They have identified pathologic entities that seem to benefit more, and, most importantly, they bring up the point of whether we should wait with an operation until LV dysfunction sets in or rather propose surgery before the onset of LV dysfunction. I have 2 comments and 2 questions.

In our experience, the stability of a repaired tricuspid valve significantly exceeds that of a bicuspid valve. You showed different results, although the difference was not statistically significant. Could you elaborate on the reasons for the slightly higher risk of reoperation in tricuspid valves? Was this related to the technique of cusp repair, the technique of annular stabilization, or does it rather reflect the more difficult learning curve of assessing valve configuration in tricuspid aortic valves?

Dr Suri. Thank you, Professor Schäfers, for those questions. This is a curious finding and, as you point out, although we did not demonstrate a statistically significant difference in reoperation rates among the pathologic-anatomic subgroups, we will continue to analyze these data as the available follow-up duration lengthens and the total number of repairs available for analysis increases.

As you know, patients with tricuspid aortic valve prolapse often present at an older age than those with bicuspid regurgitation, and, as you have championed, we hypothesized that due to the, at times, sclerotic nature of the aortic cusps in the older patients with poor tissue quality, this might have been responsible for the slightly increased raw number of recurrences. That said, with the new echocardiographic tools available, including measurement of both the annulus and the coaptation margins, as you have championed, we hope to further elucidate the predictors of reoperation with greater precision in the future.

Dr Schäfers. You proposed earlier surgery, and one could go as far as proposing surgery for AR similar to that for mitral regurgitation, that is, every severe mitral regurgitation should be repaired. However, we need to remember that this is primarily recommended for mitral pathologic entities, which can be repaired with a likelihood of 90%.

To translate such a concept into the treatment of AR, of course, we need to consider the total number of patients with AR who go to the operating room. In other words, we need to define the denominator. This is difficult in such a retrospective study. Nevertheless, can you explain or comment on the reasons for exclusion from AVR and rather the decision for primary AVR?

Dr Suri. The questions are good ones—(1) will AVR have a 99% success rate, such as mitral valve repair for degenerative leaflet prolapse does in the current era; and (2) will early AVR ever be enthusiastically endorsed at the guideline level? Several differences between degenerative aortic and mitral disease must be considered when we address these questions. The first 2 differences are technical ones: the first being the relative lack of aortic cusp tissue available, and the second, the rather greater unpredictability of cusp tissue quality compared with that of mitral valve leaflets. We also must acknowledge disparities in knowledge—even if aortic repair were to become more widely available, the heterogeneous historic echocardiographic quantification of aortic valve regurgitation has led to a lag in our understanding of the effect of uncorrected severe AR on long-term survival. It will thus take some time for correction of AR with aortic repair to become widely recognized as an operation
that should be performed earlier to improve late survival. Even if
that were to occur, however, the outcomes might remain less
uniform than the enviable results we have seen for degenerative
mitral valve disease owing to the important differences in tissue
characteristics I mentioned earlier.

Thus, if we had to put things together in moving AVR\textsubscript{cp}
forward, our perspective would be as follows. Number 1, as you
point out, we need to understand the denominator; in other words,
which patients truly have severe aortic insufficiency that is
repairable? Number 2, can we more accurately describe, as you
and Professor El-Khoury, Dr David, and others in the room have
done, the pathoanatomic subgroups we are speaking about to better
communicate among centers? Accomplishing these aims will
better allow us to standardize repair maneuvers and relate them
to the mid- and late-term outcomes. The establishment of
international multicenter registries will facilitate a better
understanding of how the timing of surgery and surgery type
(repair vs replacement) relate to long-term survival, heart failure,
and reoperation risks. Ultimately, consensus statements might
recommend that AVR\textsubscript{cp} be performed before prognosis-limiting
events such as LV dilation or dysfunction, analogous to those
relating to mitral valve repair currently. Once again, important in
all this is developing good judgment in determining who should
undergo AVR\textsubscript{cp} and which patients might be best served by AVR.

Dr Schäfers. What were the exclusion criteria for repair? What
made you shy away from repair that you found on the intraopera-
tive transesophageal echocardiography or inspection?

Dr Suri. We would tend favor AVR for patients with calcified
cusps that are immobile or retracted or those with poor tissue
quality, particularly, if they are elderly.

Dr Schäfers. Thank you. My congratulations for this important
study, and I would like to thank the Society for the privilege of
discussing it.

Dr Suri. Thank you, Professor Schäfers.

Dr Khalid Rasheed (Karachi, Pakistan). Congratulations for
this excellent presentation, but as has been said, there is always
room for improvement. It has been recognized that in AVR\textsubscript{cp}
or reconstruction the sinotubular junction also has a vital role. In
your repair techniques, do you do anything to either stabilize or
fix the sinotubular junction so that it does not dilate and lead to
valve failure?

Dr Suri. Thank you for the question. I would like to acknow-
ledge our former fellow and now surgical associate, Dr Vikas
Sharma, for diligently combing through these records. In
doing so, we have removed all cases of aortic aneurysm
pathology from the present analysis, except for those with solely
supra-sinotubular junction dilatation, to focus on the performance
of AVR\textsubscript{cp} itself. In general, outside of the present series, if the
sinotubular junction is dilated, we do downsize it, using an
appropriately sized graft. We do not, however, fix the sinotubular
junction routinely to a specific dimension and have not noted
progressive sinotubular junction dilatation to be the mechanism
of repair failure in our experience. Logically, if sinotubular
dilatation occurs in conjunction with annular dilatation, we would
address the annulus and also downsize the sinotubular junction in
the same operation.

Dr Joseph Ladowski (Ft Wayne, Ind). I would like to point out
a fairly minor error in your abstract, which raises a more important
question, and that is, you state that of the 227 patients available for
follow-up, only 47 were taking warfarin and state that that was
16%. It is actually >20%. That, combined with your reoperation
rate of >20% at 10 years, leads me to ask, you very elegantly
told us which patients you would not repair going into this, but
now that you have all this experience, which ones do you wish
you had not repaired?

Dr Suri. I think the interpretation might need a little
clarification. We actually were speaking about those who
underwent AVR\textsubscript{cp} for primary AR not requiring concomitant
nonaortic valve operations. Thus, excluding those who had, for
instance, undergone replacement of their tricuspid valve or
mitral valve with a mechanical prosthesis, necessitating warfarin
anticoagulation, only roughly 20% of the remaining population
was using oral anticoagulation at the last follow-up visit.

The second point is in whom we would consider repair. I think I
alluded to that in my previous response, but I will reiterate for
clarity. Dr Schaff has performed the greatest number of repairs
in the present report. In general, surgeons at Mayo Clinic consider
aortic replacement for severe aortic insufficiency in elderly
patients and those with diminished cusp mobility, poor tissue
quality, or cusp calcification. However, as we have demonstrated
in the presentation, the exponential failure rate of bioprosthetic
valves in younger patients deserves consideration. AVR in those
with a pliable, mobile aortic valve might no longer be the default
procedure in the current surgical era, especially for young patients,
because experience with AVR\textsubscript{cp} is growing and the overall
durability has been demonstrated.