Peer Review File

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Reviewer A

1. How many patients underwent FET totally for three years?

Reply:

In this study, some of these patients were underwent the prior aortic procedure in our center, and some were in other centers. For past three years, more than 1000 aortic procedures per year had been performed in our center.

What % of occurrence rate of AAL after FET?

Reply:

The incidence of AAL after FET was about 1%-2%.

TAR with FET through median sternotomy is recommended for AD-A/B

Reply:

Thank you for your academic suggestion. We believe this is a reasonable strategy for AD.

Was there no spinal cord injury?

Reply:

Of course, there was. The incidence of spinal cord injury is about 1.5-3.0% in our center.

How they define “mild” or “moderate” leakage?

Reply:

The shunt was assessed by TEE. The degree of blood shunt was classified into 3 grades: I (mild, VC: <0.3 cm, JA: <6 cm^2, ERO: <0.1 cm^2); II (moderate, VC: 0.3–0.6 cm, JA: 3–6 cm^2, ERO: 0.1–0.3 cm^2), III (severe, VC: >0.6 cm, JA: >6 cm^2, ERO: >0.3 cm^2).

What kind of FET devise used? How they anastomose it to the native aorta?

Reply:

The FET devise we used is from the MicroPort, Shanghai, China. The self-expandable

stented graft was inserted into the true lumen and anastomosed on the normal aortic wall in a continuous circumferential full-thickness manner.

Could the authors completely avoid the occurrence of intraoperative rupture?

Reply:

For the last three years, intraoperative rupture did not occur in FET procedure.

1 or 2 debranching TEVAR might be ideal to close the AAL without endoleak.

Reply:

Thank you for this comment. We believe 1 or 2 debranching TEVAR is an ideal strategy and is performed each week in our center. Nevertheless, in some cases such as the Marfan syndrome, TEVAR is not appropriate. Therefore, the FET procedure and hybrid procedure were performed in different cases.

Reviewer B

We thank the reviewer for the comments.

1. lines 84-85: They mentioned the cases of FET were performed in acute and chronic dissection. However, in lines 163-168, 15.6% of their cohort did not receive any surgery on ascending /aortic arch. What is the difference between their procedure and a TEVAR procedure? what is the indication of such a procedure?

There were 12.5% of patients who received transposition of the arch vessels, do they mean reimplantation of the arch as an island technique?

Reply:

We believe the indication and strategy is very important for the procedure. There are five patients (15.6%) with type B dissection underwent FET procedure in our study. Three of them have the Marfan Syndrome which was inappropriate for TEVAR. One patient has chronic dissecting aneurysm, a planned second-stage thoracoabdominal aortic replacement will be performed in the future. The other one has an acute type B dissection with a large intimal tear and inadequate landing zone. Therefore, TEVAR was not performed in these patients.

The transposition technique is that mean of the island technique as the figure in your comments.

2.The authors must be aware that this AAL problem is quite unique to the way of primary surgery was performed which is not common in other centers.

Reply:

In this study, some of these patients were underwent the prior aortic procedure in our center, and some were in other centers. More than 1000 aortic procedures per year were carried out in our center. Nevertheless, we believed the incidence of AAL is not significantly higher than other publications.

3.In figure 1. the figure didn't show any ascending/arch graft material, only the native aorta was shown. There are no anastomosis suture lines between the proximal part of the "FET". Please consult the operating surgeon and make sure the diagram is accurate.

Reply:

Thank you very much for this suggestion. We modified the figures to be clearer with anastomosis suture lines. Because of we would like to describe the AAL after FET, the ascending/arch graft material was not showed in the figure.

4.Line 94: To date, only a few small studies reported endovascular strategies for AAL treatment (references 9-11). Again, AAL is a very unique problem related to the primary operation technique, so it is not surprising to have only a few reports. Moreover, references 9-11 actually are not describing the treatment of AAL.

Reply:

We rewrote the sentence that “Some small studies have reported different endovascular strategies for AAL lesions (9-11).” Line94-95.

Moreover, references 9-11 described trans-catheter strategies for AAL after different aortic procedures. The references 9 reported a trans-catheter closure using an AVP II, references 10 reported endovascular repair using a stent-graft, and references 11 described a closure using an AVP III.

5. Line 130: please provide the make of the devices

Reply:

The brand information has been added in the manuscript.

6. In your text, the antegrade technique with femoral access is actually a "retrograde"

technique in which the false lumen was accessed in the reverse direction of the blood flow. Your retrograde technique with brachial artery access is actually an antegrade approach.

Reply:

We believe that this suggestion is crucial for detailing the techniques clearly. In some opinions, the retrograde and antegrade approach depend on the direction of occluder releasing. The front disk deploying in the high-speed blood flow area was called antegrade. Therefore, we defined the antegrade approach in this way. However, based on your valuable comment, we redefine the retrograde and antegrade depending on the direction of the device insertion. In the revision, the retrograde is defined the femoral access, and the antegrade is defined the branchial artery access.

7. The authors claimed patients with AAL are asymptomatic, please explained the indication of reintervention, e.g. expansion of the aortic diameter.

Reply:

The primary indication was mentioned in line 173-175. Based on your comments, we rewrote the sentence. Now, we stated that “The primary indication for closure was the AAL causing poor thrombosis of the FET’s segment false lumen.”

Reviewer C

The indication for the treatment was ct graphical evidence of leak in aortic anastomosis and the antegrade perfusion of false lumen.

- Why wasn't the progression of the FL also included in the indication?
- Is there data for FL diameter after FET Procedure to AAL development?

Reply:

We could not agree more that the progression of the FL is absolute included in the indication. It did not mention is because that we believe the AAL and the antegrade perfusion lead to the FL enlargement.

In our study, some of these patients were underwent the prior aortic procedure in our center, and some were in other centers. Consequently, we did not have all the details before the FET Procedure.

How many FET procedures have been performed in this period (2016 - 2020)? Can you please indicate the incidence of ALL in your clinic?

Reply:

Every year, we performed more than 1000 aortic procedures in our center. We regret that we did not statistics all the FET procedures in this period (2016 - 2020). In this series of AAL closure, not all the patients underwent aortic procedures in our center as mentioned above. Nevertheless, in another study from our center, the incidence of AAL is about 1-2%.

Why show ALL only after FET, there are also cases after conventional elefant trunk. This can increase the number of patients?

Reply:

Conventional elephant trunk was performed limited each year in our center.

Although the success of the indicated therapy is high with few complications, it offers itself as an alternative if the patients are not suitable for open reoperation, because the success rate after open surgery is higher. Can you please discuss this in more detail.

Reply:

We believed that open reoperation is the golden therapy of AAL. However, it is associated with a high morbidity and mortality. In addition, the cost of an open aortic procedure is about 30 000 dollars in China. The per capita disposable income in China is only 5000 dollars in 2021. Thus, the cost of percutaneous closure is about 5000 dollars. Hence, considering the risk and costs, some patients and surgeons performed percutaneous AAL closure.

The endovascular correction of ALL using proximal stent graft extension is also safer and more effective, the main problem for this is the insufficient prox. landing zone. Can you please add the proximal landing zone measurements to the work to remove this treatment method as a better alternative?

Reply:

We believed that TEVAR is also effective in cases with sufficient landing zone. For ideal stent sealing and leak occluding, a more 1cm length landing zone is necessary. However, the landing zone in each case in our series was less than 1cm. After measurements on CTA, the distance between the leak and the nearest branch was 2.84

± 2.48 mm. The data was added in table 2.

- The work is very descriptive and lacks group comparisons and statistics. All ALL should be shown and then the group comparison should be performed. Is it possible to compare the different therapies (redo surgery, TEVAR, perc. ALL-closure) with each other?

Reply:

As mentioned above, TEVAR had not been performed in such cases. The redo-surgery often involved other situations requiring surgical treatment. So, it is difficult to compare the results between deferent therapies. In the future, we prefer to design a study to compare the effectiveness between redo-surgery and percutaneous closure.

Line 202: In which period (Months) was the significant FL regression after ALL-closure detected?

Reply:

This situation was detected in the CTA 1 year after closure. This was be added in the results (line 204).

This article still lacks the intraoperative data such as the duration of the operation, contrast medium and amount of radiation, etc.

Reply:

These data were added in the results.

Line 171: Only few patients have shown (chest pain, dyspnea). Have symptoms improved after ALL treatment?

Reply:

The symptoms (chest pain and dyspnea) were all relieved technical success cases.

Reviewer D

Do the authors have some financial disclosures with pharmaceutical company?

Reply:

We have nothing to disclosure.

In their results section of the abstract, the authors mention 34 AAL closure, while successfully device deployments were achieved in 36 leaks. However, in table 1, 32 leaks are mentioned. I suppose that some patient had 2 simultaneous leak? Can you please provide some explanations?

Reply:

In our study, 32 patients were included. Of them, 2 patients had 2 leaks were closed with 2 devices in the procedure. During the follow-up, two patients underwent a secondary percutaneous closure because of a recurrence leak (line 160-161). The data was showed in table 2.

How was the degree of false lumen thrombosis and the residual shunt assessed at follow-up? Did the authors make a follow-up aortic computed tomography angiography? Did they perform a transesophageal echocardiography? Or Both?

Reply:

The degree of false lumen thrombosis was assessed by aortic CTA. The residual shunt was assessed by TEE. The degree of blood shunt was classified into 3 grades: I (mild, VC: <0.3 cm, JA: <6 cm^2, ERO: <0.1 cm^2); II (moderate, VC: 0.3–0.6 cm, JA: 3–6 cm^2, ERO: 0.1–0.3 cm^2), III (severe, VC: >0.6 cm, JA: >6 cm^2, ERO: >0.3 cm^2).

In their conclusions, the authors state that "(…) The magnitude of benefit is greatest with AAL reduction to a grade of mild or less (…)". However, I don't see any clinical outcomes in the study. Do the authors speak about the imagery assessment success rate? Can you please comment on this?

Reply:

In the results, the diameter of segment false lumen significantly decreased after a successful closure with mild or less residual shunt. However, the false lumen did not change in the three patients with a moderate residual leak. In numerous researches, the diameter of FL is related to the prognosis.

In the femoral antegrade technique, the proper Amplatzer device is deployed across the leak ANTEROGRADELY (but coming RETROGRADELY to the aortic flow from the femoral vessel…) while in the retrograde technique, the delivery sheath is advanced

through the aortic true lumen from the right brachial artery, following the local aortic flow. I understand that the term “retrograde” is related to the blood flow in the brachial artery but as in the ANTEROGRADELY approach the device is deployed anterogradely from a retrograde puncture in the femoral vessels, it may create a confusion when reading the manuscript… Would it be judicious to call the femoral approach retrograde and the brachial one anterograde? It would be interesting to have the point of view of the authors on this.

Reply:

We believe that this suggestion is crucial for detailing the techniques clearly. In some opinions, the retrograde and antegrade approach depend on the direction of occluder releasing. The front disk deploying in the high-speed blood flow area was called antegrade. Therefore, we defined the antegrade approach in this way. To avoid confusion, we redefine the retrograde and antegrade depending on the direction of the device insertion. In the revision, the retrograde is defined the femoral access, and the antegrade is defined the branchial artery access.

Thank you again.

I would discuss more deeply the potential advantages of percutaneous access with respect to open repair. Also, even if the authors have no control group of AAL redo surgical repair, I would emphasize the potential differences in outcomes in patients with open procedural repair compared to endovascular treatment.

Reply:

Comparing the redo-surgery and percutaneous closure is very important. We believed that open reoperation is the golden therapy of AAL. However, it is associated with a high morbidity and mortality. In addition, the cost of an open aortic procedure is about 30 000 dollars in China. The per capita disposable income is only 5000 dollars in 2021. Thus, the cost of percutaneous closure is about 5000 dollars. Hence, considering the risk and costs, some patients and surgeons performed percutaneous AAL closure.

The redo-surgery often involved other situations requiring surgical treatment. So, it is difficult to compare the results between deferent therapies. In the future, we prefer to design a study to compare the effectiveness between redo-surgery and percutaneous closure.

Lines 213-214: the authors state : "(…) Successful AAL reduction to mild or minimal resulted in quick false lumen decrease and reduced the need for redo aortic surgery (…)". However, to state this, the authors should perform a comparison with patients presenting AAL who were not treated, looking afterwards if the need for redo aortic surgery is really higher in this category… I understand that it seem logical, but be cautious adding "(…) MAY REDUCE the need for redo aortic surgery (…)"

Reply:

Thank you very much for the professional advice. Due to the lack of data between redo-surgery and percutaneous closure, the sentence "and reduced the need for redo aortic surgery" was be deleted (line 288).

Page 15, line 221 and Table 1: As the primary procedure was not always a Frozen Elephant Trunk, I would rephrase the title in : "(…) Techniques and Outcomes of Percutaneous Aortic Anastomosis Leak Closure After Arch and Ascending Aorta Surgery for Aortic Dissection".

Could you provide the classification of AAL you are speaking about?

Reply:

We would like to answer the two questions together. In our previous study, we classified the AAL after Arch and Ascending Aorta to three types as follows.

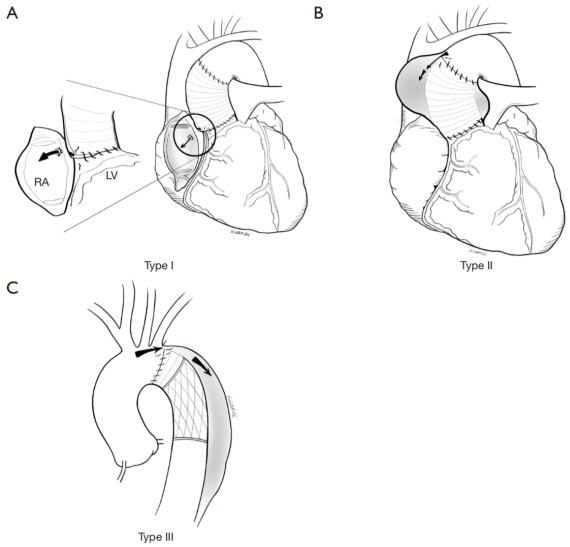

Figure 1 Illustration of the classifications of AAL. (A) The diagram of type I AAL; (B) type II AAL; (C) type III AAL. AAL, aortic anastomotic leak; RA, right atrium; LV, left ventricle.

In this study, the techniques and results of AAL after FET procedure was detailed analyzed. All the occluders were used to close the leak of the FET.

There is no reference to Figure 1 and Figure 2 in the manuscript. Please add it.

Reply:

There might be some mistakes in the submission of the manuscript. The legends and the figures have been re-upload.

Minor comments:

- Page 5, line 58: " (….) (FET) for aortic dissection and describe the procedural and mid-term outcomes in a (…)" ☾ " (….) (FET) for aortic dissection and TO describe the procedural and mid-term outcomes in a (…)"
- Page 5, line 62: " (….) There different strategies were performed: 1. antegrade(…)" ☾ THREE different strategies were performed: 1. Antegrade (…)"
- Page 8, line 110: " (….) in preparing an AAL closure (…)" ☾ " (….) in preparing TO AAL closure (…)"
- Page 8, line 120: " (….) First, a 6 French access was obtained (…)" ☾ " (….) First, a 6 French access IS PLACED (…)". Try to use always the same verbal form, to give consistency to your message.
- Page 8, line 123: " (….) was crossed (…)" ☾ " (….) IS crossed (…)".
- Page 8-9, line 124-125: "(…) Then, the catheter inserted the FET AAL defect after it was advanced (…)" ☾ "(…) Then, the catheter INSERTS the FET AAL defect after BEING advanced (…)"
- Page 9, line 130: please provide the abbreviations for ADO I etc… as this is the first time that these terms appear in the text.
- Page 10, line 141: "(…) which to advance the delivery system (…)" ☾ "(…) which advance the delivery system (…)"
- Page 10, line 146: "(…) which means a symmetric device (…)" ☾ "(…) which means THAT a symmetric device (…)".
- Page 14, line 216: (…) Aortic shape augmentation was due to growth (…)" ☾ "(…) Aortic shape augmentation IS due to growth (…)".
- Page 15, line 225: suggestion: "(…) According to various studies, there are a few endovascular strategies that offer (…)" ☾ "(…) According to various studies, there are a few endovascular strategies PROVIDING (…)".
- Page15, line 227: "(…) Endovascular repair using a stent-graft was not widely used

due to an (…)” ☾ “(…) Endovascular repair using a stent-graft IS not widely used due to THE OFTEN insufficient landing zone (…)”.

- Page 17, line 250: “(…) with the aorta, thus preventing device migration (…)” ☾ “(…) with the aorta, TO PREVENT device migration (…)”.

- Page 18, line 273: “(…) hypothesize two possibilities of a recurrence AAL (…)” ☾ “(…) hypothesize two possibilities FOR a recurrence AAL (…)”.

Reply:

We apology unreservedly for our mistake in grammar. We have rewritten all the sentences follow your suggestions. The revision had checked by a native English-speaking expert.

Please provide abbreviation for the different devices types with the legend of table 1 (ADO I, VSO, ADO II, AVP III, AVP IV, AVP II).

Reply:

The abbreviation of devices has been added.