Author's response to reviews

Title: Endovascular repair of abdominal aortic aneurysm with severely angulated neck and tortuous artery access: A case report

Authors:
qinglong zeng (zengql3500@163.com)
lianjun huang (huanglianjun2008@163.com)
xiaoyong huang (xy_huang5000@126.com)
mengliang peng (pengmengliang03@163.com)

Version: 2 Date: 17 December 2014

Author's response to reviews: see over
Dear Editor and Reviewers:

Thank you for your letter and for the reviewers’ comments concerning our manuscript entitled “Endovascular repair of abdominal aortic aneurysm with severely angulated neck and tortuous artery access: A case report” (ID: 1625265387145260). Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our clinical practice. We have studied comments carefully and have made corrections which we hope meet with approval. The main corrections in the paper and responses to the reviewer’s comments are as following:

Responses to the reviewer's comments:

Reviewer #1:
Response to comment: A more detailed and objective assessment of the probable claudication and renal function would be appropriate.
Response: Considering the reviewer’s suggestion, we have added objective assessment of renal function and claudication to case presentation part of the paper. Special thanks to you for your good suggestions.

Reviewer #2:
Response to comment: Discussion about other experiences with anatomical problems was suggested.
Response: Hostile neck always challenges vascular surgeon, anatomical factors especially neck length, neck diameter and neck angulation often exclude EVAR in patients with AAA. Beside angulated neck in our case, other EVAR experiences with anatomical problems have been cited and discussed.

Reviewer #3:
1. Response to comment: Why did not we consider open repair in this case since it was anatomically unfit for EVAR?
Response: It is a really difficult question when to choose open repair or endovascular repair for AAA. Open repair maybe a better choice in AAA patients with unfavorable anatomic morphology, however it requires a major surgical invasiveness, aortic clamping with visceral ischemia and increased mortality and morbidity. One or more following aspects may account for the off-label use of EVAR, such as advanced age and comorbidities, minimal invasiveness, learning curve effect of endovascular specialists and encouraging clinical outcomes, and independent decision-making of patients or their guardians. Due to the underline comorbidities and patient’s refusal to open surgery in our case, a second EVAR was carried out after consent was obtained. Though severe angulated neck, neck diameter and length was adequate for proximal fixation and seal, and current stent-grafts become more flexible and can be compatible with irregular neck. So we finally chose EVAR.

2. Response to comment: Why was Endurant stent-graft not successfully deployed in local hospital?
Response: It is a very good question. Endurant is a flexible stent-graft that can be suitable for patients with hostile neck and tortuous access, but in fact the case we presented seemed to be more anatomically complex and unpredictable. According to previous medical record, we found Endurant could be induced through left femoral access assisted by buddy wire technique and delivery system could arrive to superenal aorta but failed to angiographically confirm proximal neck, since graft sheath was almost incarcerated in the neck and contrast medium could not fluently pass the taper neck downwards. So we saw technical failure in local hospital.

3. Response to comment: This case showed a tapered neck (proximal diameter 20mm, distal diameter 13mm), and a 28mm endograft was used, why did we chose a >40% oversizing?
Response: We are very sorry for our negligence of description about the neck, it also had a maximum diameter of 23mm. 15%-20% oversizing is preferred in our center and we suggest relative large oversize to hostile neck. So a 28mm endograft was used. We had added the description of the neck maximum diameter in the manuscript.
4. Response to comment: why did we consider the iliacs prone to rupture or type Ib endoleaks? The diameter was ok for EVAR with no need for internal iliac artery (IIA) coverage. Tortuosity as depicted in CTA was present mostly on the left side but not too excessive.

Response: Preoperative CTA showed aneurysmal dilatation and severe calcification of bilateral iliac arteries in this case. Endovascular approach with distal land zone in dilated and calcified iliacs may hasten dilation course and increase the potential risk of rupture and probable Ib endoleaks. We quite cleared that bilateral IIAs coverage would increase the risk of comorbidities like claudication though its incidence was acceptable according to our experiences. Furthermore, we had planned to reconstruct the IIA during follow-up if necessary.

Truly, tortuosity presented on the left aortoiliac path may be not too excessive, but tortuous aorta and aortoiliac access made the stent-graft delivery system advance difficultly and the wire access to left iliac leg was unable to be obtained. Both skilled techniques and flexible endovascular devices were required.

5. Response to comment: why did we cover both IIAs? Whether we think of iliac-branched device or a sandwich technique to preserve IIA and patient was free of symptoms during follow-up?

Response: In most cases, we try to preserve at least one IIA to reduce incidence of related complications. Just as we explain above, we didn’t think it was proper to deploy stent-grafts in apparent dilated and severely calcified iliacs. We didn’t try iliac-branched device or a sandwich technique to preserve IIA, for these adjunctive procedures inevitably increase the risk of endoleaks and technical difficulties, especially under local anesthesia. Fortunately, short-term (6 months follow up) outcome was encouraging, the patient was free of any symptoms. Certainly, a close and long-term follow up is needed.

6. Response to comment: why we did not try Endurant endograft again since it is really conformable graft and its first attempt was done in another hospital, and the endograft choice must be clearly stated.

Response: it's really a good question. We often face these problems about which type of stent-grafts to use in these patients with hostile neck, COOK, MEDTRONIC or Gore, etc. By now, no data exist regarding direct comparison of the performance of different stent-graft type in EVAR for complicated AAA. We mostly considered Gore Excluder stent-grafts in the patients with severe neck angulation (>90°) and tortuous access, and clinical outcomes were often favorable. At outside hospital, primary EVAR using Endurant stent-graft (Medtronic Vascular, Santa Rosa, CA, USA) was first attempted through left access, but failed to angiographically confirm proximal neck after introducing delivery system below the origin of renal arteries. Considering first attempt failure and our previous experiences, we used Excluder stent-graft from right access. Of course, we believe Endurant might get satisfactory results with skilled hand and adjunctive techniques. More studies about the optimal selection of stent-grafts are needed in the future.

Other changes as reviewer suggested:

1. Line 47 “with unknown cause” was deleted.
2. Line 48 “Computed tomography angiogram (CTA) demonstrated the severely tortuous descending aorta and infrarenal AAA” was corrected as “Computed tomography angiogram (CTA) demonstrated a severely tortuous descending aorta and an infrarenal AAA”
3. Line 51 “aneurismal” was corrected as “aneurysmal”
4. Line 51-53 “In addition, aneurysmal dilatation of bilateral iliac arteries with a 17mm and 23mm diameter of the left and right respectively, and severe tortuosity of aortoiliac access made the complicated AAA more difficult to repair.” was corrected as “In addition, aneurysmal dilatation and severe calcification of bilateral iliac arteries with a 17mm and 23mm diameter of the left and right respectively, and tortuosity of aortoiliac access were showed.”
5. Line 58 “with a maximum blood pressure of 150/90 mmHg” was deleted.
6. Line 59 “a stroke for 2 years” was corrected as “stroke with residual left limbs weakness”.


Special thanks to you for your good comments and suggestions.

Reviewer #4:

1. **Response to comment:** expert opinion about what readers can learn from this case and the future of off-label use of EVAR; since the heterogeneity existed in these referred studies, were these data comparable?

Response: We know growing studies show feasibility and safety of EVAR in patients with unfavorable morphology, but the EVAR indications of off-label use reach no consent and disputes still exist in the efficacy of EVAR in patients with hostile neck. Despite the complexity of our case, we still obtained encouraging result. We believe endovascular management with flexible stent-graft and integrated technique is feasible in hostile neck and tortuous access. With the advances of endovascular devices and techniques, indications of EVAR will be expanded and the future of EVAR in hostile AAA is promising especially for patients who are unsuitable for open repair.

We quite agree with reviewer about the heterogeneity in referred studies, since inclusion criteria were not completely same, most studies may use a definition of > 60° neck angulation for hostile neck, but we reported a case with 136° angulation, which maybe an extreme one. Though favorable result was obtained in the case, it should be cautiously referred, since it couldn’t be considered as high quality evidence about EVAR for complicated AAA.

There are many confounding factors that affect outcomes of EVAR for patients with HNA, like reviewer’s suggestion we could divide patients into subgroup with different severity of angulation in future studies, and the results from these studies will be more convincing. In addition, since stent-graft become more flexible and easily compatible with neck angulation, neck length and diameter are more important prognosis factors of EVAR.

2. L58-60 As reviewer suggested we had rephrased this paragraph about the patient’s medical history.

3. L67 what did we do by “potentiated anesthesia”? We had corrected as “intravenous sedation and local anesthesia”.

Since EVAR were performed in local anesthesia, we used Dexmedetomidine Hydrochloride by intravenous drip to induce sedation and alleviate the stress of patient during procedure.

4. L67-84 As reviewer suggested we entered the total duration of the procedure in case presentation part.

5. L90-91 the statement “EVAR has been accepted as the first choice treatment for AAA in the majority of patients since it was first reported by Parodi in 1991” was corrected as “EVAR has been widely used as an alternative to open repair for patients with AAA since it was first reported by Parodi in 1991.”

6. We had revised the whole paper for linguistic errors and improper expression.

Other changes:

Line 141-142 “Maybe patients with extensive collateral network in the pelvis had relatively rare complications after internal iliac artery occlusion” was deleted.

Reviewer #5:

1. As reviewer suggested we had specified the names and manufactures of materials used in this case.

2. **Response to comment:** Line 20 “a second endovascular repair using the more flexible Excluder stent-graft was conducted” High flexibility of Excluder stent-graft was noted in several single center studies, but it hasn’t been compared to Endurant™ stent-graft regarding flexibility. Furthermore, Endurant™ has also flexible limbs that accommodate to tortuous anatomy.
Response: We are very sorry for our improper writing about higher flexibility of Excluder than Endurant’s without solid evidences, but we actually find the difference of flexibility between their delivery system (not stent-graft itself) in our clinical practice, due to different design of graft sheath and deployment. Our successful experience of this case with Excluder stent-graft didn’t deny the feasibility of Endurant stent-graft. Other experienced specialists may also obtain satisfactory result when using Endurant. We had objectively rephrased this part in our manuscript.

3. Line 28 “6 months follow-up by Computed tomography angiogram was satisfactory” was corrected as “follow-up at 6 months by computed tomography angiogram demonstrated fluent bilateral femoral and renal arteries without endoleaks and stent migration.”

4. Response to comment: explain why we used Excluder device instead of Endurant device.
Response: Since we have no data regarding direct comparison of the performance of different stent-graft type in EVAR for complicated AAA. It is often difficult to decide which type of stent-grafts to use. We gained more experiences about Excluder stent-grafts in patients with severe neck angulation (>90°) and tortuous access, and clinical outcomes are often favorable. So we prefer Excluder stent-graft. Of course, we don’t deny Endurant can also get satisfactory results by skilled hand. More studies about the optimal selection of stent-grafts are needed in the future.

5. Response to comment: explain why we described Excluder device come with “a smaller sheath” and suggest we should refer to the iliac tortuosity index and anatomic severity grading score.
Response: We are very sorry for our incorrect writing about Excluder device come with “a smaller sheath”, since both Eudrant and Excluder would require a 6.8mm sheath. We had rephrased the description about Excluder. Iliac tortuosity index and anatomic severity grading score provide us good methods to quantify the anatomical tortuosity and indicate the technical difficulty of EVAR. However, we failed to evaluate the score of this case because of its uncommon use in our clinical practice. We should do more work to improve our ability to manage patients.

6. Response to comment: explain why we cover both IIA’s, and simultaneous embolization of IIA wasn’t performed as a staged procedure.
Response: In most cases, we try to preserve at least one IIA to reduce incidence of related complications. But in this case, we didn’t think it was proper to deploy stent-grafts in apparent dilated and severely calcified iliacs, bilateral IIAs coverage was unwilling but necessary. In addition, we often don’t suggest simultaneous embolization of IIAs unless IIAs also dilate, since the incidence of type II endoleaks is relatively low according to our experiences in our center.

7. Line 74 Did we try to negotiate the left aortoiliac path using the “buddy wire” technique?
Response: Certainly, we quite believe other maneuvers might be adopted in this case. Buddy wire technique can straighten iliac artery and provide support to facilitate stent-graft deployment. But to this patient with severely calcified iliacs should be cautious.

8. Response to comment: discussion is too long and paper should emphasize in other options for impossible iliacs.
Response: It’s really a constructive suggestion. We have tried our best to shorten the content of discussion and put the emphasis on key points.

9. Considering the Reviewer’s suggestion, we have rechecked the author’s name in references.

Finally, the article has sent to recheck the language and many minor changes have been made. I don’t think it is
necessary to put them here. We really appreciate your efforts and please let us know if there are more questions. Your serious consideration to this manuscript would be greatly appreciated!

Best regards,

Qinglong Zeng, MD
Lianjun Huang, MD
Aortic Center of Anzhen Hospital affiliated to Capital Medical University, Beijing, China