

## Antegrade approach to cross a native aortic valve



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Transcatheter aortic valve implantation (TAVI) has become a well-established treatment for patients with high and intermediate surgical risk symptomatic severe aortic stenosis (AS)<sup>1,2</sup>. With the widening of the indications for TAVI, the incidence of bicuspid valve in the TAVI cohort is now increasing<sup>3</sup>. Sometimes we encounter difficulty in crossing a bicuspid aortic valve, due to its anomalous anatomy, severe calcification, and enlarged ascending aorta. It is important to have a bail-out solution for cases where there is difficulty in crossing a native aortic valve in order to accomplish transfemoral TAVI successfully.

In this issue of *AsiaIntervention*, Tay et al report a novel technique for crossing a Sievers type 0 bicuspid stenotic aortic valve<sup>4</sup>.

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Multiple attempts were performed with various catheters and wires; however, it remained difficult to cross the aortic valve. Therefore, the authors performed a transseptal puncture and guided the wire and the catheter to the left ventricle, crossing the aortic valve to the aorta via the antegrade approach. After externalisation of the wire to the sheath in the femoral artery, the valve was finally implanted via the retrograde transfemoral approach.

The antegrade approach has been used for percutaneous mitral commissurotomy<sup>5</sup> since 1982 using the Inoue Balloon™ (Toray

Industries, Inc., Tokyo, Japan), and is also predominantly used in antegrade balloon aortic valvuloplasty in Japan<sup>6</sup>. Furthermore, this approach was also used in the first TAVI case<sup>7</sup> by Cribier et al. Therefore, using this approach it is easy to cross a stenotic calcified aortic valve and natural to use it for TAVI. This antegrade transseptal approach is also used for some mitral procedures such as percutaneous mitral valve repair (MitraClip™ [Abbott Vascular, Santa Clara, CA, USA], etc.)<sup>8</sup>, and for left appendage closure devices<sup>9</sup>. Therefore, in the current era, it is of the utmost importance for interventional cardiologists to learn this technique for the future development of this field.

Despite the advent of smaller-profile sheaths in the current era, the transfemoral approach still has some limitations, namely difficulty in crossing a severely calcified aortic valve, and the potential to cause vascular complications<sup>10</sup>. The TAVI devices currently available cannot be used via the antegrade approach, because they are designed only for the retrograde transfemoral approach and the rigidity of the devices hinders their antegrade use. To solve the current limitations of the transfemoral approach, TAVI devices more compatible with the antegrade approach, with softer, more flexible, and lower profiles, may be developed in future. This case report has not only provided us

with a useful bail-out technique that we should keep in our toolbox, but has also given us a glimpse into the future in terms of the development of ideal TAVI devices.

## References

1. Leon MB, Smith CR, Mack MJ, Makkar RR, Svensson LG, Kodali SK, Thourani VH, Tuzcu EM, Miller DC, Herrmann HC, Doshi D, Cohen DJ, Pichard AD, Kapadia S, Dewey T, Babaliaros V, Szeto WY, Williams MR, Kereiakes D, Zajarias A, Greason KL, Whisenant BK, Hodson RW, Moses JW, Trento A, Brown DL, Fearon WF, Pibarot P, Hahn RT, Jaber WA, Anderson WN, Alu MC, Webb JG; PARTNER 2 Investigators. Transcatheter or Surgical Aortic-Valve Replacement in Intermediate-Risk Patients. *N Engl J Med*. 2016;374:1609-20.
2. Mack MJ, Leon MB, Smith CR, Miller DC, Moses JW, Tuzcu EM, Webb JG, Douglas PS, Anderson WN, Blackstone EH, Kodali SK, Makkar RR, Fontana GP, Kapadia S, Bavaria J, Hahn RT, Thourani VH, Babaliaros V, Pichard A, Herrmann HC, Brown DL, Williams M, Akin J, Davidson MJ, Svensson LG; PARTNER 1 trial investigators. 5-year outcomes of transcatheter aortic valve replacement or surgical aortic valve replacement for high surgical risk patients with aortic stenosis (PARTNER 1): a randomised controlled trial. *Lancet*. 2015;385:2477-84.
3. Yoon SH, Bleiziffer S, De Backer O, Delgado V, Arai T, Ziegelmüller J, Barbanti M, Sharma R, Perlman GY, Khaliq OK, Holy EW, Saraf S, Deuschl F, Fujita B, Ruile P, Neumann FJ, Pache G, Takahashi M, Kaneko H, Schmidt T, Ohno Y, Schofer N, Kong WKF, Tay E, Sugiyama D, Kawamori H, Maeno Y, Abramowitz Y, Chakravarty T, Nakamura M, Kuwata S, Yong G, Kao HL, Lee M, Kim HS, Modine T, Wong SC, Bedgoni F, Testa L, Teiger E, Butter C, Ensminger SM, Schaefer U, Dvir D, Blanke P, Leipsic J, Nietlispach F, Abdel-Wahab M, Chevalier B, Tamburino C, Hildick-Smith D, Whisenant BK, Park SJ, Colombo A, Latib A, Kodali SK, Bax JJ, Sondergaard L, Webb JG, Lefevre T, Leon MB, Makkar R. Outcomes in Transcatheter Aortic Valve Replacement for Bicuspid Versus Tricuspid Aortic Valve Stenosis. *J Am Coll Cardiol*. 2017;69:2579-89.
4. Tay E, Singh D, Kong WK, Hon JKF. Hybrid technique to bail out an unsuccessful transfemoral TAVR attempt. *AsiaIntervention*. 2018;4:38-40.
5. Inoue K, Owaki T, Nakamura T, Kitamura F, Miyamoto N. Clinical application of transvenous mitral commissurotomy by a new balloon catheter. *J Thorac Cardiovasc Surg*. 1984;87:394-402.
6. Sakata Y, Matsubara K, Tamiya S, Hayama Y, Usui K. The Efficacy and Safety of Antegrade Inoue-Balloon Aortic Valvuloplasty to Treat Calcific Critical Aortic Stenosis. *J Invasive Cardiol*. 2015;27:373-80.
7. Cribier A, Eltchaninoff H, Bash A, Borenstein N, Tron C, Bauer F, Derumeaux G, Anselme F, Laborde F, Leon MB. Percutaneous transcatheter implantation of an aortic valve prosthesis for calcific aortic stenosis: first human case description. *Circulation*. 2002;106:3006-8.
8. Feldman T, Kar S, Elmariah S, Smart SC, Trento A, Siegel RJ, Apruzzese P, Fail P, Rinaldi MJ, Smalling RW, Hermiller JB, Heimansohn D, Gray WA, Grayburn PA, Mack MJ, Lim DS, Ailawadi G, Herrmann HC, Acker MA, Silvestry FE, Foster E, Wang A, Glower DD, Mauri L; EVEREST II Investigators. Randomized Comparison of Percutaneous Repair and Surgery for Mitral Regurgitation: 5-Year Results of EVEREST II. *J Am Coll Cardiol*. 2015;66:2844-54.
9. Reddy VY, Holmes D, Doshi SK, Neuzil P, Kar S. Safety of percutaneous left atrial appendage closure: results from the Watchman Left Atrial Appendage System for Embolic Protection in Patients with AF (PROTECT AF) clinical trial and the Continued Access Registry. *Circulation*. 2011;123:417-24.
10. Hayashida K, Lefevre T, Chevalier B, Hovasse T, Romano M, Garot P, Mylotte D, Uribe J, Farge A, Donzeau-Gouge P, Bouvier E, Cormier B, Morice MC. Transfemoral aortic valve implantation new criteria to predict vascular complications. *JACC Cardiovasc Interv*. 2011;4:851-8.