Dr Elefteriades is a cofounder of CoolSpine, a consultant for CryoLife, a member of the Data/Safety Monitoring Board for Terumo, and a member of the Data/Safety Monitoring Board for Jarvik Heart. All other authors have nothing to disclose with regard to commercial support.

hypertension, coronary artery disease, and chronic kidney disease—and they may therefore have required and received better medical treatment. That group, however, was the surgery noncompliant and overwhelming comorbidities group. So, this is contrary to their concern raised that disparate medical treatment (ie, insufficient attention to medical management) may have biased against the surgery noncompliant group.

We appreciate the focus of Bugar and colleagues on these important details. In our study, the demonstrated real-world effectiveness of the simple size and symptom-based algorithm adds confidence to contemporary management of the dilated ascending aorta.

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THE OPTIMUM ARTERIAL CANNULATION SITE DURING OPEN AORTIC ARCH REPAIR: IS IT THE AXILLARY ARTERY?

To the Editor:

I read with interest the article by Kim and colleagues¹ about axillary artery (AA) cannulation in open aortic arch repair. Their propensity-matched, retrospective

analysis included 116 patients in each cohort of AA and non-AA cannulation. The primary outcome from the study was early postoperative embolic stroke, whereas the secondary outcomes were in-hospital mortality and major operative complications. They concluded a lower rate of embolic stroke in axillary cohort (2.6% vs 8.5%, $P = .46$), as well as lower in-hospital and 30-day mortality rates ($P < .05$).

As reported by the authors in Figure 1, B in their report, the matched cohort of AA had only 57% ($n = 66$) of patients with pure axillary cannulation whereas 43% ($n = 50$) of the patients had combined axillary with femoral or ascending aorta cannulation and this serves a strong reporting bias about the reported outcomes. The data in this cohort represents the outcomes of such combined cannulation techniques rather than just AA cannulation; therefore, I wonder if the authors tried to compare the figures between pure AA cannulation versus non-AA and whether the event rates and statistical figures will remain significant?

Furthermore, there is no clear description of why the patients in AA cannulation had femoral and ascending aorta cannulations as well. An explanation should be provided to make it clear to the readership of the journal the logic behind dual site cannulations and possibly its effect on the reported outcomes.

I am a bit surprised that there is no innominate artery (IA) cannulation used among the cohort. Currently, IA cannulation is gaining momentum in aortic arch and complex thoracic aorta surgeries with satisfactory outcomes.² In our recent systematic review,³ we showed that IA cannulation in thoracic aorta procedures has a postoperative stroke rate of 1.25%, which is much lower than what is reported by Kim and colleagues¹; additionally, the all-cause 30-day mortality rate with IA cannulation was 2.7% versus 2.6% with AA cannulation. A further meta-analysis comparing AA versus IA cannulation reported no superiority of either techniques in terms of mortality or neurological outcomes.⁴ Currently, there is an ongoing randomized controlled trial in Canada comparing the outcomes of AA versus IA cannulation in proximal aortic arch repair, we anticipate the results to be published this year aiming to establish the equality or superiority of either technique.⁵ One should not forget the use of ascending aorta cannulation in the setting of acute dissection; studies have shown that central cannulations can have better outcomes over peripheral access.⁶

The key indications for AA cannulation includes redo aortic surgery, complex pathologies, and in the settings of acute aortic dissection; however, the main contraindication remains a diseased AA that makes the cannulation not safe. Although the indications for IA cannulations remains the same, the exclusions are involvement of IA in the dissected aorta, severely calcified or unfavorable anatomy of the IA.³ Nevertheless, this remains choice of the surgeon on choosing AA or IA cannulation in such circumstances, and to date there is no evidence of confirming the

Author has nothing to disclose with regard to commercial support.

superiority of either technique. We need to be careful not to overstate the use of AA cannulation in aortic arch surgery, especially when the study is of a small sample size and there are no comparative outcomes reported in using IA cannulation as an alternative arterial cannulation method.

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REPLY: FINDING THE BEST OPTION OF THE CANNULATION SITE

Reply to the Editor:

Aortic lesions are often detrimental to aortic cannulation. Ideally, cannulations should be placed at sites with a healthy aortic or arterial wall. The jet of blood from the cannula can have a sandblast effect on the adjacent diseased aortic wall and could lead to disastrous embolic complications or aortic dissection. Thus, aortic cannulation is a really sensitive issue in aortic surgery. The issue includes not only the cannulation site but also the size and shape of the cannula.

I completely agree with the conclusion in the letter by Harky and colleagues.¹ The use of the axillary artery cannulation in aortic arch surgery should not be overstated. The authors imply the superiority of the innominate artery cannulation to the axillary cannulation. Attention should also be given to the cannulation at the innominate artery, which is showing its presence. I have often observed the fragile atheroma at the orifice of the innominate artery during

Author has nothing to disclose with regard to commercial support.

aortic arch surgery. Such lesions are less frequently seen at the orifice of the left common carotid artery. Accordingly, a cannula for selective cerebral perfusion is often inserted first at the left common carotid artery in my practice. The innominate cannulation might have more powerful jet at the lesion of the orifice, and the axillary cannulation has less sandblast effect due to the long distance to the orifice in the same situation. To find the best cannulation site, minute evaluation of the quality of the aorta by preoperative computed tomography and epi-aortic echography during operation is essential.

The comparison between the innominate cannulation and axillary cannulation is essential to understand the drawbacks and advantages of each cannulation procedure. One may be better than the other in particular cases. The cannulation site should be decided for each situation for cases with various aortic lesions. Fortunately, we can use several cannulation sites and can also combine them to prevent complications.

Standardization is key to achieve safety of the surgery. We need a standard in surgical techniques. However, only one golden standard cannot be determined for the choice of cannulation technique, especially in aortic surgery. Aortic surgeons should know several ways of the cannulation and apply the best option of the cannulation site to fit the situation.

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REPLY FROM THE AUTHORS: THE OPTIMUM ARTERIAL CANNULATION SITE DURING OPEN AORTIC ARCH REPAIR: IS IT THE AXILLARY

ARTERY?

Reply to the Editor:

Thank you for thoughtful comments. I agree with your comment that the possibility of bias exists from combined axillary artery (AA) cannulation. We carried out an analysis comparison outcome of pure AA and non-AA groups. Pure