


Discussion

Dr G. Chad Hughes (Durham, NC). I would like to thank the Association for the opportunity to discuss this work and congratulate Joe on a great presentation. Joe and Alberto, great work. I just have a few questions.

Although the authors state their initial experience has led them to use this technique more widely, it was used in only 26% of the 242 patients undergoing DeBakey type I dissection repair during this time interval. This indicates the presence of bias with regard to patient selection, surgeon preference, or both. Please describe in more detail how patients are selected to undergo this procedure because it would appear that the vast majority still do not receive this adjunctive antegrade stent graft repair.

Dr Bavaria. That is a very fair question. That gets into the methods of selection a little bit, and there was a little bit of an evolution—especially in the really early phases.

The first 6 we did were actually done for significant malperfusion problems, and when we looked at them—this was presented at the Annual Meeting of The American Association for Thoracic Surgery in 2006—we saw that we had very good remodeling. This was the impetus for the entire effort. The fact of the matter is, in our institution there are 5 aortic surgeons who take dissection call; 2 of them do the procedure and 3 of them do not. So that’s the natural selection bias right there; the patients come in randomly.

The other selection bias is that we do not do Marfan patients, so the entire Marfan subgroup was excluded, and that’s about 15% of cases. We do not perform the procedure in patients we believe will have <10-year life expectancy from their age. An analysis probably should be done to take out that side. But that is the actual selection algorithm right there.

Dr Hughes. Yes. I would say if there is institutional buy-in, I would question why 3 of the surgeons don’t do it.

Dr Bavaria. That’s a good question. I can’t answer that.

Dr Hughes. Okay. We’ll move on.

Dr Bavaria. I think they’re a little younger and may not be as self-secure.

Dr Hughes. Yeah, got it.

Although the postoperative outcomes as presented suggest no adverse effects of the addition of antegrade stent graft deployment to standard dissection repair, the results are unadjusted and do not take into account potential differences in the risk profiles of the groups.

For example, the incidence of preoperative renal failure was nearly double in the standard versus stented group, and the incidence of preoperative shock or performance of concomitant coronary artery bypass grafting was not reported, all of which are predictors of composite mortality or major morbidity following proximal aortic replacement based on data from more than 45,000 patients in the Society of Thoracic Surgeons database, which we recently published in Journal of The American College of Cardiology.

Further, the International Registry of Acute Aortic Dissection has previously published a risk model for type A dissection repair that could be used to risk adjust the patient cohorts, or ideally, the analysis could be repeated with a propensity-matched design that would better account for any potential differences between the groups. Please comment on that.

Dr Bavaria. We went through the univariate analysis of the preoperative risk factors, and there wasn’t anything that was below 0.05.

But I totally agree with you. The next iteration should be a propensity-matched analysis, and I totally agree that we should do a little bit more robust analysis of preoperative factors to make sure that we are comparing apples to apples here, and I think a propensity analysis is perfect.

At some point we are probably going to have to do a prospective randomized study on this. I think the equipoise is satisfactory enough to do that. That probably will require a multicenter trial.

Dr Hughes. That gets to my last question: Although the decreased need for open reintervention is interesting, it seemed somewhat less compelling in the absence of the survival benefit. Do you have any thoughts on why you’re not seeing a survival benefit at this point?

Dr Bavaria. That is a very good question. I do not know why there is not a survival benefit. You might think there should be. Some of this may be because there was a significant learning curve with the original 10 or 15 cases. We had to do some interventions because we were placing the stents too distally, and as Eric Roselli
has taught us, it may be better to bring these stents a lot more proximal—we figured that out.

We basically cover the subclavian artery. We bring it as far proximal as possible. We don’t cut out the graft like Eric does, but we do bring them as far proximal as possible.

That was probably something that affected the mortality rate on the stented side at the beginning of the series. I do not really know the answer. We’ll see.

Dr Hughes. Well, again, congratulations, and I echo your sentiment. I think this would be well suited to a multicenter randomized trial.

Dr Bavaria. Thank you very much, Chad.

Dr Marc R. Moon (St Louis, Mo). Joe, does this have to be a covered stent graft? Couldn’t you just put in a stent? Wouldn’t it effectively do the same thing?

Dr Bavaria. One of the reasons why it works in these selected patients is because many times there is a large fenestration in the proximal descending aorta that we cannot get to.

So if you have a large fenestration in the proximal descending aorta, then a pure stent would maybe not work as well. It would theoretically work as well if there were not a large communication in the proximal descending aorta. But if you have a large communication in the proximal descending aorta, then you need a fully covered stent.

Dr Alberto Pochettino (Rochester, Minn). I just want to make a couple of comments, because I was involved in this study.

The first issue raised regarding patient selection is a good one, and I want to emphasize that this was a work in progress. The first 8 to 10 patients were indeed what I would call a pilot project; most were patients who definitely had malperfusion and needed something more than a standard operation. We were impressed with how good the results were in those initial, intrinsically high-risk patients.

What came down within the University of Pennsylvania was that 1 of the surgeons—myself—went on to generalize the use of this technique to all DeBakey type I dissections, with the only exclusion being collagen vascular disease. The remaining surgeons were not compelled to embark on a modification that makes an operation that is intrinsically difficult even more difficult and increases the circulatory arrest time by about 20 minutes, without clear-cut, up-front evidence that it would be of benefit.

Ultimately, as the results improved, some of the other surgeons, Bavaria being one of them, started using the antegrade stent technique.

As we think back, the issue remains as to whether or not this technique is worthwhile. I don’t as yet know the answer. I’ve been impressed that the technique is safe and reproducible, with equivalent results to the standard type A repair.

As we analyze the long-term outcomes most of the patients in the 2 groups, aside from the early pilot project, are indeed similar in presentation and early outcomes. I don’t remember seeing a particular bias regarding the stented group being sicker or not as sick compared with the other groups. Again, the early pilot project was a little bit different.

Dr Anthony Estrera (Houston, Tex). Joe, nice job. The concept is good. I do like the concept, and if the data of the Investigation of Stent Grafts in Patients With Type B Aortic Dissection trial bears out as Nienaber has presented most recently at 5 years is anything to go by, you should see a difference as your data matures.

My question is related to spinal cord ischemia and paraplegia. Although it wasn’t significant, the \( P \) value was .07. Because the stent-graft is thrombosing-remodeling—all those relevant intercostals—what are your thoughts about paraplegia and was your study powered enough to show a difference?

Dr Bavaria. We probably do not have enough data right now. I have a slide I didn’t show that is not just the survival differences between the 2 groups as far as the learning curve is concerned, but also the entire morbidity and mortality profile in the learning curve.

We had 5 spinal cord ischemic events, and all 4 of those were in the first part of the series. And that’s why at the beginning we didn’t know how long the stents should be, and now we’ve kind of standardized that. But you’re right, it is an issue.

Dr Eric E. Roselli (Cleveland, Ohio). Joe, great presentation. Just 2 really quick questions.

Despite the fact that you show there was more malperfusion and longer circulatory arrest times in your stented patients, there was really no difference in mortality. Did you do any additional adjunctive procedures like stenting any static occlusions of organs downstream at the same time in any of your patients?

Dr Bavaria. No, we did not. The only adjunct is that we are doing more and more of these operations in the endo suite now, so when we put a stent in, we’ll shoot a completion angiogram.

Dr Roselli. Great. I think that’s an important part of the procedure. A serendipitous finding in my series was that I think we can treat these patients with malperfusion better using the hybrid suite.

My second question concern folks who had persistent false lumen perfusion in the stented area on follow-up. Have you done an imaging analysis to see if they had persistent dissection in the branch vessels of their arches? I suspect that may be a common area where a persistent entry tear was filling the false lumen of the aorta.

Dr Bavaria. I agree with that concept. I think the differential between my technique—or our technique—and maybe even your technique and Di Bartolomeo’s technique right behind you, is that they’re doing a total arch, and they have a sewn-in graft where there is no communication. In other words, there is no landing zone in this dissected aorta.

We’re getting into the mid-70s pretty consistently; between 70% and 80% success. But we have 20% to 25% nonsuccess compared with what Roberto is going to tell us, probably 10% with a full elephant trunk graft that is made for this.

So I think you’re right. There are either left subclavian or type 1A endoleak situations that you can think about. We had more of these in the early phase because we learned a lot and put them up more proximally now.

Dr Moon. Hopefully you’ve decreased the pressure so much in that false lumen that it’s not going to be a problem and dilate over time like it would be if you didn’t have the stent in there.

Dr Bavaria. I agree. I think that differential between putting a stent in antegrade under a hemiarch condition compared with a total arch with a designed E-Vita type of graft (JOTEC, Hechingen, Germany), that does explain the differential, which is about 15%.
Dr Moon. How much contrast do you do on your completion angiogram? What can you do?
Dr Bavaria. As little as possible.
Dr Moon. Fifteen for 30?
Dr Bavaria. Yes.
Dr Roselli. Mine is 12.5 cc, 15 for 25 with half-strength contrast.
Dr Bavaria. Ten for 30 or something like that. Right at the end of the stent so it doesn’t get hung up.

Dr Roberto Di Bartolomeo (Bologna, Italy). Joe, my compliments on your presentation and your technique. What do you think about our initial experience in type B acute aortic dissection with impending rupture and/or visceral malperfusion to use the frozen elephant trunk technique?
Dr Bavaria. For type B?

Dr Di Bartolomeo. Yes, for type B acute dissection when there is impending rupture or/and distal malperfusion.
Dr Bavaria. With the E-Vita?
Dr Di Bartolomeo. Yes.
Dr Bavaria. Yes, it makes sense.
Dr Di Bartolomeo. Seventy percent of patients have the acute aortic dissection in the ascending aorta, and 22% start in the descending aorta. With our operation, the frozen elephant trunk, using the E-Vita—or now the Thoraflex, the new device from Vascutek (Renfrewshire, Scotland)—it’s possible to remove the ascending aorta and aortic tissue in the same operation, also reducing the risk of the type A aortic dissection. Is it a good idea?
Dr Bavaria. I think that is going to be the topic of our next research project. That’s a nice segue.