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Impact of Image Analysis Methodology on Diagnostic and Surgical Classification of Patients with Thoracic Aortic Aneurysms (Commentary)

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In the current manuscript, Mendoza and colleagues(1) have compared different methods for measuring the diameter of the aorta. This is one of the first studies to attempt to compare different methods of aortic diameter measurement and the potential impact of the resultant differences in size measurement referral for surgical repair.

In patients without acute aortic pathology, aortic size remains the primary determinant of eligibility for surgical repair.(2) Current consensus guidelines use an aortic size of 5.5 cm or greater as a surgical indication. These guidelines are based primarily on data published in several large studies of the natural history of aortic aneurysms. (3–6) Although these series attempted to account for aortic tortuosity, they did not rigorously define a method for determining maximal aortic size. Similarly, delineation of normative aortic sizes has been based on a variety of imaging methods and measurement techniques.(2) Even measurements as intuitively simple as growth rates have been significantly impacted by measurement methods.(3,4) Because of the lack of rigorous measurement definitions used across institutions, results of normative data and natural history studies have been variable.

In this setting of variable size measurements, the current manuscript is particularly important. The primary result is not surprising: the double-oblique (DO) method provides smaller (and more accurate) estimates of aortic size than simple axial (AX) cuts in the plane of the CT image. While intuitively straightforward, it remains important to rigorously assess the difference between the two measurement methods as has been done here. The measurement error introduced by using the AX method may be particularly important in patients and at locations with pronounced aortic tortuosity; these are often patients with aortic pathology and connective tissue disorders such as Marfan's disease, who are most in need of accurate assessments of aortic size. Given the results of this study, the DO method or other methods using similar techniques to account for aortic tortuosity (such as the centerline technique [7]) should become the routine method for evaluation of aortic size.

While the authors have clearly demonstrated the poor correlation between the two measurement methods, and the superiority of methods taking into account aortic tortuosity, the implications regarding size criteria for surgical intervention are less convincing. While performed in a less rigorous and inadequately reproducible manner, the seminal studies of the natural history of aortic disease took aortic tortuosity into account through subjective

assessments of the “true” aortic diameter or in later years the use of 3-D reconstruction techniques (2–6). While these methods can and should now be improved upon, and further data collection is warranted, the data we have is sufficient to continue to recommend aortic intervention at the traditional size criteria.(2)

Overall, the authors have performed a rigorous assessment of an important aspect of aortic surgery. Without accurate and reproducible methods, comparisons of results across studies are difficult and development of criteria for surgical intervention is challenging. Going forward, it is critical that studies of aortic aneurysms clearly define the methods of size measurement and reassessments of the indications for intervention should be done as data becomes available.

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