Anesthesia management for retrograde aortic valve replacement

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To the Editor,

We read with great interest the article, “Case series: Anesthesia for retrograde percutaneous aortic valve replacement—experience with the first 40 patients”. Ree et al.¹ report their experiences with the retrograde aortic valve replacement procedure, and the preliminary results of the two new valve application techniques, the transfemoral² and transapical³ approaches, are encouraging.^{2,3} Since anesthesiologists must deal with the added co-morbidities associated with elderly patients, this article is of utmost interest, because the number of minimally invasive aortic valve replacement procedures is increasing worldwide.

Whereas this procedure is performed under general anesthesia in 90% of cases, other groups prefer and propagate regional anesthesia and conscious sedation for the retrograde approach.⁴ Ree et al. performed the procedures in the cardiac catheterization laboratory, and, unfortunately, it was not possible to deliver the prosthetic valve in five patients, and, in two patients, the valve was malpositioned. These results dictate the operating room setup for minimally invasive aortic valve replacement. Anesthesiologists must be prepared for sudden hemodynamic deterioration which may require inotropic support, ventricular pacing, or emergency cardiopulmonary bypass; thus, the setup of the room must lend itself to the possibility of an emergency cardiopulmonary bypass.

The authors reported that the most common procedural complications were myocardial ischemia and arrhythmia following rapid ventricular pacing. Did they maintain a specific mean arterial pressure before commencing the rapid ventricular pacing? Also, the authors treated intraoperative

hypotension (systolic arterial pressure <90 mmHg) with intravenous crystalloid infusion as well as inotropic agents. We routinely experience a significant decline in the mean arterial pressure for both balloon valvuloplasty and valve implantation after rapid ventricular pacing. In our experience, it is important to increase the mean arterial pressure (MAP > 75 mmHg) before starting rapid ventricular pacing, especially if the procedure is performed under general anesthesia. If the “starting point” of the mean arterial pressure is higher before initiating rapid ventricular pacing, the necessary time to stabilize the patient is shorter. A prolonged period of hypotension after rapid ventricular pacing may be the risk factor for myocardial ischemia after rapid ventricular pacing.

These initial experiences necessitate a thorough understanding of anesthesia management and the hemodynamic effects of retrograde valve replacement in order to ensure successful outcomes with this new approach for percutaneous retrograde replacement of the aortic valve for high risk patients.

Conflicts of interest None declared.

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Reply

We sincerely thank Drs. Fassl, Kodavatiganti, and Ingerski for their interest in our article,¹ and we are grateful for this opportunity to reply. Fassl et al. correctly point out that, in addition to the transfemoral approach, another new catheter-based valve replacement technique utilizes the transapical approach, which also was first pioneered at our centre.^{2–4} Since the anesthetic and procedural considerations for the two techniques are not identical, we focused our case series on the transfemoral approach. However, a concise review of the technical aspects and anesthetic management of both techniques has recently been published.⁵

We are not convinced that there is sufficient data to show that regional anesthesia or conscious sedation produces better outcomes than general anesthesia for retrograde percutaneous aortic valve replacement. In contrast, and as mentioned in our article, we have made the following observations: (1) intraoperative transesophageal echocardiography facilitated by endotracheal intubation and general anesthesia is critical for correct prosthesis placement and good procedural outcomes; (2) a sizeable number of patients require major vascular repair and/or massive transfusion, essentially necessitating general anesthesia; and (3) all of our patients tolerated general anesthesia *per se* well. As Fassl et al. are emphasizing, the anesthesiologist must be prepared to manage sudden hemodynamic deterioration, which may include initiating emergency cardiopulmonary bypass. Therefore, we completely share their opinion that an appropriately equipped and staffed operating room, as opposed to a remotely located cardiac catheterization laboratory, is the location of choice for these procedures. As mentioned in our article, this has now become standard practice at our centre.

We share the concerns about the hemodynamic consequences of rapid ventricular pacing, especially in the setting of the high-risk multimorbid elderly patient with critical aortic stenosis. The cases described in our article represent our initial experience with the retrograde percutaneous aortic valve replacement procedure, and our practice has naturally evolved in light of these and other concerns. Our current practice is to maintain a mean arterial pressure ≥ 60 mmHg with a titrated infusion of norepinephrine, and to administer an additional preemptive bolus dose of phenylephrine at the time of rapid ventricular pacing to decrease the period and magnitude of hypotension. The strategy described by Fassl et al. appears to be

similar and is likely to achieve the same objective. However, we found that another important aspect is the situation where the hypotension produced by rapid ventricular pacing is prolonged and does not respond to phenylephrine or norepinephrine. In this circumstance, prompt diagnosis of the etiology of the hypotension is required, and this, in our experience, is most expeditiously accomplished by transesophageal echocardiography. In addition to myocardial ischemia, rupture of the aortic root or the mitral valve apparatus should be included in the differential diagnosis. As alluded to above, it is imperative to rapidly initiate cardiopulmonary bypass for the survival of patients with one of the latter two diagnoses.

Finally, we fully agree that it is crucial to generate the knowledge to achieve a thorough understanding of the effects of anesthetic management on patients undergoing these new catheter-based valve replacement techniques, which we believe will require future prospective study. Although these techniques are less invasive than conventional aortic valve replacement, devastatingly rapid and severe intraoperative complications can occur. These complications must be anticipated and managed expeditiously if favourable outcomes are to be attained.

Conflicts of interest None declared.

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