Author’s response to reviews

Title: Quantifying the learning curve for pulmonary thromboendarterectomy

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Author’s response to reviews:

Dear Editors,

We would like to thank the reviewers for their comments and insights to improve the quality of our manuscript. We believe we have incorporated all of their requests into our manuscript to the best of our ability. Please see below for our detailed responses:

Reviewer #1: This is a very unique paper showing the importance of learning curve for PEA.

Major

How many surgeons are involved in this study?

There are 3 primary surgeons involved in this study – one thoracic surgeon and two cardiac surgeons – functioning in a team. This has been further clarified in the manuscript.
Is figure 1 for one surgeon?

Figure 1 is for a single team of surgeons involving a thoracic and cardiac surgeon working together. All endarterectomies were performed together by a thoracic surgeon (CDW) and a cardiac surgeon (either GJV or MAV).

For learning curve which factors are important, trained team or trained surgeon?

How many operations do surgeons need to experience for performing excellent PEA in your analysis?

We attempt to make the case that a well-trained team is more important than a single surgeon, as even the operative team comprised of more than one surgeon alone. As a team, we show that 20 patients are needed to gain proficiency, while 100 cases are needed to gain expertise.

Please provide the prevalence of residual pulmonary hypertension (postoperative mPAP>30mmHg or other definition) in T1, 2, 3.

For residual PH or dead cases instead of DHCA is there any other flection point in your analysis?

The prevalence of residual pulmonary hypertension was 4 patients in T1, 4 patients in T2, and 3 patients in T3, so there was no apparent difference across terciles and we have added this information to the text and tables as we agree it is important to report this. We did not appreciate any other notable or clinically relevant flection points in our analysis.

Recently more type 3 patients might be operated.

Is there any difference in surgical indication among T1 to T3?

Before the first flection point PEA for type 3 might be difficult.

We found no significant difference in the Jamieson classification among terciles. This information is included in Table 1. Interestingly, in our dataset, the proportion of type 3 patients in T3 was slightly lower than in the T1 and T2.
Please provide postoperative hemodynamic data in Table 3.

We have included post-operative hemodynamic data as requested in Table 2. Unfortunately, we do not have post-operative measurements of cardiac output for a number of our earlier cases, and thus cannot reliably report this information from our dataset.

Reviewer #2: Thank you for inviting me to review this interesting manuscript. The manuscript comes from an experienced center in Boston with an excellent multidisciplinary CTEPH team. Although the manuscript is a retrospective review of the results of PTE surgery, I believe it warrants publication, especially given the recent surge in surgeons' interest in pulmonary endarterectomy as the surgical treatment for chronic thromboembolic pulmonary hypertension. As authors indicate, there are no previous published data to assess the learning curve for pulmonary endarterectomy, however it is quite reassuring that these authors came to a similar conclusion to what our group had come up with a few years ago. Although, our manuscript was not accepted for publication, the findings were presented as an abstract at the 2013 annual meeting of Western Thoracic Surgical Association meeting: Pulmonary Endarterectomy: What Constitutes Adequate Surgical Training? The conclusion was also that at least 100 pulmonary endarterectomies are needed before surgical expertise/mastery is gained.

I have a couple of comments:

I would like the authors to elaborate on the complication rate. They note that 54% of patients experienced at least one complication. However, the severity is not mentioned. Complications can range from benign postoperative arrhythmias to significant events such as cerebral or myocardial events.

In reporting our complication rates, we reviewed all complications that were recorded as part of our STS Database collection effort. In looking through the complications listed, we elected to eliminate “atelectasis” in this revision as this is difficult to interpret as significant in isolation. In addition, we added a “major” complication category, which included postoperative respiratory failure or acute respiratory distress syndrome requiring reintubation, sepsis, and return to operating room. Thus, the rate of major complications was roughly 20% in our total experience.

It would also be interesting to specify if there were improvements in the incidence of complications that could be related to technical errors or level of surgical expertise, such as hemoptysis, or residual pulmonary hypertension post-op (mPAP >25 and/or PVR >400).

Though the number of major complications does appear to trend downward from 25% to 13.3% from T1 to T3, we did not find there to be any statistically significant difference in complication rates or technical errors across terciles. We elaborate on the issue of residual pulmonary
hypertension above, and also found no significant difference in the number of patients with residual mPAP > 30 mmHG with increasing surgical experience. We have reported this in the text and Table 3 however. We also elaborated on cases of major postoperative hemoptysis – there were 4 total in our series, and the occurrence of these cases did not appear to correlate with surgeon experience or proficiency.