

## EDITORIAL COMMENT

# Intracardiac Echocardiography

## Guiding Tool in Transcatheter Aortic Valve Replacement\*



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During the last decade, devices for transcatheter aortic valve replacement (TAVR) have been shown to allow for dedicated percutaneous approaches with many improvements in transcatheter heart valve (THV) delivery, making general anesthesia and endotracheal intubation unnecessary complications of the procedure. In light of further advancements in TAVR devices, procedural guidance by angiography and fluoroscopy only without any echocardiographic viewing or with just intermittent trans-thoracic echocardiographic assessment has become the standard approach at many centers worldwide.<sup>1-3</sup> Dispensation with permanent echocardiographic guidance (PEG) remains controversial and may be adverse in high-risk patients, and PEG guidance mostly provided by transesophageal echocardiography (TEE) obviously seems to have several advantages over any “minimalist approach”—for example, significant reduction in the use of radio contrast,<sup>4</sup> effective imaging to facilitate crossing the native aortic valve, help with adequate balloon and device positioning for optimal deployment of the THV,<sup>5,6</sup> and detection of life-threatening complications at an early stage.<sup>7-9</sup> Despite considerable advances during the last decade, major adverse events remain a concern during and after TAVR.<sup>10</sup> With the decreasing age of TAVR candidates, minimizing potential complications of any kind remains the focus of attention. Those detectable by TEE include annulus rupture,<sup>11,12</sup> perforation of the myocardium with subsequent pericardial hemorrhage,<sup>13</sup> coronary ostia occlusion with subsequent myocardial ischemia,<sup>14</sup> aortic annulus perforation or

aortic dissection,<sup>13</sup> THV malpositioning or dislodgement,<sup>15</sup> and paravalvular leak.<sup>16</sup>

In this issue of *JACC: Asia*, in their original paper based on a retrospective analysis, Murakami et al<sup>17</sup> focus on a specific and not immediately life-threatening complication: high-grade atrioventricular block caused by compression of the conductive system by the THV with subsequent need for permanent pacemaker implantation (PPMI). It turns out that guidance of TAVR using intracardiac echocardiography (ICE) from a transjugular (TJ) approach may optimize valve positioning and subsequent deployment, significantly reducing the PPMI rate. Therefore, Murakami et al<sup>17</sup> associate ICE monitoring with a lower rate of high-grade atrioventricular block requiring fewer PPMIs. This may be considered an important and new message showing to what extent improvements in outcome can be achieved by permanent ICE guidance, which has been already reported as beneficial in TAVR in another context.<sup>18-21</sup> Although ICE guidance of TAVR is not new, for the first time, Murakami et al<sup>17</sup> report a clinical benefit using a TJ ICE approach, which was not just shown to be feasible and safe but might also facilitate work-sharing between interventional and imaging team members. As previously shown for transfemoral ICE,<sup>20</sup> Murakami et al<sup>17</sup> demonstrated TJ ICE to perfectly fit into the procedural workflow of TAVR.

About 20 years after the introduction of ICE for PEG during interventional procedures,<sup>22,23</sup> costs and lack of expertise<sup>19</sup> must be considered the most important obstacles preventing interventional cardiologists from taking full advantage of ICE monitoring during TAVR. Resterilization of ICE catheters has been allowed in some countries—for example, in Germany—and may help reduce costs. However, the direct clinical impact will be, finally, more important than any monetary costs or savings. Therefore, PEG provided by ICE including a TJ approach promises to be advantageous not only compared with “minimalist” approaches but also with TEE, which requires general anesthesia for permanent viewing.<sup>18,20</sup>

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Training and a consequent team approach with equally entitled roles of interventional and imaging cardiologists have proved a recipe for benefit from ICE guidance and procedural success in general. The recent introduction of 3-dimensional ICE for the monitoring of complex interventional procedures in structural heart disease represents another promising development, which again might place special emphasis on ICE and increase its acceptance as a guiding tool in general.<sup>24</sup> Thus, use of ICE should be considered more often in high-risk TAVR cases,<sup>19,20</sup> particularly in patients with pre-existing conduction block. Nonetheless, randomized and prospective trials comparing the accuracy, repro-

ducibility, and outcomes of ICE guidance vs guidance by TEE and vs pure fluoroscopy and angiography need to be performed before ICE imaging is adopted as the primary nonradiographic imaging modality for TAVR.

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