

# Best Practices for Carotid Artery Stenting

Interview by Lauren LeBano

Recent data on carotid artery stenting have been encouraging, and technologies and studies on the horizon also seem promising. However, good outcomes are dependent on the experience of the operator and on appropriately selecting patients. In this Q&A, Chris Metzger, MD, shares his thoughts on recent studies and on best practices for performing carotid artery stenting. Dr Metzger is an interventional cardiologist at the Wellmont CVA Heart Institute in Kingsport, Tennessee, and he will be speaking on this topic at the International Symposium on Endovascular Therapy (ISET) in Hollywood, Florida.



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**VDM:** Are there any technology advances or changes in recent data that you want to highlight?

**Dr Metzger:** I am very excited that the newest data supplements the safety, durability, and effectiveness of carotid stenting. The CREST 10-year data were published and showed that carotid stenting was at least equivalent to carotid endarterectomy at 10 years in terms of preventing strokes and keeping the carotid artery open. Secondly, the ACT 1 trial was a randomized trial published in the *New England Journal of Medicine* and showed that carotid stenting was at least as good if not slightly better than carotid endarterectomy in long-term follow-up, even in the standard-risk patients.

Additionally, some of the advances in carotid stenting, including proximal and embolic protection, have been shown in a large meta-analysis to have extremely low event rates, stroke, and other complication rates in high-risk patients. In combination with that meta-analysis, two investigational device exemption trials, ARMOUR and EMPIRE, were prospective trials that showed the same results. This means that there were significantly less than 3% rates of stroke or death even in patients at high risk for endarterectomy. These studies have been very encouraging.

Finally, the ROADSTER 1 trial studied carotid stenting performed via a small surgical incision in the proximal common carotid artery with flow reversal, and this also showed extremely low event rates. Overall, carotid stenting is performing extremely well and has low event rates and excellent durability. It seems to be at least as good as carotid endarterectomy in appropriately selected patients.

**VDM:** Have you seen these encouraging results reflected in your own practice?

**Dr Metzger:** Absolutely. In my own practice, we still perform a high volume of carotid stenting and have very good results. We use proximal protection a lot, and we often use the combination of proximal and distal embolic protection together to achieve safe outcomes in challenging patients. We use the direct surgical access carotid stenting that was studied in the ROADSTER 1 trial in appropriate patients. We have a good amount of options for carotid stenting, and those options apply to not all, but a very significant majority, of patients who have carotid disease. With experienced operators, careful selection, and good technique, our results have been excellent.

**VDM:** Do you have any tips for carefully selecting the appropriate patients?

**Dr Metzger:** Case selection is extremely important in carotid stenting. Carotid stenting should only be done in patients who are at acceptably low risk for the carotid stenting procedure, and the risk for carotid stenting should be lower than that same patient's risk of medical treatment or carotid endarterectomy. Toward that end, we would generally avoid patients who have unfavorable carotid anatomy such as heavy calcification, heavily diseased aortic arch or common carotid arteries on the way to the internal carotid lesion, or individuals with severe tortuosities, occlusions, or "string signs."

Selection also involves careful avoidance of patients who are likely to have bad outcomes or will be unable to tolerate the procedure, including those who are elderly, those who are very ill, and those who have diminished cerebral reserve, especially some degree of dementia or significant memory impairments.

We need to remember that although carotid stenting does very well, the disease process itself in asymptomatic patients is relatively benign. We want to carefully select patients who are likely

to survive long term and derive a benefit from undergoing a procedure performed for stroke protection. The bottom line is we should never “force” a carotid stent procedure. If the procedure is not going well, if the patient is not doing well on the table, or if the patient has unfavorable anatomy, then we should stop and consider alternatives. Carotid stenting works beautifully in appropriately selected patients, when it is performed with good technique by an experienced operator who exercises good judgment.

**VDM: Are there any gray areas in which deciding whether to recommend carotid artery stenting is difficult?**

**Dr Metzger:** We want to treat people who are either symptomatic or have true high-grade stenosis and a very low risk of stroke or death from the procedure. Our goal should be less than 3% risk of complications, and ideally less or equal than 1% to 2%. This can all be accomplished by knowing how to do the procedure well and selecting the right patients.

There are some clues on the table that a patient should not undergo the procedure. If you have to struggle to get to the carotid artery because of angles, then that would be a time you would stop, even if you thought the individual was a good carotid stent candidate. If the person can't cooperate during the procedure, that would be another time that you would want to stop. The more disease that you have to traverse, the riskier the procedure becomes. Remember that that every time you put a catheter across disease you have a chance of breaking a piece of plaque loose and causing an embolic event. Any of those situations should alert you to avoid forcing the procedure and to consider other options, such as medical therapy or surgery. An experienced operator knows when to stop when various factors “add up” and don't feel right.

**VDM: What are some of the areas of controversy and debate surrounding carotid stenting?**

**Dr Metzger:** The number one controversy is whether carotid stenting should be considered equivalent to carotid endarterectomy. In my opinion, carotid stenting is as good as, and sometimes better than, carotid endarterectomy in carefully selected patients who have appropriate anatomy and who are treated by experienced operators. In other words, if patients are at high risk for carotid endarterectomy but have good carotid stent anatomy, then they are better candidates for carotid stenting. On the other hand, there are times when endarterectomy is clearly superior. If the patient has bad anatomy for carotid stenting and is a good candidate for endarterectomy, then he/she should fare better with endarterectomy.

Other areas of debate arise over who should be performing these procedures. I personally believe that the subspecialty of the operator is not significant. A vascular surgeon, a neurologist, an interventional cardiologist, or a well-trained interventional radiologist can all have good outcomes if they have careful experience and training before operating independently. You need to perform many procedures with an experienced operator “mentor” before working independently.

I think that one of the reasons carotid stenting is not approved by Centers for Medicare and Medicaid Services more globally is the concern that too many clinicians will be offering a procedure that has a high risk and that inexperienced operators with poor judgment will not be regulated. This would increase complications, as well as significantly increase costs to CMS.

The boundaries of patient access vary from region to region and hospital to hospital. There is often too much politics and not enough collaboration. However, meetings such as ISET are invaluable for enabling more collaboration amongst subspecialties, and for helping clinicians in all specialties to perform better.

**VDM: What are some mistakes that inexperienced operators make?**

**Dr Metzger:** The number one mistake inexperienced operators make is poor judgment. Inexperienced operators don't stop when they should stop, and some lack the training to offer the procedure. A lack of adequate training often leads to poor judgment.

Other problems include failure to confirm therapeutic anticoagulation before performing the procedure, too much manipulation of the lesion before it's protected, overaggressive post-dilatation of the stent, or failing to adequately access the aortic arch safely without excessive manipulation.

**VDM: How can inexperienced operators improve their technique and judgment?**

**Dr Metzger:** It's important to do as many procedures as you can with experienced operators before operating independently, or at least have somebody (not a company representative) be there to proctor and mentor you.

Additionally, I recommend starting with easier cases and never forcing the procedure. Have a low threshold to stop. Carotid stenting outcomes have improved over the years not only because of the technology advancing, but also because we have learned lessons from experience. Experienced operators have the easiest time saying no.

**VDM:** How can operators who already have experience continue improving?

**Dr Metzger:** Have an experienced team and make sure your team is involved and understands the procedure. Do the procedures on a regular basis. Don't divide up the cases equally amongst your group. In other words, it's probably better to have 1 or 2 experts in your group instead of everybody trying to do the procedures. If everyone does the procedures, then the experience is diluted. Repetition is helpful in this procedure. Lastly, keep watching other skilled operators at meetings such as this one.

**VDM:** Are there upcoming technologies or studies that you think will make some changes to the field?

**Dr Metzger:** One newer technology is the micromesh stent, which has a thin micromesh layer within it to try to prevent plaque protrusion within the first 24 to 48 hours after the carotid stent procedure. This is important because up to half of the strokes that happen with carotid stenting occur after the procedure itself, likely because of plaque protrusion.

Additionally, the SCAFFOLD trial of the Gore device had preliminary results that look very promising, and the ongoing CONFIDENCE trial with a different micromesh stent looks extremely promising as well. ■

*Editor's Note: Dr Metzger discloses consulting for the following: Abbott Vascular, BARD, Boston Scientific, CSI*

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