FIGURE 1. Intraoperative aortic root endoscopic findings. *Left*, Left and noncoronary cusps were prolapsed after remodeling. *Right*, Optimal configuration of central plicated left and noncoronary cusps was confirmed. L, Left coronary cusp; N, noncoronary cusp; R, right coronary cusp.

hemostatic sutures are placed if necessary. Then, both coronary arteries are reconstructed and the distal graft anastomosis is completed.

Although determination of the actual degree of aortic regurgitation might be difficult and the image is only 2-dimensional, the endoscopic method is simple and reproducible. This method allows the opportunity to correct a minor prolapse and leak before aortic declamping.

In conclusion, with the combination of effective height measurement and the aortic root endoscopy, more detailed information on the repaired valve can be obtained. As a consequence, improved results of the aortic valve-sparing operation may be obtained.

Kojiro Furukawa, MD^a

Satoshi Ohtsubo, MD^b

Tsuyoshi Itoh, MD^c

^aDepartment of Thoracic and Cardiovascular Surgery
Faculty of Medicine
Saga University
Saga, Japan

^bDepartment of Cardiovascular Surgery
Saiseikai Central Hospital
Tokyo, Japan

^cDepartment of Cardiovascular Surgery
Fukuoka Wajiro Hospital
Fukuoka, Japan

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AORTIC ROOT ENDOSCOPY

Reply to the Editor:

We thank and give credit to Furukawa and colleagues¹ and Itoh and colleagues² for the introduction of aortic root and valve endoscopy during aortic

valve (AV)-sparing surgery in 1995. The fact that the accuracy of on-clamp AV evaluation in the diastolic position under pressure was demonstrated by Itoh and colleagues, and confirmed by us, thus encouraging our policy to control the AV endoscopically after repair and to proceed to additional valve corrections immediately without echocardiographic examination. Meanwhile and after experience with AV endoscopy in more than 100 elective and emergency cases, this technique improved our knowledge about “how to do and choose” valve-sparing repair techniques respecting the anatomic configuration of the AV components to achieve a symmetric and functionally accurate configuration of the valve apparatus.

The complexity of the AV apparatus requires extensive experience to deal with sizing, commissures, remnant aortic wall fixation, and free margin reconstruction. Techniques to standardize parameters, such as an effective height of leaflets and commissures, facilitate the decision making intraoperatively but do not reduce the complexity of the procedure and technical failure. Malas and colleagues³ estimated a learning curve of approximately 40 to 60 AV-sparing surgeries to reproduce the safety and efficiency of the technique. Thus, in our opinion, the surgeon’s experience remains the most important factor for durable AV and root repair.

Echocardiography is the only instrument to evaluate the AV result after repair. Residual regurgitation, coaptation length, and prolapse are detected accurately. However, echocardiography does not differentiate directly the reason for residual valve

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Video clip is available online.

pathology according to the surgical steps. Prolapse postoperatively may result from isolated or combined findings, including commissural stretching, leaflet reduction or elongation by reimplantation, free margin under- or overcorrection, and annulus undersizing. Likewise, in case of a functional accurate but asymmetric valve after repair, no definitive statement to improve the surgeon's technique is given.

AV endoscopy enables the visualization and differentiation of such important details. The resulting leaflet position and symmetry can be studied and related to the commissural, supra-annular, or free-margin stitches. However, as Sievers⁴ mentioned, a pressure level of 60 mm Hg minimum is required to push the leaflets to the end-diastolic position and to evaluate coaptation and symmetry (Video 1). Endoscopy does not reduce the importance of intraoperative tools and techniques that are used for the standardization, safety, and durability of AV repair. Endoscopy enables only the control of the result before clamp release and initiates minor or major corrections, if required. It is the only instrument that can demonstrate directly the result of surgical techniques in cardiac and aortic surgery, giving important information to understand the AV pathology and to improve the surgical

VIDEO 1. A maintained pressure in the aortic root at a minimum of 60 mm Hg is required to assess the AV by endoscopy. The video demonstrates the movement of the noncoronary leaflet (on the right) to end-diastolic position under increasing pressure after supracoronary ascending aorta replacement in acute aortic dissection. Video available at: [http://www.jtcvsonline.org/article/S0022-5223\(16\)30298-7/addons](http://www.jtcvsonline.org/article/S0022-5223(16)30298-7/addons).

technique. In our department, endoscopy enabled a more sophisticated methodology to choose the repair technique.⁵

We apologize for overlooking and not citing Itoh and colleagues² important contribution from 1997, which paved the way for us and others, hopefully ameliorating the inevitable learning curve in performing more complex AV reconstructions.

Konstantinos Tsagakis, MD

Jaroslav Benedik, MD

Heinz Jakob, MD, PhD

Department of Thoracic and Cardiovascular Surgery

West-German Heart and Vascular Center

University Hospital Essen

Essen, Germany

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**PATENT FORAMEN
OVALE IS NOT A
BENIGN PATHOLOGY
IN PATIENTS
UNDERGOING OFF-
PUMP
CORONARY ARTERY**

BYPASS: A WORD OF CAUTION

To the Editor:

We thank Bozinovski and Caton¹ for their valuable article entitled "A Benign PFO in OPCAB Can Suddenly Take a Right Turn, but Maybe It Can't Tolerate It." They present a case with desaturation due to right-to-left shunt through a patent foramen ovale (PFO) during off-pump coronary artery bypass (OPCAB). Although rare, this is an extremely important problem in the OPCAB procedure. PFO is a frequent pathology with an estimated prevalence of 25%.² However, in cases without a known PFO, intermittent intra-atrial shunting due to an elevated right atrial pressure may be an important problem during OPCAB. Because most patients undergoing off-pump revascularization are high risk in terms of chronic obstructive pulmonary disease and elevated pulmonary artery pressures, opening of a PFO is not infrequent when the right atrial pressure increases. This is particularly evident in cases with left and posterior wall revascularization due to positioning of the heart leading to right atrial compression. These patients are not always capable of tolerating decreases in systemic oxygenation and cyanosis due to right-to-left shunting.