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Discussion to: Incidence of Postoperative Seizures in Neonates Following Cardiac Surgery with Regional Cerebral Perfusion and Deep Hypothermic Circulatory Arrest

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Dr. Robert D.B. Jaquiss (Dallas, TX):

Good afternoon. I’d like to thank a lot of people, but most particularly Dr. Hsia, for submitting the manuscript to me with plenty of time—it’s very well-written and very clear—and also to congratulate her on a superb presentation. In a retrospective analysis of neonates undergoing open-heart surgery over a 10-year period at CHOP, you looked back at two alternative means of mechanical circulatory support during the operation. The incidence of seizures was identical between them, essentially the same with both techniques. A quick reading of the title and the abstract might lead one to conclude that the bypass strategies are therefore equivalent, and a superficial perusal of your central message in your document would give the same message. But I’m not sure that’s exactly what the data says. A more careful reading of your manuscript suggests that there is a remarkable era effect. In your recent era, all of a sudden, a new technique has been introduced into the firmament of CHOP, and people may still be learning how to use it. So, there’s a little bit of unfairness there. I think the last few slides, where you looked at support details, are very telling. And I think a better way to state the findings here is that lightning-fast surgery conducted with DHCA, or more leisurely surgery conducted with regional perfusion, can produce equivalent results at least in terms of meaningful outcomes like survival, discharge, and in this case, seizure occurrence. Would you agree with that characterization of your work?

Dr. Jill Hsia (Philadelphia, PA):

That is definitely possible. Previous literature has also shown that patients who undergo RCP do have longer support times. So, it’s hard to separate the two, especially since, as you mentioned, we do see an era effect. In our matched DHCA cohort, we did have a third of the patients in that cohort from the most recent surgical era, which doesn’t completely erase the era effect, as you had mentioned. The surgeons who conducted RCP had been doing it at their previous institutions, so there may not be as much of a learning curve from at least a surgical standpoint. But of course, it could be possible for there to be a learning curve from the anesthetic management standpoint.

Dr. Jaquiss:

Thank you. Another question relates to the fact that seizures don’t just occur after surgery. They not uncommonly, surprisingly, occur before surgery. And so, I think it’s possible that the surgery didn’t cause these seizures, or the support mechanism didn’t, because that might be the implication, is that it’s related to something that we did in the operating room to hurt them. So, do you think maybe it’s time to stop just focusing on how we support the circulation during the operation and think more broadly about pharmacologic neuroprotection, for example?
Dr. Hsia:

We didn’t monitor our patients on EEG prior to surgery, so you’re absolutely correct in that the patients with postoperative EEG seizures could have been seizing prior to surgery and we would not have known. I think that this study may potentially add to the body of evidence that suggests maybe there isn’t a difference between the two mechanical support strategies and that you’re perhaps correct, that maybe it is time to focus on other modalities or other ways that we can protect these infants who, as we know, are very prone to having neurodevelopmental abnormalities.

Dr. Jaquiss:

So as the local and regional expert on these two techniques, you are aware that this debate or this comparison is one that has been ongoing for a long time. You refer in your manuscript to small, single-center prospective trials. Do you think it’s time for another one that’s not small, that’s larger? Do you think there’s equipoise? Or now that you’ve looked at all these data, how would you want your child to be supported?

Dr. Hsia:

In terms of the question of equipoise, I think it’s difficult to answer because each surgeon has their own clinical experience and, I would guess, has their own technique that they have found gives the best results. In thinking of a randomized control trial, we would have to ensure that there’s not only equipoise but also that patients were managed during their time of RCP and DHCA in a standardized way. And right now at CHOP, that is not standardized, and so that would also be another anticipated hurdle. I think another tough hurdle, too, would be that monitoring these neonates on EEG in the postoperative period is also very resource-intensive, that many centers may not be able to do that, or it may potentially take away from the care of other patients. So, I think that there would be many potential hurdles, but I don’t know that we would be able to answer the question of which method is superior, or if they’re both the same, without doing that.

Dr. Jaquiss:

Thank you very much. It was an excellent presentation.

Dr. Hsia:

Thank you.
Dr. Aditya Kaza (Boston, MA):

I do have a question. Your most recent series had a seizure incidence of over 13%. And this is, I’m assuming, from the encephalography that you detected seizures. That seems a little high. This is something that Dr. DeCampli has reported before. What percentage of these patients actually go home on medications for neurologic injuries suffered, we assume, perioperatively or related to their heart disease?

Dr. Hsia:

Thank you for your question. That’s not something that we looked at for this paper, but that would be something important to investigate in the future. In terms of the seizures themselves, the majority of the seizures were subclinical, and from what I could tell from doing the chart review, many of them had resolved. And for some of the patients, we have started to look at whether or not they went home on an AED, but we did not find that information for the whole cohort that I presented.

Dr. William DeCampli (Orlando, FL):

That was a really well-conducted study and a very well-presented presentation. Thank you. So, I don’t really have a question. This is really an inquiry to the panelists as to whether they’d be willing to conduct a very brief poll of the audience because periodically over the years, we have asked the question, “How many in the audience routinely would use DHCA to conduct the standard stage 1 operation? How many would routinely use selective cerebral profusion or RCP?” Would you be willing to conduct that poll now?

Dr. Kaza:

Certainly. How many people use circ arrest routinely? And how about regional profusion?

Dr. DeCampli:

Okay. I rest my case.

Dr. Glen Van Arsdell (Los Angeles, CA):

And how many use both?
So, a little bit of both. So it strikes me that the fatal flaw in these studies—and the University of Michigan did one where they looked prospectively and shut it down because it was going to take too big of numbers to show any difference—but the fundamental issue is you’re not going to circ arrest for 53 minutes if you can do it in 39 minutes. So, is there a subcategory of patients that you can analyze that had 39 minutes or 41 minutes, whatever the number is of regional cerebral perfusion, against those patients that had circulatory arrest for that amount of time?

Dr. Hsia:

Yes, that’s a good idea for a future analysis for us. I think we may be limited by the small number of patients we have now who underwent regional cerebral perfusion, but I think as the technique is used for more babies at CHOP, then we could potentially look into that and see if there would be a difference.

Dr. Van Arsdell:

And then, one last question that is not a neurologic outcome, but if you’re using regional cerebral perfusion, you might intentionally do a more complex arch reconstruction that includes coarctation resection or some other things. Did you notice any difference in residual lesions?

Dr. Hsia:

We did not look at residual lesions for this paper, but this would be an important thing to look at for the future.

Dr. Van Arsdell:

Thank you.