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Reply:

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Reply:

We are delighted by the widespread, international interest our recent editorial regarding CT angiography (CTA) has engendered. Our delight stems from 3 factors. First, such interest and ongoing dialogue may well improve patient care. Second, highlighting specific, ongoing differences in opinion will help focus future research on this important topic. Last, the arguments put forth in the letters published above serve to strengthen our contention that routine CTA for subarachnoid hemorrhage is inefficient, redundant, and potentially harmful to patients.

In our original editorial we stated, "The one individual apparently left out of consideration in this streamlined, new-millennium approach is the patient, as far as we can tell."[1] We would like to refocus the discussion on the patient, by using the imaging and treatment algorithms put forth by both Dr. Agid[2] in his letter and by Dr. Westerlaan[3] in his publication through the following simulated patient encounter:

Physician: Mr. Jones, you have a very serious problem. There is bleeding in your head and we need to find out why it is there.

Patient: What are you worried about?

Physician: The most urgent thing to find out is if you have 1 or more aneurysms. If you have an aneurysm and we don't treat it, it may bleed again and you may die.[4]

Patient: Sounds scary. What's the best way to see if I have an aneurysm?

Physician: The best way would be with something called a catheter angiogram.

Patient: Okay, so I'm going to have an angiogram?

Physician: Uh, no. We're going to do something called a CT angiogram, or a CTA.

Patient: Why not do the real angiogram?

Physician: The angiogram has a risk of stroke. For experienced angiographers, it is a pretty small risk[5] but not zero.

Patient: Sounds scary. So if I have the CTA, I won't need the angiogram?

Physician: Actually, even if you have the CTA, you probably will need an angiogram anyway. A recent publication by a Dr. Westerlaan showed that 75% of patients end up getting both tests.[3] If we find an aneurysm on CTA that is kind of round, then we will do an angiogram and fix the aneurysm with a coiling procedure at the same time. If we don't find an aneurysm with the CTA, then we will still do an angiogram because angiograms still find some aneurysms that CTA doesn't. Even experts in CTA still recommend angiography if the CTA is negative.[2]

Patient: So if most of your patients get both procedures, who are the patients who actually avoid the angiogram?

Physician: Really the only way you will not end up getting the angiogram is if the aneurysm looks like it needs to be treated with an operation rather than coiling.

Patient: You mean the kind of surgery where they cut a big hole in my head? Can you really be certain from the CTA that I wouldn't be treatable with that coil thing?

Physician: Well, it is true that an angiogram may be better than a CTA in deciding whether the coil will work or not. We know that because sometimes the patients we send for coiling based on a CTA end up not being good for the coil after all.[3]

Patient: So if sometimes the CTA says you can coil when really you can't, isn't it also possible that sometimes the CTA will send a patient straight to surgery when, in fact, his or her aneurysm would have been good for coiling?

Physician: I think you just need to trust us that we don't make that mistake. I guess we really don't know how often we make the mistake, though, since we don't get angiograms on those patients we think are best for surgery.

Patient: Hmm. One other question: At the beginning, you said that I might have "an aneurysm or aneurysms." How often do people have more than 1 aneurysm?

Physician: Up to one third of patients who have 1 aneurysm will also have other aneurysms.[6]

Patient: Then I am confused. If you don't see any aneurysm on CTA, you then do an angiogram because you know that CTA misses aneurysms.[2,3] If you see at least 1 aneurysm, and it looks bad for coiling, then I go straight to surgery without an angiogram. But I still could have more aneurysms not seen on CTA, couldn't I, since you said yourself that CTA misses aneurysms? Why are you suddenly more trusting of CTA to find all aneurysms just because it found 1?

Physician: Well, I guess if you put it that way, there is a chance we could miss those other aneurysms.

Patient: I guess those other aneurysms don't matter, then? You can be sure that the one you saw on the CTA is the one that burst and not one of the other ones? Do the other ones ever need to be treated?

Physician: Well, we can't be 100% sure that we found them all on CTA, and we also can't be 100% sure that the one we found burst rather than the ones we missed. Missing the ruptured aneurysm would be very bad, since 50% of those aneurysms will burst again if untreated and most of those patients who bleed again will die.[4] Also, people who have 1 ruptured aneurysm really should have the other, unruptured ones fixed as well because we know they have a reasonably high risk for future rupture.[7]

Patient: If all of the aneurysms need to be treated at some point, wouldn't I be better off if the surgeon knew where all the aneurysms were in my head before cutting me open? Couldn't she fix more than 1 aneurysm from that hole in my head?

Physician: Yes, it is often possible to treat multiple aneurysms from 1 hole, or craniotomy.

Patient: Well, at least I can be sure that surgery is better than the coiling, right, since it is a much bigger deal?

Physician: Actually, no. We know from a large trial called ISAT [International Subarachnoid Aneurysm Trial] that it is preferable to coil rather than clip, if the aneurysm is amenable to both procedures.[8]

Patient: Is there anything else I should know about things that CTA might miss?

Physician: Well, Dr. Westerlaan[3] had a few patients with inflammation of the blood vessels, known as vasculitis, which is not easy to see on CTA. Also, lesions like arteriovenous malformations or fistulas have been missed on CTA in patients like you.[9]

Patient: Doctor, what if this bleeding were in your head? Wouldn't you want to know everything before surgery, especially since coiling is better than surgery because I may have other aneurysms that CTA could miss?

Physician: This isn't about me, sir. This is about progress. If you are not getting CTAs on everyone, then you are standing in the way of progress.

Patient: But you are already getting angiograms on most people after CTAs, and, from my perspective, you should even be getting angiograms even on the few patients you send straight to surgery. Why not just do the angiogram and skip the redundant CTA?

Physician: Sir, you need to accept that angiograms are just breathing their last gasp before becoming obsolete. You sound just like one

of those old, outclassed radiologists who simply have not yet accepted that angiography is doomed.

Patient: You wouldn't happen to have a phone number for one of these doomed radiologists, would you?

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