

Perioperative Stroke for the General Anesthesiologist and Specialist

2017

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Dr. Alan Jay Schwartz: Hello. This is Alan Jay Schwartz, Editor-in-Chief of the American Society of Anesthesiologists' 2017 *Refresher Courses in Anesthesiology*, the latest research and educational findings. The focus of the *Refresher Courses in Anesthesiology*'s CME program and the modules featured is to educate learners on current developments in the science and clinical practice of the specialty of anesthesiology. Returning for a second year, we will be speaking directly with individual authors to learn about their expertise, perspective and insight regarding the featured module.

Today, we are pleased to present the following one-on-one conversation with fellow RCA editor Dr. Amanda Burden and author Dr. Laurel Moore. They will be highlighting the module titled "Perioperative Stroke for the General Anesthesiologist and Specialist."

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Dr. Amanda Burden: Hello, and welcome to the ASA Refresher Course lecture on perioperative stroke for the general anesthesiologist and specialist. I am Amanda Burden. I am Associate Professor of Anesthesiology at Cooper Medical School of Rowan University in Camden, New Jersey, and I'm here with Dr. Laurel Moore, who is Associate Professor of the Department of Anesthesiology at the University of Michigan, who authored this chapter, "Perioperative Stroke for the General Anesthesiologist and Specialist." And

she's going to talk with us about some key issues we need to consider when caring for our surgical population.

As she discusses in this chapter, our surgical patient population is becoming older, they have more comorbidities, and the procedures that we're doing with them are more and more complex. So, perioperative stroke is becoming an increasing problem for us, and it is, of course, as we all know, a devastating complication in the perioperative period that significantly increases morbidity and mortality. Dr. Moore is going to talk with us about how we can recognize these issues, recognize which patients are at particular risk, and talk about how we can work through these issues and help these patients to avoid this devastating complication. Dr. Moore, thank you so much for taking the time to talk with us, and welcome.

Dr. Laurel Moore: Thank you so much for this opportunity, Dr. Burden, and I appreciate the ASA inviting me. I agree with all your points in the introduction, and I thought I would just emphasize a few general concepts regarding perioperative stroke for this podcast. And I'm going to emphasize, kind of, for the non-cardiac and non-neurosurgical patient.

So, first of all, I think we're realizing that perioperative stroke occurs much more frequently than what we realize and what's been documented by retrospective database studies, and that we're probably just seeing the tip of the iceberg. I think we all suspect that, because postoperative stroke is difficult to recognize in our patients because there's a lot of reasons for, you know, sedation; delirium; you know, postoperative opiates. And so, it's hard to recognize focal neurologic findings to begin with.

But recent data would support that there's almost a 10% incidence of new stroke by MRI in patients 65 and over undergoing non-cardiac and non-carotid procedures. And it's interesting. In this large study that came out in the *British*

Journal of Anaesthesia last year, there were only 100 patients, so it was a very small study. But in only one of those ten patients, after the research MRI revealed acute ischemia, did they then recognize that the patient was in fact having neurologic symptoms. And I think this is important, because we do know that in the non-operative setting covert stroke is associated with dementia, stroke, premature death, and even though there's no data for that in the operative setting, it's probably a big problem for our patients in the long run.

Making this even more complicated is, we really don't understand why perioperative stroke occurs. What are the mechanisms? I think this is pretty well sorted out for ischemic stroke in the non-operative setting. We have these TOAST criteria, and the vast majority of ischemic strokes are assigned to one of five or six different mechanisms. We have nowhere near that level of granularity in the perioperative setting.

I do think we recognize that there's clearly surgical procedures that are associated with stroke. We all know that. We take care of those patients. Those are the open-heart procedures; those are carotids. But I think that it's in those patients that are undergoing low-risk procedures, we don't really understand why these strokes occur.

And interestingly, these patients don't wake up with stroke, for the most part. Stroke present upon emergence from anesthesia is very rare, probably less than 10% of non-cardiac patients. So, what is it about days two and three that are causing people to develop stroke? And we really don't understand that. And so, it's really hard to try and minimize the risk without understanding what the mechanisms are.

Going further along those lines, I do think we recognize now and there's good data to support that the perioperative setting is particularly treacherous for those patients who are at risk for stroke. And who are those patients? We know from

database studies that the elderly are at risk. Certainly, having a history of a prior stroke puts you at very high risk for recurrent stroke. Cardiac disease, renal disease, are all risk factors, but clearly the perioperative setting is very high-risk.

And there was a study that came out in 2014 by Jørgensen et al in *JAMA* which I think is really pertinent to practicing anesthesiologists, and I'm not sure that this evidence has percolated down to our surgical colleagues. And basically, it was a really nice study with a huge number of patients, using the Danish nationwide patient register. And what they looked at was the incidence of recurrent stroke, death, and other major adverse cardiovascular events in patients who had previously suffered a stroke.

And what they showed is, depending on how long the distance between the initial stroke and surgery, there was an odds ratio of anywhere between 8 and 67-fold increased risk of stroke in these patients—huge. And this temporal increased risk of stroke extended out as long as nine months following the initial stroke—the preoperative stroke. These patients were also at increased risk for death and other major adverse cardiovascular events.

And I think what's really interesting about this study is, one of the criticisms of this study is that they didn't have any non-operative controls. So, what these researchers, Jørgensen's group, did, is they went back to their database and they did a new study, essentially. This was only in an editorial, but they compared the risk of recurrent stroke for operative patients versus a very large non-operative setting of patients who had suffered ischemic stroke. And they found two really interesting things. They found that the temporal trend in terms of, you know, there's a higher risk of stroke closer to the initial stroke and this fell off over time—and again, over about nine months—but the patients who underwent surgery as opposed to controls had a much higher rate of recurrent

stroke. Again, emphasizing that those patients at risk are at particular risk in the perioperative setting.

Finally, I think I'd like to emphasize that we don't do a very good job of recognizing stroke in the perioperative setting, and this is unfortunate because we're really getting better about managing acute ischemic stroke through endovascular interventions. And as most of our listeners will be aware, there've been some data that have come out in the last couple of years really strongly in support of thrombolytic therapy or endovascular management of acute ischemic stroke—large vessel occlusion in patients with anterior circulation disease. And if you can't recognize stroke in time to manage it—and that window is currently still six hours—we're really missing an opportunity to offer a really potentially important intervention for these patients.

And we've shown in a retrospective study that very few postoperative strokes in the non-cardiac setting are actually recognized within that six- to eight-hour window for intervention. Interestingly, I mean, we already said that patients are hard to recognize in the postoperative setting. In fact, in our retrospective study, there weren't clear focal findings. Fifteen percent of patients only presented with mental status changes. So, I think as our management of acute ischemic stroke improves, we really need to work on improving our recognition of stroke in the postoperative setting.

Dr. Amanda Burden: Thank you so much, Dr. Moore. Are there any strategies that you recommend for people to use to prevent these strokes, or to identify them earlier?

Dr. Laurel Moore: So, I'm smiling; you can't see me through the phone {laughter}. That is the \$64,000 question. I think we have tantalizing bits of information. Beta-blockers, and particularly non-cardioselective beta-blockers, probably are associated with an increased risk of perioperative stroke. However, you have

to weigh that against the risk of stopping beta-blockers in the perioperative setting, and we know there's risk associated with acute cessation of beta-blockers immediately preoperatively. So, I don't think anybody's advocating for that.

There may be—and I say may be, though I think there are good data in support of this—maybe we should consider higher transfusion triggers for patients who are on beta-blockers, and I think that they may be particularly sensitive to anemia and their risk of stroke may be increased as a result. Some of ASH's work has strongly supported that. I think that the question of blood pressure – I'm a neuroanesthesiologist; I like everybody to have a high blood pressure.

Dr. Amanda Burden: {Laughter}.

Dr. Laurel Moore: And that's easy to say. I think the data in support of that are not as strong. There are data, and I think clearly there are patients that we recognize are at risk for perioperative stroke; but, you know, whether there's a clear link between intraoperative hypotension and perioperative stroke is still a little soft, I would say. And maybe what we're finding is those patients who have some intraoperative hypotension—and we know that's incredibly common, but people aren't waking up all over the place with stroke—but perhaps that's a marker for patients who may also suffer postoperative hypotension when they're less monitored on the floor rather than in the immediate, you know, OR and PACU setting. So, you know, it's a little difficult to say.

I think the one other issue that's interesting now is what we should be doing with antiplatelet therapy, and I do not have an answer there. The POISE-2 study would suggest that, you know, continuation of antiplatelet therapy may not be protective against certain outcomes. Those were primarily death and kind of a composite of myocardial – you know, nonfatal myocardial infarction.

But I think maybe that study excluded or did not focus on those patients who have the most to gain by continuing perioperative antiplatelet therapy, and by that I mean those patients who are on guideline-supported indications for antiplatelet therapy, and thus those patients who had the most to gain may have been diluted out by patients who were on aspirin for perhaps less validated reasons. So, I think there's a lot of things to consider. I think we're early in the process, and I think it's still difficult to say these are the things that we must do to avoid perioperative stroke.

I'll say one more thing—and I'm guilty of this myself; I'm really interested in perioperative stroke—it's amazing how frequently we don't discuss that as a risk when we're doing our preoperative interview with patients. And so, I think we all need to make a concerted effort, in those patients who clearly are at risk for perioperative stroke, to include that in our list of complications. My chairman, Dr. Kevin Tremper, always says to an audience, you know, if you asked 100 anesthesiologists in an audience whether you'd rather suffer a perioperative MI or a perioperative stroke, 100 out of 100 would rather have the heart attack, because of the devastating complications of stroke. And I think that we can probably communicate those risks better to our patients when we talk to them preoperatively.

Dr. Amanda Burden: Dr. Moore, thank you so much for really shedding light on this critically important topic and for covering so many important issues for our practice and to help us care better for our patients.

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Dr. Laurel Moore: Thank you for the opportunity. I've really enjoyed this.

Dr. Amanda Burden: And now back to you, Dr. Schwartz.

Dr. Alan Jay Schwartz: Thank you for joining us today and participating in this insightful conversation with this month's featured author. Be sure to join us for next month's one-on-one author interview. To purchase the full subscription of the 2017 *Refresher Courses in Anesthesiology* program, please visit www.asahq.org, click on the Shop ASA link, and search for RCA.

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