Research Highlights

Highlights from the latest articles in ablation and endovascular valve repair

Relationship between electrical pulmonary vein reconnection and contact force during initial pulmonary vein isolation

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Evaluation of: Neuzil P, Reddy V, Kautzner J *et al.* Electrical reconnection after pulmonary vein isolation is contingent on contact force during initial treatment: results from the EFFICAS I study. *Circ. Arrhythm. Electrophysiol.* 6, 327–333 (2013).

Pulmonary vein (PV) isolation is the most common and effective interventional treatment for paroxysmal atrial fibrillation. Nevertheless, recurrence of arrhythmia after treatment remains a substantial issue. The main reason for recurrences is conduction recovery caused by the inability to create durable lesions with currently available techniques. The contact force (CF) between the catheter tip and endocardial tissue could play an important role for the lesion quality during radiofrequency ablation. Recently, two manufacturers developed techniques allowing for the measurement of real-time CF between the catheter tip and the beating heart wall.

In this study by Neuzil *et al.*, the TactiCath® (Endosense, Meyrin, Switzerland) system was evaluated in a prospective, multicenter study in 46 patients. The operator was blinded to CF data. At 3-months follow-up, there was an invasive control of PV reconnection. The goal of the study was to investigate the exact relationship between CF parameters and the location of reconnection of PVs. The PV isolation was performed with a standard technique using wide antrum ablation lines around each ipsilateral PV pair. All PVs were initially successfully isolated with this technique. In almost half of the patients, a deflectable sheath was used during the initial ablation procedure (mean CF was not different when using a deflectable or conventional sheath).

In general, CF was higher in the right PVs than the left PVs. Lowest CFs were observed during ablation of the left PVs at the anterior superior and anterior inferior aspect of the PVs. The highest CFs were documented at the anterior inferior aspect of the right PVs. A total of 40 of the initial 46 study patients completed the invasive follow-up. At the follow-up procedure, 65% of patients showed ≥1 gaps. The ablation power output for sites with and without gap segments were not different. There was a significant difference in minimum CF in segments with no gaps versus gaps (8.1 vs 3.6 g; $p < 0.0001$). Moreover, the force–time interval played an important role in determination of subsequent gaps. Segments with a minimum force–time interval >400 gs had a 95% chance of showing persistent PV isolation compared with a 79% chance with a minimum force–time interval of <400 gs ($p < 0.001$). At the index procedure, there was no serious adverse event.

In conclusion, the most attractive point of this study was the invasive follow-up. Thereby, the exact number and location of reconnections in correlation to CF could be demonstrated, revealing a direct correlation between CF during ablation and long-term lesion durability. Thus, CF appears to be one of the most important issues in the attempt to create long-term durable ablation lesions.

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Future Medicine part of fsg

4-year results of EVEREST II-trial: interventional repair of severe mitral valve regurgitation with the MitraClip® system

Evaluation of: Mauri L, Foster E, Glower D *et al.* 4-year results of a randomized controlled trial of percutaneous repair versus surgery for mitral regurgitation. *J. Am. Coll. Cardiol.* 62, 317–328 (2013).

Endovascular repair of mitral regurgitation (MR) using the MitraClip® (Abbott Vascular, IL, USA) has evolved as a suitable alternative for surgical treatment in patients with severe symptomatic MR. The EVEREST II randomized controled trial comparing MitraClip treatment with conventional surgery for MR showed similar rates of death at 1 year, but a higher degree of residual MR in the MitraClip group. A total of 279 patients were recruited at 37 centers in North America. Patients were randomized in a 2:1 ratio to endovascular repair and conventional surgery, respectively. Major adverse events at 30 days were lower in the MitraClip group. Follow-up visits at 1-year intervals, including echocardiographic re-evaluation and review of the data by a core laboratory were performed.

In this study by Mauri *et al.*, long-term follow-ups after interventional/surgical mitral valve repair are reported for the first time. A total of 88% of patients in the MitraClip group and 77% of patients undergoing conventional surgery completed a 4-year follow-up. Regarding device safety, only a few new, previously unreported types of complications have been described in the MitraClip group (e.g., one attachment of the device to a single mitral valve leaflet and one mitral valve stenosis). Regarding treatment efficacy at 4 years (i.e., freedom from death, surgery for mitral valve dysfunction and MR grade 3+ or 4+), there was no significant difference between both groups (39.8% in the MitraClip group and 53.4% in the surgical arm; p = 0.07). The severity of MR changed in only a few patients between year 1 and 4 after the procedure in both groups. Moreover, reduction in New York Heart Associaton class after treatment was stable during follow-up in both groups.

The most important finding of this long-term follow-up study is the demonstration of durability of both the effectiveness and safety of the MitraClip for at least 4 years. In general, if there is a good result 6 months after the MitraClip procedure, the MR will remain stable over time. Nevertheless, in comparison to surgical repair of MR, the MitraClip procedure is still associated with a higher rate of residual MR at 1 and 4 years.

Incidence and relevance of new-onset left bundle branch block after transcatheter aortic valve implantation

Evaluation of: Franzoni I, Latib A, Maisano F *et al.* Comparison of incidence and predictors of left bundle branch block after transcatheter aortic valve implantation using the CoreValve versus the Edwards Valve. *Am. J. Cardiol.* 15, 554–559 (2013).

Conduction disorders, such as atrioventricular block (AVB) or bundle branch block (BBB), are common side effects of transcatheter aortic valve replacement (TAVI). There are a considerable number of studies trying to predict the occurrence of complete AVB and the need for pacemaker implantation before the procedure. The relevance of new-onset left bundle branch block (LBBB) is incompletely investigated thus far.

In this study, 238 patients without preexisting AVB, BBB or previous pacemaker implantation and the need for TAVI were examined. The Medtronic CoreValve® (Medtronic, MN, USA) was implanted in 87 patients and the Edwards SAPIEN (Edwards Life Sciences, CA, USA) in 151 patients. After TAVI, new-onset LBBB was observed in 26.5% of patients. There was a significant difference between patients treated with the Medtronic valve as compared with those treated with the Edwards system (50 vs 13.5%; p < 0.001). In 12.7% of patients, permanent pacemaker implantation was necessary, mostly owing to the development of complete AVB. Disappearance of LBBB at discharge was described in a substantial proportion of patients (recovery in 56% with Medtronic valve and 35% in the Edwards group). In total, 41 patients (17%) had LBBB at discharge without pacemaker implantation. Besides the valve type, there was no other predictor for LBBB development in multivariate analysis.

The total mortality and cardiovascular mortality were not increased in patients with new-onset LBBB at 1-year follow-up (log-rank p = 0.42 and 0.46, respectively).

These results are in contrast to other recently published data, which showed an increased mortality risk in the case of

new-onset LBBB after TAVI. Notably, the follow-up period of only 1 year is a limitation of this study. Thus, larger prospective multicenter trials are necessary to determine the prognostic impact of LBBB development, as well as QRS widening without specific branch block after TAVI. By clarifying the mechanisms of new-onset LBBB due to TAVI treatment, prevention of device-induced conduction disturbances should be one of the goals of further development of TAVI devices.