Quantification of Carotid Stenosis on CT Angiography—Does Gender Matter?

I read with interest the report by Bartlett et al[1] describing a linear relationship between millimeter carotid stenosis, as measured on CT angiography, and derived percent stenosis. According to the "Materials and Methods" section, the authors did not evaluate their patient population on the basis of sex. Tartaglino et al,[2] however, reported that men and women differ in the average size of their internal carotid arteries (ICAs) on CT angiography by a minimum of 10% (larger in men). It is interesting to note that average brain weight is also approximately 10% greater in men than women. Bartlett et al reported an average distal ICA diameter of 4.4 mm. If their study population included equal numbers of men and women, it is plausible that the average distal ICA diameter would have been 4.6 mm in men and 4.2 mm in women. A 1.3-mm residual lumen in a female patient with a distal ICA diameter of 4.2 cm yields a 69% stenosis. Moreover, some women would likely have even smaller distal ICA diameters, resulting in a degree of stenosis <69%. Tartaglino et al[2] found that the 70% stenosis threshold by North American Symptomatic Carotid Endarterectomy Trial (NASCET) criteria required a smaller residual diameter for women than for men.

In summary, there is a potential effect of sex on the authors' measurement of 1.3 mm as a threshold value for assigning stenosis ≥70% by NASCET criteria. Although the potential effect is subtle, assigning separate threshold measurements for men and women (even if these differed by only 1 mm) might have further strengthened the authors' conclusions.

References

1. Bartlett ES, Walters TD, Symons SP, et al. **Quantification of carotid stenosis on CT angiography.** *AJNR Am J Neuroradiol* 2006;27:13–19
2. Tartaglino LM, Hollander MD. Needleman L. **CT angiography of carotid stenosis: should the NASCET criteria be different for men and women?** *Radiology* 1997;205(P):231–32

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Reply:

We thank Dr. Friedman for the interest in our recent article regarding quantification of carotid stenosis on CT angiography.[1] It is correct that the original data were not evaluated according to gender. We realized this oversight after publication of the original article.

We are currently undertaking a rigorous reanalysis of the data to incorporate gender into the model. By using gender-specific receiver operating characteristic curves, our preliminary data have shown that there is indeed a difference in the ideal cutoff values for severe and moderate disease in men and women. The difference, however, is only 0.1 mm, which makes the severe cut-off value for women 1.2 mm and the moderate cutoff value 2.1 mm. We are working to determine the statistical significance of this subtle difference. Because female patients comprised only 31% (42/132) of the original data, analysis of additional female patients may be necessary to have adequate power to examine this relationship.

In summary, our preliminary reanalysis has shown a slight difference in the gender cutoff values for severe and moderate carotid stenosis in CTA quantification. The difference, however, is very subtle, at 0.1 mm, which could be considered within range of acceptable measurement error for any given carotid. We hope to provide a more thorough statistical analysis of the gender differences in the near future.

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Reference

1. Bartlett ES, Walters TD, Symons SP, et al. **Quantification of carotid stenosis on CT angiography.** *AJNR Am J Neuroradiol* 2006;27:13–9

Decreasing the Diagnostic Cerebral Angiogram Requirements for Neuroradiology Fellows Would Be a Mistake

There is currently a discussion taking place among academic neuroradiology programs concerning the minimum number of required diagnostic cerebral angiograms for neuroradiology fellows. Currently, fellows in Accreditation Council for Graduate Medical Education–approved programs are required to perform 50 cerebral angiograms to satisfy the requirements. In recent years, some fellowship programs have been lobbying for a reduction in the cerebral angiography requirements for fellows. I think it is important for patient safety and the credibility of our subspecialty to at least maintain the requirements at the current level or, better yet, increase the number to 75.

The pressure to reduce cerebral angiography requirements has developed primarily as a result of increasing noninvasive MR imaging and CT procedure volumes. At institutions that are "fellow driven," fellows are needed to run the MR imaging and CT services. To keep up with growing cross-sectional volumes, opportunities for fellows to perform conventional angiography are compromised. A simple solution is to reduce the number of required angiograms and thus time spent away from cross-sectional services. This solution, however, has 2 serious consequences. First and foremost, patient safety is compromised if fellows finish their training with less than 50 angiograms and begin performing these potentially dangerous procedures unsupervised. The performance of cerebral angiography has not become easier in the last several years and neuroradiology fellows are presumably not smarter than their predecessors. If we considered 50 cerebral angiograms to be a minimum requirement in the past, why are we considering a reduction in the numbers now? The second consequence to decreased training in cerebral angiography is the inevitable erosion of our credibility among other specialties when it comes to the performance of this procedure. Without a doubt, neuroradiologists are currently the experts when it comes to performing and interpreting cerebral angiograms. No other specialty can claim equivalent training in imaging-guided procedures and radiation physics; however, we put our expertise in significant jeopardy if we dilute our training requirements. The competence of trainees who have performed less than 50 cerebral angiograms is suspect at best and places patients and our credibility at risk.

As a subspecialty community, we should carefully weigh the consequences of reducing the fellowship training requirements for cerebral angiography. Diluting the numbers with noninvasive angiography techniques such as MR angiography and CT angiography cannot replace the hands-on training required to competently perform con-