Intraoperative transfusion was performed if any one of the following three conditions was met: abnormal vital signs; blood loss of more than 1000 mL; or hemoglobin less than 7.0 g/dL

Changes in text: (Page 9-10, Line 211-212)

Intraoperative transfusion was not performed for any patients.

Reviewer C

The authors demonstrated the characteristics of intraoperative complications in robot-assisted pulmonary resection. The manuscript was well-written throughout. It will attract the readers' interest.

I would like to make some comments on it.

Comment 1

Major

1) They mentioned in the main text (Line 159-160) that all intraoperative complications were of grade 1 according to the CTCAE. However, there was one death case of postoperative pneumonia due to air leakage after intraoperative lung parenchyma injury. From this description, it should be a grade 5 complication. CTCAE Category would be as follows; CTCAE v5.0 MedDRA v20.1 Code #10065832: intraoperative respiratory injury, or CTCAE v5.0 MedDRA v20.1 Code #10053481: bronchopleural fistula.

Authors should explain that case in detail if they really think it should be the grade 1 complication.

Reply 1:

Thank you for your comments.

As you pointed out, the one death should be a grade 5 complication.

We revised text and table as follows:

Changes in text: (Page 10, Line 218-219)

Most intraoperative complications were grade 1 according to the CTCAE, except for one death.

Changes in Table 3: (CTCAE grade for patient No.10)

1→5[‡]

Changes in Table 3: (footnote in Table3)

[‡]One death attributed to postoperative pneumonia caused by air leakage after intraoperative lung parenchymal injury.

Comment 2:

2) No conversion case was reported but there were 2 cases with blood loss of more than 200ml and console time of more than 4 hours. I really would like to know their opinion about the conversion. Is the conversion a fault of the surgeon? When considering patient safety as the top priority, is it really appropriate to continue robotic surgery without conversion in such cases?

Reply 2:

Thank you for your comments.

Considering patient safety as the top priority, we believe that there should not be any hesitation when conversion is necessary. The primary purpose of our report is to share the knacks and pitfalls of RATS among thoracic surgeons so that such intraoperative problems will not be repeated. Currently, console time rarely exceeds 4 hours, but we would try to announce to the console surgeons that exceeding 4 hours is one of the guidelines for conversion. Thank you for your valuable suggestion.

Changes in text: (Page 16, Line 372-375)

Because patient safety is the top priority, we believe that there should be no hesitation when conversion is necessary. The primary purpose of our study is to share our experience with RATS among thoracic surgeons so that such problems will not be repeated.

Comment 3

Minor

1. Line 164 The word "site" must be "side".

Reply 3:

Thank you for your comments.

We changed the word “site” to “side” in our manuscript.

Comment 4

2. Line 171 Is the Manufacturer of "TachoSil" Really "Corza health"?

Reply 4:

Thank you for your comments.

CSL Behring K.K. is the manufacturer of TachoSil®.

We changed the text as follows.

Changes in text: (Page 10 Line 230-231)

To address this, we first applied pressure on the bleeding point using a roll gauze and applied a fibrin sealant sheet patch (TachoSil®; CSL Behring K.K., Tokyo, Japan).

Comment 5

Line 219 There Was Only 1 Death Case, Therefore the Expression "leading cause" Must Be Strange

Reply 5:

Thank you for your comments.

We deleted “leading” as mentioned below.

Changes in text: (Page 4 Line 79)

The cause of mortality was pneumonia.

Changes in text: (Page 12 Line 285)

The cause of mortality was pneumonia due to prolonged air leakage.

Reviewer D

Dr. Takase and colleagues, report on the intraoperative complications associated with robotic pulmonary resection and their management. This was a single institution retrospective study of 134 patients. They carefully documented all of the intra operative complications and the outcomes associated with these. In all cases the complications were able to be managed without conversion. The manuscript is well written and easy to comprehend. I have added some points below that if addressed may increase the educational value of the manuscript.

Comment 1

It is unclear how many surgeons were involved in this study and where they were on their trajectory of their learning curve in robotic thoracic surgery.

Reply 1:

Thank you for your comments.

According to your comments, we revised the text.

Changes in text: (Page 6, Line 121-131)

Introduction of RATS

Our two console surgeons switched from thoracoscopic surgery to robotic surgery gradually. Until April 2018, neither of them had any experience performing RATS. One of the console surgeons had experience with approximately 2000 anatomical lung resections using VATS. The other console surgeon had experience with approximately 600 anatomical lung resections. The first console surgeon with the most VATS experience performed RATS for the initial 30 cases. Thereafter, the second console surgeon started performing RATS. Only surgeons who have passed the training program (e-learning, demonstration, e-learning test, case observation, and wet laboratory training) supervised by The Japanese Association for Chest Surgery are allowed to become console surgeons and perform RATS. A proctor surgeon was invited to perform the first case.

Comment 2:

Of the surgeons involved were injuries more commonly associated with those with a new experience, more senior, or trainees?

Reply 2:

Thank you for your comments.

Among the initial 30 cases treated after the introduction of RATS, seven intraoperative complications occurred. The complication rate was higher for the first console surgeon (with the most VATS experience) than that for the second.

Comment 3

The types of injuries that they report on, I typically do not document, especially when direct pressure controls the bleeding. Do they have a method for documenting these?

Reply 3:

Thank you for your comments.

Although some reports do not define minor bleeding as an intraoperative complication, we defined all bleeding caused by vessel wall disruption as vascular injury, regardless of the extent of the injury and hemostatic time. We reported even minor bleeding because we believe it allows for more precise information-sharing among surgeons.

According to your comments, we added text in the Methods section.

Changes in text: (Page 8, Line 175-177)

We defined a vascular injury as any bleeding caused by disruption of the vessel wall, regardless of the extent of the injury and the hemostatic time.

Comment 4

Why did the authors define any bleeding from major vessels as a major vascular injury?

Reply 4:

Thank you for your comments.

The SVC, IVC, PA, PV, and aorta are usually defined as the great vessels. Therefore, injuries to only these vessels may be acceptable as major vascular complication. However, we also defined injury of the azygos vein as a major vascular complication. Surgery (especially superior mediastinal lymph node dissection) is often performed near the azygos vein, and the azygos vein is very familiar to the general thoracic surgeon. Furthermore, it is important to know the cause and management of azygos vein injuries because they sometimes lead to major bleeding. Therefore, we included injury to the azygos vein as a major vascular injury.

According to your comments, we added text in the Methods section.

Changes in text: (Page 8, Line 173-175)

The AV is not usually defined as a great vessel. However, surgery (especially superior mediastinal LN dissection) is often performed near the AV. Because the injury sometimes leads to major bleeding, we included the AV injury as a major vascular injury.

Comment 5

Are there any learning points from the injuries that would help others not make the same injuries?

Reply 5:

Thank you for your comments.

According to your comments, we added the text in the Discussion section.

Changes in text: (Page 15-16, Line 353-375)

Among the initial 30 cases, seven intraoperative complications occurred. In the subsequent 104 cases, eight intraoperative complications occurred, excluding two minor PA injuries. Although the complication rate decreased with experience, the overall complication rate was higher than that of other studies. We believe that the high incidence of injuries had three causes. The first cause is the lack of tactile sensation, especially for the initial 30 cases. The console surgeon was still learning. It is important to recognize the absence of tactile sensation and strong force of the robotic forceps. During the early period of RATS, it may be better to use a blunt and long bipolar grasper rather than Maryland forceps. The second cause is insufficient communication with assistant surgeons. The initial 30 cases of RATS were performed by only one certified console surgeon. The assistant surgeons were surgical residents. There were no surgeons available to provide appropriate advice, which may have led to a lack of communication. Thereafter, RATS was performed by two certified console surgeons. Therefore, it was possible to perform RATS with better communication, and more appropriate advice was available. The assistant surgeon should be a senior surgeon if possible. The third cause is different surgical views and organ positioning between conventional VATS and RATS. We performed most anatomic lung resections using VATS. It took time to adjust the differences. Therefore, many misinterpretations of the anatomy (especially bronchial injury) occurred among the initial 30 cases. No bronchial injuries were observed since then. Although both RATS and VATS are classified as minimally invasive, the experience of performing VATS is not always applicable to RATS, especially during the early period of RATS. Because patient safety is the top priority, we believe that there should be no hesitation when conversion is necessary. The primary purpose of our study is to share our experience with RATS among thoracic surgeons so that such problems will not be repeated.

Comment 6

For the superior vena cava injury that was made by the robotic instrument pushing the suction, this seems that it would take an excessive force. How did this happen? Was it not visualized at the time of occurrence?

Reply 6:

Thank you for your comments.

The assistant's suction was located at the right end of the surgical field, behind the Maryland forceps. The console surgeon was quite focused on the superior mediastinal lymph node dissection and was not aware of the assistant's suction. The assistant realized that the suction was being pushed with excessive force and tried to announce it to the surgeon; however, the SVC was injured before that. I added a video so you can see the details.

Comment 7

We like to use the robotic suction as opposed to an assistant with a suction, have the authors tried this instrument?

Reply 7:

Thank you for your comments.

I have experience using this device. Although we believe it is a useful device, we have rarely used it to date because the robotic suction takes away one of the surgeon's robotic instruments. Many cases are completed with minimal blood loss, and it is cost-effective.

Comment 8

We tend to use insufflation, the method that the author uses would not allow for that. Did the authors identify a decreasing rate of injury with increasing experience? This would be important to the analysis of these data.

Reply 8:

Thank you for your comments.

According to your comments, we added the following text.

Changes in text: (Page 7, Line 154-157)

EZ access^{®□} (Hakko Co., Ltd., Medical Device Division, Tokyo, Japan) allows CO₂ insufflation so that the AirSeal^{®□} (CONMED, CO, USA) trocar can be inserted without air leak. EZ access is a silicon cap for the LAP Protector wound retractor.

Changes in text: (Page 10, Line 216-217)

Among the initial 30 patients that underwent RATS, seven patients encountered intraoperative complications.

Changes in text: (Page 15, Line 353-356)

Among the initial 30 cases, seven intraoperative complications occurred. In the subsequent 104 cases, eight intraoperative complications occurred, excluding two minor PA injuries. Although the complication rate decreased with experience, the overall complication rate was higher than that of other studies

Comment 9

Although the authors have still images of the repairs, this is not that helpful. Do the authors have video of the repairs, if added, these would be much better suited to the education of the readers.

Reply 9:

Thank you for your comments.

I have added the video.

Comment 10

Have the surgeons changed practice in anyway additional ways to prevent future injury?

Reply 10:

Thank you for your comments.

According to your comments, we added the text in the Discussion section.

Changes in text: (Page 15-16, Line 353-375)

Among the initial 30 cases, seven intraoperative complications occurred. In the subsequent 104 cases, eight intraoperative complications occurred, excluding two minor PA injuries.

Although the complication rate decreased with experience, the overall complication rate was higher than that of other studies. We believe that the high incidence of injuries had three causes. The first cause is the lack of tactile sensation, especially for the initial 30 cases. The console surgeon was still learning. It is important to recognize the absence of tactile sensation and strong force of the robotic forceps. During the early period of RATS, it may be better to use a blunt and long bipolar grasper rather than Maryland forceps. The second cause is insufficient communication with assistant surgeons. The initial 30 cases of RATS were performed by only one certified console surgeon. The assistant surgeons were surgical residents. There were no surgeons available to provide appropriate advice, which may have led to a lack of communication. Thereafter, RATS was performed by two certified console surgeons. Therefore, it was possible to perform RATS with better communication, and more appropriate advice was available. The assistant surgeon should be a senior surgeon if possible. The third cause is different surgical views and organ positioning between conventional VATS and RATS. We performed most anatomic lung resections using VATS. It took time to adjust the differences. Therefore, many misinterpretations of the anatomy (especially bronchial injury) occurred among the initial 30 cases. No bronchial injuries were observed since then. Although both RATS and VATS are classified as minimally invasive, the experience of performing VATS is not always applicable to RATS, especially during the early period of RATS. Because patient safety is the top priority, we believe that there should be no hesitation when conversion is necessary. The primary purpose of our study is to share our experience with RATS among thoracic surgeons so that such problems will not be repeated.

Reviewer E

The authors discussed the causes and treatment of complications following lung resection using a robot. They had 134 patients that were eligible, and they were able to control all pulmonary artery, vein, and bronchus damage. There was no thoracotomy procedure performed. I commend the successful management on the good results. I have a few inquiries.

Comment 1:

1) A high rate of vascular and bronchial injury was observed. What accounted for the high rate? Do you believe the high rate of injury was caused by the robotic surgery's limitations? In the author's institute, what was the injury rate for VATS pulmonary resection?

Reply 1:

Thank you for your comments.

The intraoperative complication rate for VATS anatomic lung resections for lung cancer performed during the observation period of this study was 6.3%.

According to your comments, we added the text.

Changes in text: (Page 15-16, Line 353-375)

Among the initial 30 cases, seven intraoperative complications occurred. In the subsequent 104 cases, eight intraoperative complications occurred, excluding two minor PA injuries. Although the complication rate decreased with experience, the overall complication rate was higher than that of other studies. We believe that the high incidence of injuries had three causes. The first cause is the lack of tactile sensation, especially for the initial 30 cases. The console surgeon was still learning. It is important to recognize the absence of tactile sensation and strong force of the robotic forceps. During the early period of RATS, it may be better to

use a blunt and long bipolar grasper rather than Maryland forceps. The second cause is insufficient communication with assistant surgeons. The initial 30 cases of RATS were performed by only one certified console surgeon. The assistant surgeons were surgical residents. There were no surgeons available to provide appropriate advice, which may have led to a lack of communication. Thereafter, RATS was performed by two certified console surgeons. Therefore, it was possible to perform RATS with better communication, and more appropriate advice was available. The assistant surgeon should be a senior surgeon if possible. The third cause is different surgical views and organ positioning between conventional VATS and RATS. We performed most anatomic lung resections using VATS. It took time to adjust the differences. Therefore, many misinterpretations of the anatomy (especially bronchial injury) occurred among the initial 30 cases. No bronchial injuries were observed since then. Although both RATS and VATS are classified as minimally invasive, the experience of performing VATS is not always applicable to RATS, especially during the early period of RATS.

Comment 2:

What kind of staplers were utilized by the authors? Endoscopic staplers or robotic staplers?

Reply 2:

Thank you for your comments.

Robotic staplers were used for vessels and lung parenchyma for most of the 30 initial cases. Because there were no robotic staplers with cartridges suitable for stapling thick tissue (e.g., black), endoscopic staplers (purple or black) were used for bronchial stapling. After the initial 30 cases, only robotic staplers were used because Sureform green and black staplers were available.

Comment 3,4:

Please compare the injury and non-injury groups' bleeding outcomes and surgery times. Please compare the rates of complications, c-tube indwelling time, and hospital stay for injury vs. non-injury groups.

Reply 3,4:

Thank you for your comments.

Statistical analyses were performed to analyse the differences in the variables between the two groups.

According to your comments, we added text and Table 4.

Changes in text: (Page 9, Line 188-194)

Statistical Analyses

The summarized data are shown as median with range or interquartile range for continuous variables, and as number and percentage for categorical variables. The Chi-square test was used to evaluate the relationship between categorical variables, whereas the one-way analysis of variance and Wilcoxon signed-rank test were used for continuous variables. All P values were two-sided, and significance was set at <0.05 . Statistical analyses were performed using the JMP Pro version 16 (SAS Institute Inc., Cary, NC, USA).

Changes in text: (Page 12, Line 268-273)

Surgical Outcomes and Postoperative Complications

Patients in the injury group had significantly longer operative times than those in the non-injury group (161 vs. 133 min) (Table 4). There were no significant differences in blood loss, drainage length, hospital stay duration, and overall postoperative complications (grade ≥ 1). The postoperative complication rate was higher in the injury group, but there was no

significant differences.

Comment 5

Vascular or bronchial injury is uncommon in robotic surgery when performed by an expert hand. When there are significant anthracotic lymph nodes or highly invasive tumors, most cases occur. Otherwise, it's possible that inexperience is to blame. However, if the high rate of injury in this study is due to inexperience, the findings cannot be generally applied to other institutes.

Reply 5:

Thank you for your comments.

You are absolutely correct. We agree with you. The primary purpose of our report is to share the problems and pitfalls of RATS among thoracic surgeons so that such problems will not be repeated. I would very much appreciate your understanding of this point.

Reviewer F**Comment 1**

The authors describe a retrospective single institutional early experience of anatomic robotic lung resection of on a highly selected patient group. The study included review of 134 patients with some significant and serious intr-operative complications. This appear to be during their early learning curve, mostly due to technical reasons. They have included the intra-operative techniques they used to deal with these complications. A detailed post-operative outcome is not reported.

Reply 1:

Thank you for your comments.

We added Table 4 to describe the postoperative complications.

Comment 2

In the current era where robotic surgery is becoming routinely performed and an infrastructure exists for safe training, such as simulation and proctoring, these technical problem that can be avoided is not acceptable and not be of an interest to the readership.

Reply 2:

Thank you for your comments.

You are absolutely correct. The primary purpose of our report is to share the problems and pitfalls of RATS among thoracic surgeons so that such problems will not be repeated. I would very much appreciate your understanding of this point.

Comment 3

On the methods, most notably, the authors chose to implement some very concerning methods that significantly lower the internal validity of the study as a whole in addition to the authors' mis-utilization of the CTCAE, both of which function to significantly cripple the value of the study at hand.

For example, the authors utilized the CTCAE to grade adverse events as a result of surgery, however, the CTCAE is intended to grade the severity of organ toxicity as a result of cancer therapeutic medications. Additionally, they report all of their patients were grade 1, however,

this does not fall in line with grade 1 pending the interventions employed.

Reply 3:

Thank you for your comments.

The CTCAE has a section on intraoperative complications such as “intraoperative arterial injury.” I do not believe that this term has been misutilized, as you suggested.

As the other reviewer pointed out, the one death should be a grade 5 complication.

We have revised the text and Table 3 accordingly.

Changes in text: (Page 11, Line 218-219)

Most intraoperative complications were grade 1 according to the CTCAE, except for one death.

Changes in Table 3: (CTCAE grade of patient No.10)

1→5[‡]

Changes in Table3: (in footnote)

[‡]One death attributed to postoperative pneumonia caused by air leakage after intraoperative lung parenchymal injury.

Comment 4

The authors also wrote, “We tended to select patients with good lobulation and few comorbidities...” for enrollment in the study and fail to mention any exclusion or inclusion criteria, implicating a marked amount of selection bias.

Reply 4:

Thank you for your comments.

As noted in the limitations, the selection bias cannot be completely eliminated. We selected patients with fewer comorbidities and non-fused fissures as the initial 20 cases. These 20 patients were also included in our study.

Reviewer G

We thank the editors for the opportunity to review this study by Takase et al. The data in the manuscript is relevant, especially given the rise in adoption of robotic assisted pulmonary resection. I have only minor grammatical comments, as shown below.

Comment 1

Line 44. 45: please state the overall complication rate in the results section of the abstract.

Reply 1:

Thank you for your comments.

According to your comments, we added the text to the Results section of the Abstract.

Changes in text: (Page 3, Line 62)

Intraoperative complications occurred in 17 (12.7%) patients.

Comment 2

Line 47. "Patients" is not needed at the end of the sentence.

Reply 2:

Thank you for your comments.

According to your comments, we deleted “patients” from the text in the abstract’s result section.

Changes in text: (Page 3, Line 62-65)

These complications included pulmonary artery injuries in seven patients, pulmonary vein injuries in three, azygos vein injury in one, superior vena cava injury in one, bronchial injuries in three, and lung injuries in four.

Comment 3

Lines 88. 93: Wording needs to be more clear. Were the first 20 patients without "good lobulation, clinical N0 stage..." not considered for RATS at all at your institution or simply not included in the study?

Reply 3:

Thank you for your comments.

We selected patients with fewer comorbidities and non-fused fissures as the initial 20 cases. These 20 patients were included in our study. We corrected "good lobulation" to non-fused fissure because the other reviewer pointed out the lack of clarity.

According to your comments, we revised the text in the Methods section.

Changes in text: (Page 6, Line 112-116)

We selected the initial 20 patients who had non-fused fissures, clinical N0 stage, and no other critical comorbidities. The initial 20 patients were also included in our study. After the initial 20 patients, we continued to perform RATS without considering the above criteria. Moreover, patients with combined pulmonary fibrosis, emphysema, or interstitial pneumonia were not rejected for RATS.

Comment 4

Lines 131. 137: Criteria #1 and #2 are reasons for conversion while #3 is emphasizing that operative duration is not an indication for conversion. Please reword such that all criteria are indications for conversion.

Reply 4:

Thank you for your comments.

According to your comments, we revised the text.

Changes in text: (Page 8, Line 182-187)

We established the two criteria after approximately 30 cases and several intraoperative complications. Our criteria are as follows: 1) in case of bleeding, temporary hemostasis is not possible with the robotic or assistant's instrument and the bleeding cannot be controlled or treated with RATS; 2) non-vascular injuries cannot be treated with RATS. The degree of pleural adhesion and interlobar fusion or the extension of the operation time are not considered as indications for conversion.

Comment 5

Line 166. 167: "In addition, there...a stapled PA" is not a complete sentence.

Reply 5:

Thank you for your comments.

According to your comments, we revised the text.

Changes in text: (Page 10, Line 226-227)

In addition, there was one patient (No. 5 in Table 3) of the PA injuries in the distal side of PA which had already been divided proximally by stapler.