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Discussion to: A case of living-donor segmental lung transplantation and concomitant Nuss procedure in a pediatric patient with pectus excavatum

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Dr. Daniel Raymond (Cleveland, OH):

Thank you very much. First, I want to congratulate Dr. Date and his team on another technical tour de force and an amazing presentation. I approach this more from the thinking of a pectus surgeon than a transplanter. But I have a few questions I'd like to direct your way. And I'll start by talking about preoperative planning. And as you talk about size matching and calculating the volume you're going to need, did you use any kind of simulations to try to calculate intrathoracic volume and simulate a Nuss procedure and what you were going to attain by that? How much improvement did it require, and could you achieve that?

Dr. Hiroshi Date (Kyoto, Japan):

Thank you very much. That's a very good question. We know that about 200% bigger lung can squeeze into the small chest cavity. Successfully in the past, our experience of lobar transplantation and a-- roughly, we felt that the chest cavity will-- the volume will be doubled by Nuss procedure. But we do not have a specific method to calculate the estimated volume after Nuss procedure, but that's kind of an eyeball evaluation.
Dr. Raymond:

Yeah, I would say doubling is a pretty generous estimate, and there are ways of simulating that. Maybe in the future something to investigate where you can actually look at controls of Nuss procedures that have been done and calculating intrathoracic volume.

Dr. Date:

Do you have that method to estimate?

Dr. Raymond:

I'm working on it, yes.

Dr. Date:

Oh, you're working on it.

Dr. Raymond:

Yeah. With regard to intraoperative characteristics, one of the-- and you pointed out that you were having some issue on the right side with your venous anastomosis. Did the confirmation of the chest and the abnormal confirmation that you would see in a pectus patient heighten your concerns about torsion of the grafts as the heart's distorted, everything's pushed around a little bit? Did that increase your concerns? And do you do anything different because of that?

Dr. Date:

Thank you very much. I think it is not related to a chest deformity. It is related to the segmental transplantation. Because the basal segment was used, which means the bronchus was shorter, which means the graft was shifted toward the apex. So, this will increase the length between the donor and recipient pulmonary vein. That's why the venous anastomosis was pretty much stretched after the lung was expanded. So that's why I think that caused a significant stenosis.

Dr. Raymond:

Thank you. And in the closure process, the two questions I had was with the Nuss bars in place, was that going to put undue stress on the sternal closure
because you’re essentially trying to force the sternum out into a position it’s not used to? And as a result, did you accommodate that anyway in how you closed the sternum? And did you do that repair? Did you close it all in one step, or did you do a gradual closure like a staged abdominal repair that we [crosstalk] emergency?

Dr. Date:

Thank you very much. I honestly need to say that I have very little experience of chest wall deformity surgery, personally, so I asked an expert doctor, who has done thousands of Nuss procedures in the past in this operation. I don’t know how he decided the position or the size of the bar. And we felt that the chest closure, direct closure would be possible before starting this surgery, but we found that it was impossible. So, we used the Gore-Tex sheet. We re-opened the chest at least twice before completely closing the chest. We trimmed the sheet, little by little, so that the closure was successfully possible.

Dr. Raymond:

And last question, any time I see an open chest and prosthetic material, I just start thinking infection, infection, infection. What would you have done if you developed a [Barr?] infection in this circumstance?

Dr. Date:

Well, if the infection occurs, not many things you can do. Probably, you have to remove the foreign body. To avoid the infection, we carefully drape the patient, especially around the chest tube insertion. And also, we used slightly longer antibiotics with the two different antibiotics to cover both gram negative and positive bacterias. But certainly, an infection is a great concern.

Dr. Raymond:

Thank you very much. Outstanding work.

Dr. Date:

Thank you.

Unidentified Speaker 1:
Yeah, great presentation as usual, Hiroshi. So, I have a number of technical questions. We'll probably run out of time. But the one I want to get to with the planning, and if I remember correctly, you said 255%. So still way bigger. I think that was with the basal segments, not the whole lobe either. So, I'm actually kind of surprised even that you could get that to fit in with obviously the delayed closure helping. But did you think about sub-segmenting the basal segments? Is it technically feasible to do an even smaller operation than what you've done? I'm sure you've been thinking about that, or you've got to report coming at the next meeting or anterior basal segmental transplant.

Dr. Date:

Yeah. Actually, we have used the S6 segment three times in the past. That is technically very, very difficult because of the small size of the artery and veins that can be easily kinked or stretched. But we have used a basal segmental graft without any complication related to anastomosis. So, we felt that it's safer to use basal segmental, although the basal segmental would be a little bit too big. So, we felt that probably we may have to do a large wedge resection on top of the basal segmental implantation, but that was not necessary.

Unidentified Speaker 2:

Okay. So, thank you very much. This was a wonderful last presentation of a very interesting session.