

## Preface to focused issue on current challenges in transcatheter valve therapies

This issue of *Journal of Thoracic Disease* includes a potpourri of reviews and original articles about the current challenges with transcatheter valve therapies.

Since Alain Cribier implanted the first percutaneous aortic valve prosthesis in 2002, the field of interventional treatment of heart valve pathologies has grown rapidly and is still expanding. The feasibility and the safety of transcatheter aortic valve implantation (TAVI) have been proven extensively over the past years with numerous reports of data from randomized trials, large international and national registries, and single-center studies. North American and European guidelines on indications for the novel therapy were developed and adopted accordingly. In this context, the presence of an interdisciplinary heart team for planning and performance of TAVIs is highlighted as an essential prerequisite for centers performing TAVI. In 2014, the numbers of transcatheter aortic valve procedures in Germany even exceeded conventional surgical aortic valve replacement (SAVR) with 13,000 TAVIs *vs.* 11,000 SAVRs.

During the first years of experience, specific challenges with the first-generation TAVI valves were recognized and extensively studied, such as accuracy of positioning or paravalvular leakages. With technical improvements and new developments addressing those issues, a couple of different second-generation catheter valve prostheses with new features are now available and have been approved. Longer-term data of up to 5 years of follow-up have already been published and show remarkable symptom improvement as well as sustained valve functions with no signs of early degeneration.

Even though TAVI has become a standard therapy for appropriately selected patients, and procedural results have constantly improved, specific complications in high risk TAVI-collectives remain a major issue affecting outcome and survival and are the subject of current studies. Among those complications, acute kidney injury (AKI) after TAVI is a frequent finding being reported in ranges from 8.3% to 58%. The authors of the review article “Acute kidney injury after transcatheter aortic valve implantation” provide an overview on the impact of AKI on mortality and potential risk factors for renal impairment after TAVI. In addition, the review presents an elaboration of the problem when using different definitions to classify AKI which is why data in the available literature varies widely.

Apart from native aortic valve stenosis, other valve pathologies for interventional treatment have also become the focus of current investigations. As redo surgery in general is considered a higher-risk procedure, the less-invasive interventional treatment of degenerated valve bioprostheses is an appealing approach. Approximately 5% of all TAVI procedures are so-called valve-in-valve procedures, but there is still very few evidence on the best practice and results. The review article “Challenges in valve-in-valve therapy” summarizes in detail the technical problems of different anatomies and fluoroscopic appearances of surgical and transcatheter valve prostheses. Furthermore, the authors highlight the issue of correct sizing strategies for this particular TAVI application. The original article “Redo-aortic valve surgery versus transcatheter valve-in-valve implantation for failing surgical bioprosthetic valves: consecutive patients in a single-center setting” demonstrates single-center results after valve-in-valve procedures in comparison to surgical redo aortic valve replacement (AVR) for degenerated bioprostheses. Notably, survival after surgical redo AVR is excellent with 0% early mortality when excluding patients with endocarditis who are not eligible for transcatheter treatment anyway. Accordingly, the authors underline the importance of individually tailored decision-making for either strategy.

Among the different approaches for TAVI, the transfemoral and transapical access routes are most commonly used and have been studied most extensively. However, new developments like apical closure devices aim to further improve results. The review article “Access and closure of the left ventricular apex: state of play” gives an overview on current technologies for standardized and reproducible closure of the left ventricle during transapical procedures. The transfemoral approach is considered the least invasive; still, there is a trend to further decrease invasiveness and complexity by waiving general anaesthesia. The authors of the review article “Sedation or general anesthesia for transcatheter aortic valve implantation” call attention to the fact that there is to date no scientific evidence for non-inferiority of sedation only. The article further highlights the importance of the presence of an experienced cardiac anaesthesiologist during a complex procedure in complex patients. Among non-femoral access routes for TAVI, the transaxillary implantation technique is less frequently used. The

review article “Preferential short cut or alternative route: the transaxillary access for transcatheter aortic valve implantation” outlines the advantages of this alternative TAVI access route, e.g., the low invasiveness, and describes the relatively new technique of percutaneous puncture of the subclavian artery as opposed to surgical cut-down.

While the introduction of transcatheter aortic valve therapy has been a story of success, there is increasing interest in interventional treatment options of the mitral valve. Numerous devices for interventional mitral valve repair and replacement are under development, but only few have reached clinical application. The MitraClip is the only approved device with wide-spread use. The review article “MitraClip—data analysis of contemporary literature” describes the advantages of this new technology, e.g., low mortality and complications rates. In addition, the authors outline the importance to not only define and extend the group of patients that may benefit, but also to get a better understanding of those patients that do not improve after MC treatment. Last, but not least, the article “Current challenges in interventional mitral valve treatment” gives an overview on the large variety of different concepts developed for interventional mitral valve repair or replacement and explores in detail the patient- and procedure-related (technical) challenges.

This issue of *Journal of Thoracic Disease* displays the multitude of open questions in the field of transcatheter valve therapies. The authors have produced an outstanding review of patient selection, peri-interventional management, technical challenges and access-related issues, all of which are the subject of current investigations on aortic valve interventions. The issue is completed by two reviews on mitral valve interventions.



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