Transcatheter interventions for structural heart disease

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Conclusions and future perspectives

Chapter 1

Accurate visualization of different cardiac structures is mandatory to maximize the success rate of current catheter-based intervention procedures. Recent advances in cardiac imaging modalities such as real-time 3D TEE, MDCT, or MRI have significantly improved the visualization and characterization of cardiac structures and have facilitated the dissemination of several transcatheter procedures. Some procedures are challenging and require high experience. However, the combination of fluoroscopy and, most frequently, echocardiography yields an accurate procedural guidance to achieve the highest success rate with the lowest complication rates. Current catheterization laboratories may evolve to hybrid operating rooms with sufficient space to hold multimodality imaging capabilities (3D echocardiography, MDCT, and MRI). This is particularly of interest in the emerging field of transcatheter valve implantation. However, other procedures such as transcatheter closure of perimembranous VSD may be facilitated by novel image-fusion technologies that require MRI or MDCT. Ongoing research will provide novel tools to increase the number of catheter-based procedures to treat several structural heart diseases that remain currently in the surgery domain.

In **Chapter 2** procedural outcomes and long-term survival were compared in two age-based groups (80 years old and younger versus >80 years). The results of the present single center study showed that age is not associated with outcomes after TAVI. This is in line with other registries and eventually randomized controlled trials showed that TAVI is effective in young patients with low operative risk (PARTNER-3 trial for example). These studies have been pivotal for the development of new practice guidelines where age is the main factor to select surgical versus transcatheter aortic valve replacement, such as the AHA/ACC guidelines. The rationale behind this change is that the life-expectancy versus the durability of the valve should be considered rather than just the operative risk.

In **Chapter 3**, timing of percutaneous coronary intervention (PCI) prior to transcatheter aortic valve implantation (TAVI) was evaluated. PCI performed within less than 30 days prior to TAVI resulted in more frequent minor bleedings and overall vascular injury compared to patients with a longer interval between PCI and TAVI. Furthermore, no differences in the incidence of other events and in 2-year survival were reported. This has resulted in a change in the management of patients with severe aortic stenosis and significant coronary artery disease who are candidates for TAVI. Currently, we use transradial access for PCI, which results in less vascular complications and bleedings, and the PCI if needed is preferably performed at least 30 days before TAVI.

Chapter 4 investigates a practical prediction model for the risk of residual tricuspid regurgitation (TR) after percutaneous ASD closure. TR significantly improved in some patients despite significant TR at baseline, and moderate/severe TR post-closure is best predicted by the combination of age, right atrial size, right ventricular systolic pressure, and the extent of right ventricular dysfunction. This model may help identify a subgroup of patients in whom TR reduction after closure of the atrial septum defect is unlikely and therefore, surgical tricuspid valve repair and ASD closure would be preferable.

Clinical cases are described in chapters 5 and 6 to discuss implementation of new transcatheter interventions in challenging structural heart diseases who are not included in randomized clinical trials. In **chapter 5** describes the outcomes of transcatheter mitral valve repair in a patient with osteogenesis imperfecta. In osteogenesis imperfecta bleeding risks are high and wound healing process is impaired. Therefore, surgical intervention of mitral valve regurgitation can be associated with many complications during and after surgery. We concluded that transcatheter mitral valve repair is feasible, safe and effective in patients with osteogenesis imperfecta and associated symptomatic significant mitral regurgitation. In **chapter 6** a complex transcatheter valve implantation in a failed mitral annuloplasty with complete ring is complicated by a severe paravalvular leakage. In this How-to-treat case report an important learning message is provided by the operator and two independent experts. They explained how they would treat the unexpected problems. We concluded that mitral ring dehiscence may occur after a valve-in-ring procedure causing significant mitral regurgitation. Dehiscence closure with an atrial septal defect closure device is a feasible bail-out maneuver to treat para-ring mitral regurgitation.