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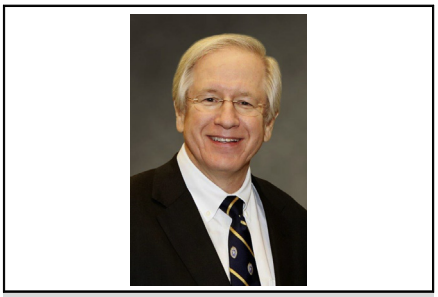
Commentary: Fools rush in where angels fear to tread

Joseph S. Coselli, MD



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CENTRAL MESSAGE

Aortic valve-sparing techniques in patients with the severest of tissue fragility require special consideration.

In this current issue of the *Journal,* Dr Naoto Fukunaga and associates, including the esteemed surgeon Dr Tirone David, describe a single rare case of valve-sparing aortic root replacement in a patient with a filamin A variant.[1] In males, loss of function mutations within the *FLNA* gene are generally lethal; in females, these mutations are most commonly linked to periventricular nodular heterotopia, which is associated with joint hypermobility, variable skin characteristics, and vascular abnormalities. Patients with this rare condition commonly have aneurysms of the aortic root and ascending aorta that are often combined with a patent ductus arteriosus and ventricular septal defects.

The authors refer to the 2013 study by Reinstein and colleagues,[2] who concluded that in their cohort of 11 patients with X-linked periventricular nodular heterotopia, although illustrative of the breadth of expressivity of this phenotype, they were unable to address the frequency and prevalence of cardiovascular anomalies in this condition. Subsequently, the authors refer to the most recent study, by Chen and coauthors,[3] who evaluated a cohort of 114 subjects, of which 48 were original patients and 66 were subjects pulled from a review of the literature. The majority of these subjects (n = 74; 65%) had a cardiovascular anomaly; of these, the most common cardiovascular abnormality was aortic aneurysm or pathological aortic dilatation (n = 21; 15 females and 6 males). The authors note that the location of the aortic aneurysm was known in the majority of patients (19 of 21), and that in all of these patients, the aneurysm involved the aortic root and/or the ascending aorta. Furthermore, on follow-up, 2 additional patients were found to have died from "sudden aortic rupture" at autopsy. Thus, there is clearly an association between patients with filamin A variants and aggressive proximal aortic aneurysm.

Fukunaga and coauthors point out the rarity of having a filamin A variant as well as the extreme tissue fragility observed in their patient. They refer to their overall experience in more than 600 valve-sparing aortic root replacements and indicate that this was the only patient with this particular genetic mutation that they have encountered. Regarding tissue fragility, the authors point to the potential life-threatening complication of pseudoaneurysm formation arising from tearing of subannular tissue. In support of the mechanism of tearing subannular tissue as a source of pseudoaneurysm formation, the authors refer to the report by Liu and colleagues[4] at Johns Hopkins Hospital, who describe 4 cases of pseudoaneurysm formation after valve-sparing aortic root replacement in 31 children with Loeys–Dietz syndrome. They note that the children who developed pseudoaneurysm (2 of which were in the periannular region) had the most severe subset of Loeys–Dietz syndrome. Two other cases of pseudoaneurysm included coronary artery dehiscence in 1 case and at the anastomosis between the aortic root graft and ascending/aortic arch graft in the other case. Consequently, only 3 of these cases of pseudoaneurysm resulted from tissue fragility, and 2 were within the aortic root. Dr Fukunaga suggests that the development of aortic root pseudoaneurysms stem from inherent tissue fragility, and in the cases detailed within the Johns Hopkins series, might stem from their technique of using only 3 subannular sutures, which may be inadequate to distribute the force associated with systolic ejection, resulting in the eventual tearing of the sutures at that level. Despite the dehiscence at the subannular level in only 2

From the Division of Cardiothoracic Surgery, Michael E. DeBakey Department of Surgery, Baylor College of Medicine; Department of Cardiovascular Surgery, Texas Heart Institute; and CHI St. Luke's Health–Baylor St. Luke's Medical Center, Houston, Tex.

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Address for reprints: Joseph S. Coselli, MD, One Baylor Plaza, BCM 390, Houston, TX 77030 (E-mail: jcoselli@bcm.edu).

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of 31 patients, Dr Cameron mentions that he is reassessing the use of only 3 subannular sutures in patients who have extreme tissue fragility.[4]

Fukunaga and coauthors[1] provide a very important contribution and a modification of their technique; in recognition of the extreme fragility of the commissural triangles of the noncoronary cusp, they added 3 horizontal 4-0 polypropylene mattress sutures to this "paper-thin area." They provide an illustrative drawing. The authors do not precisely state it, but they bestow a lesson for all of us. With the very wide and expanding clinical application of valve-sparing root replacement, there remain specific circumstances and genetic conditions with the severest of tissue fragility in which the technical expertise of the most experienced aortic root surgeons, including the legendary Tirone David, may be necessary to achieve the desired long-term results.

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ADULT

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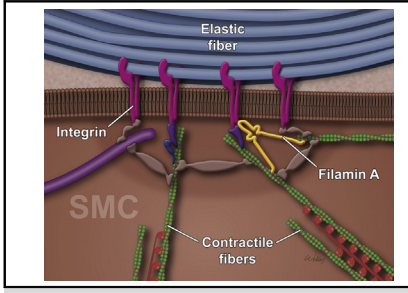
Check for updates

Commentary: Genetics and surgical planning in heritable aortic disease—moving from "when to operate" to "how to operate"

Ashley Dawson, MD,[a] and Scott A. LeMaire, MD[a,b,c,d]



Filamin A links aortic smooth muscle cell contractile units to the extracellular matrix.

CENTRAL MESSAGE

Consistent reporting of tissue quality and repair techniques used in patients with heritable aortic disease will help surgeons develop an operative plan tailored to a patient's genetic mutation.

The efficiency and decreasing cost of genetic analysis have increased the identification of gene mutations associated with heritable thoracic aortic aneurysm and dissection (HTAAD). Curating causative genes requires carefully evaluating the disease phenotypes associated with each mutation.[1] Consistently reporting gene-specific clinical features has been important in the development of evidence-based recommendations with which to counsel patients with HTAAD and make decisions about the timing of aortic repair.[2,3] From a surgeon's perspective, knowing the tissue quality and recommended repair techniques

From the [a]Division of Cardiothoracic Surgery, Michael E. DeBakey Department of Surgery, [b]Cardiovascular Research Institute, and [c]Department of Molecular Physiology and Biophysics, Baylor College of Medicine, Houston, Tex; and [d]Department of Cardiovascular Surgery, Texas Heart Institute, Houston, Tex.

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Address for reprints: Scott A. LeMaire, MD, Division of Cardiothoracic Surgery, Michael E. DeBakey Department of Surgery, One Baylor Plaza, BCM 390, Houston, TX 77030 (E-mail: slemaire@bcm.edu).

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