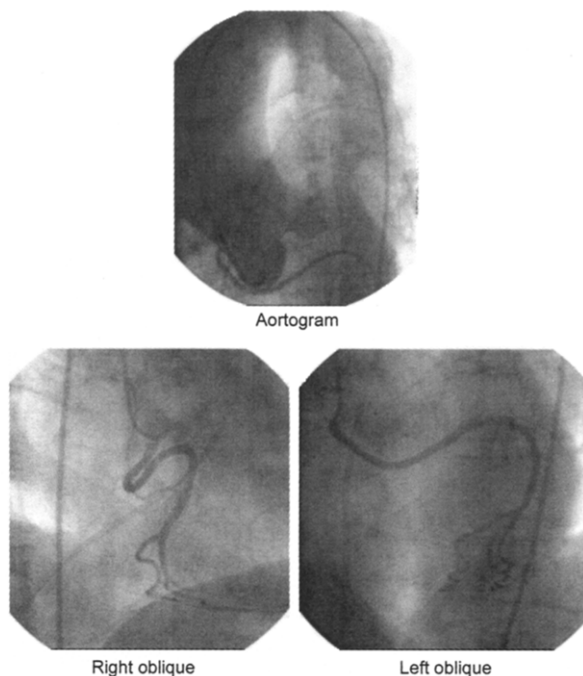


### Anomalous origin of the left circumflex coronary artery associated with bicuspid aortic valve

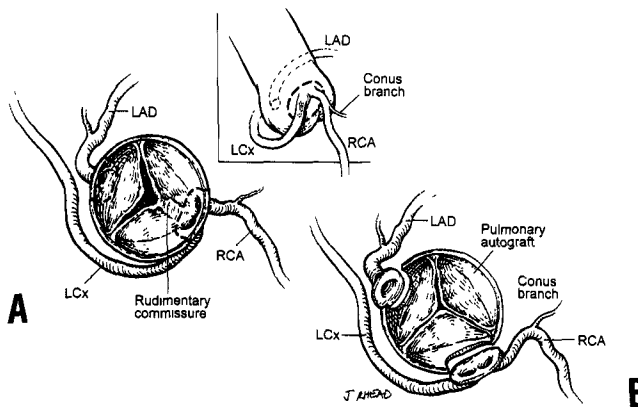
**To the Editor:**

I read with interest the article "Aortic Valve Replacement With an Anomalous Left Circumflex Coronary Artery Encircling the Aortic Anulus" by Flores and Byrne,<sup>1</sup> published in the February 2001 issue of the *Journal*. The anomalous circumflex coronary artery is described as originating from the right coronary ostium and traveling along the commissure between the non-coronary and "left" coronary cusps (their Figure 2 actually shows the course along the commissure between the noncoronary and the right coronary cusps). McAlpine<sup>2</sup> shows a similar case with the anomalous circumflex coronary artery following a course on the aortic valve hinge point in the noncoronary sinus of Valsalva. The coronary artery leaves the aorta just anterior to the commissure between the left and non-coronary sinuses, and from there it extends along the left atrium well away from the aortic root. We treated a patient with bicuspid aortic valve, and the origin and course of the anomalous circumflex coronary artery were located differently.

As seen in Figure 1, the coronary angiograms and the aortogram demonstrate that the anomalous coronary artery approximated the aortic "anulus" only in its course across the noncoronary sinus to the roof of the left atrium. At operation, significant differences in anatomy were noted compared with that observed by Flores and Byrne and by McAlpine when the aortic valve was tricuspid. These differences were related to positional coronary morphologic features associated with the bicuspid aortic valve. We found the anomalous circumflex coronary artery alongside the ostium of the right coronary artery displaced to the right, originating anteriorly above the rudimentary commissure between the right and non-coronary sinuses of Valsalva, 180° opposite the location of the left coronary ostium (anterior descending branch) (Figure 2, A). The anomalous coronary artery was adherent to the noncoronary sinus aorta, taking an oblique course posteriorly to cross the aortic anulus just anterior to the commissure between the left and noncoronary sinuses (Figure 2, inset). From that point the artery was on the roof of the left atrium, widely separated from the aortic root. Thus,



**Figure 1. Aortogram and coronary angiograms in a patient with anomalous origin of the circumflex coronary artery from the right coronary sinus of Valsalva.**



**Figure 2. A, The origin of the left circumflex coronary artery (LCx) is shown above the rudimentary anterior commissure of a bicuspid aortic valve, alongside the right coronary artery (RCA), 180° from the ostium of the left anterior descending coronary artery (LAD). The inset demonstrates the oblique course of the left circumflex artery across the non-coronary sinus of Valsalva. B, Minimal mobilization of the coronary arteries allows anastomosis to the "noncoronary" sinus of the pulmonary autograft in the Ross procedure (the graft at the sinotubular junction and above has been removed for clarity).**

there was a short relationship of the anomalous coronary artery to the aortic anulus. A Ross procedure was performed. The anomalous circumflex and the right coronary arteries were mobilized minimally and removed from the aortic root with a button of surrounding aorta. The noncoronary

sinus aorta was otherwise left intact. The coronary button was shifted further to the right. The pulmonary autograft was attached to the left ventricular outflow tract in an anatomic position, and the circumflex-right coronary artery button was anastomosed to the noncoronary sinus of

Valsalva (Figure 2, B). The left coronary artery (anterior descending) was anastomosed as usual.

I agree with the authors that injury or compression of the anomalous coronary artery is a significant hazard during aortic valve replacement with a prosthetic valve. Use of stentless aortic bioprostheses, however, should reduce if not eliminate the risk of compression of the artery by the replacement device. The authors strongly contend that "adequate mobilization of the anomalous coronary artery from the aortic annulus avoids injury by suture ligation." I suggest that mobilization of the anomalous coronary artery may not be required in some cases associated with bicuspid aortic valve, in which rightward displacement of the anomalous circumflex and right coronary artery ostia causes the anomalous coronary artery to take an oblique course over the noncoronary sinus and a shorter relationship with the aortic annulus. Suture placement in the fibrous hinge point of the aortic valve with care not to penetrate the aortic wall should not injure the coronary artery after the precise course of the artery is

known. I would add a further caution—that the anomalous circumflex coronary artery in association with a bicuspid aortic valve could be injured by classic oblique aortotomy into the noncoronary sinus. Transverse aortotomy or division of the aorta above the sinotubular junction should be used in patients with this anomaly.

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#### References

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2. McAlpine WA. Heart and coronary arteries: an anatomical atlas for clinical diagnosis, radiological investigation, and surgical treatment. Berlin: Springer-Verlag; 1975. p. 138.

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#### Reply to the Editor:

Doty's case lends further credence to our view that coronary angiography should be

strongly considered before aortic valve surgery, even in young patients, so that the precise anatomy is understood before the operation. Even if mobilization of the anomalous left circumflex coronary artery away from the aortic annulus is not needed, as was the situation in Doty's patient, who received a stentless valve, preoperative knowledge of the anatomic course of the artery was likely very helpful in planning that operation. Furthermore, such preoperative knowledge would have been even more critical had a stented bioprosthesis or a mechanical valve been chosen. As Doty points out, the traditional oblique aortotomy may have resulted in injury to the anomalous artery in his patient. I agree with Doty's remarks that the precise course of the artery should at least be known, if not treated (dissecting the artery away from the annulus), so as to avoid coronary artery injury during suture placement into the aortic annulus.

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