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EDITORIAL COMMENT

Head-Neck-Aorta CT Angiography in Patients With Acute Type A Aortic Dissection

If, When, and Necessary?

Yunpeng Zhu, MD,[a] Fuhua Yan, MD[b]

Acute type A aortic dissection (ATAAD) remains the most clinically challenging cardiovascular emergency. As the preferred diagnostic technique for ATAAD, computed tomography angiography (CTA) imaging is of great value in clarifying anatomical classification and guiding treatment. The current guideline recommends the scan range of aortic CTA for assessment of aortic dissection is from the thoracic inlet of the neck to the bilateral femoral arteries, which can provide sufficient diagnostic information in patients with severe aortic arch vessel involvement (eg, coronary, visceral, and extremity vessels).[1] In particular, because of severe involvement or occlusion of branch vessels, poor prognosis such as organ dysfunction, severe morbidity, and death was associated with malperfusion of the corresponding organs.[2] CTA imaging can assess the severity of branch stenosis and the type of hemodynamic obstruction (dynamic, static, mixed).[3] By combining the imaging information with the clinical manifestations, researchers proposed appropriate surgical strategies that significantly improved the clinical outcomes.

However, conventional aortic CTA fails to assess the severity of aortic arch vessel involvement. A large number of clinical studies have confirmed that severe involvement of common carotid artery (CCA) is closely related to neurological complications after surgery.[4] In addition, there is a high incidence of arch vessel involvement in ATAAD, and these important clinical imaging diagnostic information are the blind spots not covered by conventional aortic CTA.[5,6] In some patients with severe neurological complications (stroke, coma, and so on), the extended head-neck-aorta CTA can visualize the anatomy and pathology of the cerebral and carotid arteries.[7,8]

Therefore, Zhao et al[9-11] proposed an extended head-neck-aorta scanning method through a series of studies, and found that this extended head-neck-aorta CTA protocol provided comprehensive diagnostic information, including the extent of dissection involvement of the CCA, false lumen thrombosis, re-entry tear, anatomical stenosis, ring of Willis and so on. This positive imaging information has been shown to be strongly associated with postoperative neurological complications.[7,12,13] The study also found that 25.9% of patients who had no neurological symptoms preoperatively had an anatomically significant CCA stenosis. These additional imaging findings are helpful in the selection of arterial cannulation, reconstruction of the arch vessels, and the choice of selective cerebral perfusion.[14-16] Therefore, the extended head-neck aorta may help surgeons to adopt a targeted surgical strategy, thereby reducing the incidence of perioperative neurological deficit. Overall, it has diagnostic value in improving the clinical prognosis of ATAAD.

The research by Zhao et al[9-11] has raised an issue for CTA imaging of type A aortic dissection in the field of diagnosis: how important is the imaging information of the aortic arch vessels for diagnosis and surgery? We think it is a very interesting topic, because neurological complications have always been the main perioperative complication of ATAAD, and most studies have focused on improving surgical methods and intraoperative brain protection, which cannot

From the [a]Department of Cardiovascular Surgery, Ruijin Hospital Shanghai Jiao Tong University School of Medicine, Shanghai, China; and the [b]Department of Radiology, Ruijin Hospital Shanghai Jiao Tong University School of Medicine, Shanghai, China.

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solve the clinical problem.[17,18] In ATAAD, as a challenging disease, the involvement of aortic arch vessels cannot be ignored, just as severe coronary artery disease and superior mesenteric artery occlusion cannot be ignored, and neglecting them implies poor clinical outcomes.[7]

In this issue of *JACC: Asia*, the study by Zhao et al[19] was based on a single-center retrospective study with a small number of cases, and its clinical evidence-based medical findings were not convincing. The extended head-neck-aorta scanning proposed by Zhao et al[19] involves additional radiation dose and scanning time, which would be controversial in real-world practice. However, it does provide an alternative direction for future multicenter, large-sample research to investigate the generalizability of this technology and how to optimize the scanning parameters. Overall, the main purpose of this paper is to clarify who extended head-neck-aorta CTA is for and when it should be performed. It is necessary in patients with ATAAD with CCA involvement, because this preoperative extended head-neck-aorta CTA scan allows for a better assessment of the CCA. In particular, ATAAD with CCA occlusion may serve as a key surrogate marker for predicting neurological prognosis. For these patients, a timely and comprehensive 1-stop examination combining carotid CTA and cerebral computed tomography perfusion imaging can reveal more quantitative information, allowing for better preoperative assessment of cerebral perfusion, and providing the surgical team with detailed information to help surgeons develop more optimal surgical strategies.

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ADDRESS FOR CORRESPONDENCE: Dr Fuhua Yan, Department of Radiology, Ruijin Hospital Shanghai Jiao Tong University School of Medicine, No.197, Ruijin Er Road, Shanghai 200025, China. E-mail: yfh11655@rjh.com.cn.

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