We absolutely agree that there is still considerable confusion in the literature regarding the techniques proposed by the enlargement techniques described by Nicks, Cartmill, and Bernstein² and by Manouguian and Seybold-Epting,³ as was obvious even in subsequent discussion of the article by Dhareshwar and associates.¹

Although the authors have correctly presented Nicks' posterior aortic root enlargement procedure in a paragraph describing the surgical technique (aortotomy is extended into the noncoronary sinus toward its belly to, but not beyond, the annulus), they have added more embarrassing details with the subsequent description of Figure 2. Let me quote from the legend to Figure 2 from their article:

"Figure 2. A: a, Nicks' aortic root enlargement is accomplished by extending the aortotomy incision across the aortic annulus into the anterior leaflet of the mitral valve. b, Care must be taken to carry this incision posteriorly into the center of the anterior leaflet...."¹

Here is a citation from the original manuscript by Nicks, Cartmill, and Bernstein² concerning the surgical technique:

".....When it is revealed that the aortic annulus is small, aortic incision is carried downwards posteriorly through the non-coronary aortic sinus across the aortic ring as far as the origin of the mitral valve (Figs 2a, b and 3). A tongue of woven Dacron material, cut from a prosthetic tubular arterial graft and with its natural curvature facing the lumen, is sutured down to the fibrous origin of the mitral ring with two mattress sutures...."

Thus, it is obvious that Nicks' method of posterior aortic root enlargement does not include penetration of the incision into the anterior mitral leaflet.

Surgical techniques of posterior aortic root enlargement reported so far are presented schematically in Figure 1. Although Manouguian's technique (the aortic incision is extended through the commissure of the left coronary cusp and noncoronary cusp to the anterior mitral leaflet and the left atrial roof) was correctly reported, we would like to remind the readers of the technique of Nuñez and colleagues⁴ reported back in 1983. After resection of the aortic cusps, the adventitia of the aorta is separated by blunt dissection distally beyond the posterior commissure. Then, the aortic incision is further extended from the top of the noncoro-

Figure 1. Surgical techniques of posterior aortic root enlargement reported so far (Nicks'-white arrow, Nuñez's-black arrow, Manouguian's-black plus black dotted arrows). NCC, noncoronary cusp; LCC, left coronary cusp; RCC, right coronary cusp; AML, anterior mitral leaflet.

nary cusp-left coronary cusp commissure (the same direction as in Manouguian's technique, Figure 1) to just above the confluence of the interventricular fibrous trigone, left atrial wall, and mitral valve annulus, thus avoiding injury and reconstruction of the left atrial roof and anterior mitral leaflet. Furthermore, a patch inserted to enlarge the annulus and to facilitate closure of the aortotomy is attached to firm structures—the fibrous base of the anterior mitral leaflet and the aortic wall. This elegant and safe technique enables insertion of a prosthetic valve possibly two sizes larger in the small aortic root, and long-term survival as well as freedom from valve-related complications are satisfactory (actuarial freedom from death of 88.2% at 15 years has been reported).⁵

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Reply to the Editor:

We are delighted that our article stimulated such interest from our colleagues across the Atlantic and, in particular, that it has stimulated a discussion of every surgeon's two favorite topics—history and anatomy! We appreciate the authors' expression of sympathy for us, describing our figure legend as "embarrassing." Not at all! We stand by our comments and encourage the debate. There is too little such good-natured banter among the members of our profession.

The authors of the letter site a rather vague phrase from the article by Nicks, Cartmill, and Bernstein¹ referring to carrying the incision “posteriorly...across the aortic ring as far as the origin of the mitral valve.” Does “as far as” mean “not into?” Perhaps, but how then does one interpret the very figure, part *b*, from Nicks’ article included in our manuscript? We take exception to the statement by Nežić, Knežević, and Borović that “it is obvious” that the anterior leaflet of the mitral valve is not entered. And what is “the aortic ring?” Linguistics aside, it is physically impossible to cross the nadir of the attachment of the noncoronary cusp without entering the anterior leaflet of the mitral valve. The latter is simply what lies beyond the former. There is no territory between.

In support of our argument, we marshal three lines of evidence: First, and admittedly weakest, is the senior author’s (T.M.S.) own experience as a clinical surgeon. Every time he does an aortic valve replacement, sutures placed at the nadir of the noncoronary cusp and at the nadir of the left cusp enter the base of the mitral valve. This is simply what lies below the “surgical annulus”—if we dare use the term “annulus” at all.²

Second, we refer to Dr Robert Anderson’s work monograph³ titled “Clinical Anatomy of the Aortic Root,” in which he directly addresses first and foremost the surgeon’s persistent irrational reference to “the enigmatic annulus.” Anderson then clarifies the relationships between the more anatomically definable “semilunar attachments” of the valve cusps to the aortic wall, the “ventriculo–arterial junctions,” and the “basal ring.” The last of these connects the nadir of the semilunar attachments and represents the “ring” that Nicks’ incision crosses. As Anderson³ writes in reference to the noncoronary sinus, “the base of this sinus is exclusively fibrous in consequence of the continuity between the leaflets of the aortic and mitral valves.” This is the intervalvular fibrosa. In contrast, as one moves toward the commissural posts, there is, indeed, a fibrous wall between the semilunar attachments or “surgical annulus” and the anterior leaflet of the mitral valve. This is one of the so-called “forgotten” interleaflet triangles or what we would term the intervalvular trigone.⁴ Indeed, it is this very structure that permits “annular” enlargement in the manner described by Nuñez and associates⁵ without entering the roof of the left atrium (LA).

Figure 1. Photomicrographs through the intervalvular trigone and intervalvular fibrosa. **A**, A section through the commissure between the noncoronary or posterior cusp and left coronary cusp. **B**, Photomicrograph taken through the nadir of the posterior cusp. The region of dense attachment of the roof of the left atrium begins immediately below the semilunar attachment and the termination of the medial elastic tissue. **PC**, Posterior cusp; **LA**, left atrium; **Ao**, aorta; **AML**, anterior mitral leaflet.

Third, we offer photomicrographs (Figure 1) through the intervalvular trigone and intervalvular fibrosa. Figure 1, A, is a section through the commissure between the noncoronary or posterior cusp (PC) and left coronary cusp. A remnant of the former is apparent. Note that the elastic layers of the media of the aorta end at this “surgical annulus” and that the roof of the LA is loosely adherent to the aorta for a distance extending from well above to well below the semilunar attachment right down to the point where it is quite densely attached to the anterior mitral leaflet (AML). It is this length

of aorta below the semilunar attachments and above the attachment of the AML—the interleaflet triangle—that is exploited in the Nuñez enlargement. In Figure 1, B, however, taken through the nadir of the posterior cusp, one can appreciate that the region of dense attachment of the roof of the LA begins immediately below the semilunar attachment and the termination of the medial elastic tissue. It is the thickness of this attachment that permits one to enter the AML for a distance without violating the dome of the LA. One can also appreciate that the apparent “base of the AML”

looks quite different depending on one's perspective. From the aortic or ventricular side, the AML clearly begins immediately below the semilunar attachment, whereas from the atrial side, because of the thickness of the LA itself, the base of the AML seems to be well below the attachment of the aortic valve cusp. The muscle of the LA essentially folds down over the base of the AML.

Again we thank Drs Nežić, Knežević, and Borović for their interest and welcome the debate. What could be more fun than spirited disagreement among colleagues!

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Endovascular treatment of mycotic aortic aneurysms

To the Editor:

We read with interest the article by Hsu and Lin¹ in which they retrospectively reviewed their patients who received surgical treatment for infected aortic aneurysms at the aortic arch. Mycotic aortic aneurysm treatment is a challenging issue. Since the beginning of modern cardiovascular surgery, surgeons have searched for better treatment options because of the high mortality and morbidity rates of the classic surgical methods. The authors' results also confirm this.¹

With the increasing experience and refinements in graft technology, endovascular grafts are frequently used in the treatment of

aneurysms at critical segments of the aorta, such as thoracic and arch levels,² and even to the ascending aorta by means of hybrid therapy or alone.³

On the other hand, although it seems completely opposite to the nature of the treatment of infected aneurysms, endoluminal stent grafting is also applied for the treatment of mycotic aneurysms. Although the long-term results are not presented, the short and mid-term outcomes of this treatment modality have been promising when compared with conventional surgical techniques (ie, extensive debridement and artificial graft replacement or extra-anatomic bypass procedures).^{4,5}

We believe that endovascular stent graft repair of mycotic aortic aneurysms, especially at the critical segments of the aorta and in debilitated patients, is an attractive alternative option with low mortality and morbidity rates in the midterm. However, long-term results are definitely required before this becomes the standard therapy. It would be helpful if the authors would have commented on this issue in their article.

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Reply to the Editor:

We appreciate Dr Ugurlucan's comments on the issue of mycotic aortic aneurysms treated by endovascular approach. We believe that the endovascular stent graft is superior in some ways to open surgical repair for the treatment of mycotic aortic aneurysms, especially in the emergency setting for debilitated patients with critical aortic segment involvement. In a recent published literature review by Kan and colleagues,¹ the endovascular treatment strategy was noted to have 30-day and 2-year survivals of 89.6% and 82.2%, respectively. To date, however, there is still no level I evidence to convince us that endovascular treatment is the criterion standard for mycotic aortic aneurysm.

In Taiwan, the abdominal aortic stent graft was approved by Department of Health for clinical use only after July 2005, and the thoracic stent graft was approved after November 2006. In our published article,² patients were treated through 2006, before the endovascular stent graft era in Taiwan. Since 2006, we have performed endovascular stent graft placement in patients with ruptured mycotic aortic aneurysm. In our preliminary data, there have been 4 patients with ruptured mycotic abdominal and thoracic aortic aneurysms treated by the endovascular technique. Of these, 1 patient required a total visceral artery debranching procedure for the ruptured suprarenal mycotic aneurysm simultaneously with the stent graft placement. The pathogen is similar to our published database² as nontyphoid *Salmonella*. There was one in-hospital death with new development of aortoduodenal fistula. There was another death later than 30 days from the non-aneurysm-related cause of uncontrolled septic shock. The other 2 patients require long-term oral antibiotic therapy. There were no cerebral vascular events or stent graft-related deaths among these 4 patients.

This seems to be a result comparable to that of open surgical repair. We are still not sure, however, whether for those with aorto-esophageal aneurysm, aortobronchial aneurysm, or residual abscess in the image study further débridement and elective open surgical grafting will be necessary after stent graft placement, once the patient condition has been stabilized. In addition, for mycotic aneurysms involving the aortic arch or visceral arterial segment, the hybrid debranching procedure or fenestrated