The impact of electroanatomical mapping and VT substrate ablation on primary and secondary prevention ICD indication in patients with repaired Tetralogy of Fallot

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Background: Patients with repaired tetralogy of Fallot (rTOF) remain at risk for monomorphic ventricular tachycardia (MVT) and sudden cardiac death. Primary prevention ICD implantation studies report annualized rates of appropriate ICD therapy of ≈7% mainly for MVT. Slow conducting anatomical isthmus (SCAI) is the dominant MVT substrate, and SCAI transection by ablation has been associated with favorable long-term outcomes. Electroanatomical mapping (EAM) is the gold standard to identify SCAI. The impact of a systematic approach of EAM and ablation of SCAI on patient selection for ICD implantation is unknown.

Objective: The study aimed to evaluate the long-term arrhythmic outcome of rTOF patients who underwent EAM and ablation for primary and secondary prevention of MVT.

Methods: Consecutive patients with rTOF who underwent EAM for VT substrate identification between 2005 and 2020 were included. Indication for EAM were (A) spontaneous VT/cardiac arrest or (B) before re-valving or for risk stratification. In patients with SCAI, catheter or surgical transection was attempted. The risk score for VT/SCD proposed by Khairy et. al was calculated. After successful ablation of SCAI, ICD implantation was offered but subject to shared decision making. Patients were followed for VT and all-cause mortality.

Results: A total of 125 pts (Group A=28; Group B=97) were included (37±17 years, 62% men, QRS 155±32ms, preserved/mildly reduced LV and RV function 96% and 81%, respectively).

A SCAI was present in 59 patients (47%) (A=26, B=33). In 45 patients, 67 MVTs were induced (CL 271±54 ms), of which 63 (94%) were related to SCAI. In 44/61 patients (72%) who underwent ablation, procedural success could be achieved (A 16/27, B 28/34).

During a median follow-up of 58 (IQR 27-105) months (36 pts with ICDs), 7 patients died (5 heart failure; 2 non-cardiac cause), and 13 had VT (A=9, B=4). In 12/13 pts with VT, SCAI could not be transected (A=8, B=4), and the remaining patient, who had impaired LV/RV function, recurred with a different VT.

In patients without SCAI or successful SCAI transection and preserved/mildly reduced function, no VT occurred (figure).

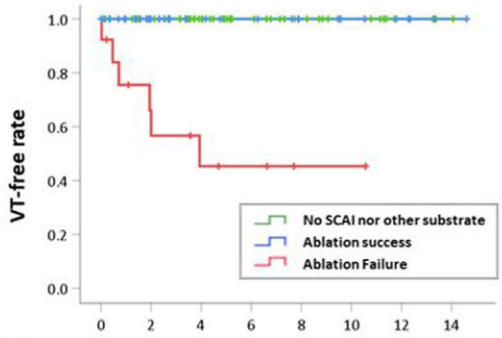
According to the risk score, 22, 27, and 48 of group B patients were classified as high (predicted annualized VT 0%), intermediate (3.8%), and low risk (17.5%). Accordingly, 77/125 (62%) (all 28 pts of group A and 49 patients [intermediate or high risk] of group B) would have been considered candidates for ICD.

After implementing the EAM-based approach, 39 patients (18 patients in group A and 21 patients in group B) may remain candidates for ICD implantation, indicating a potential 49% reduction in ICD implantation.

Conclusion: Patients with successful transection of SCAI had excellent long-term outcome. EAM-based risk stratification and (preventive) ablation targeting SCAI may significantly reduce ICD implantation rates for primary and secondary preventions in rTOF.

13.4.3 - Ablation of Ventricular Arrhythmias

VT-free rate in patients with preserved/mildly reduced cardiac function



Number at risk								
No SCAI nor other substrate	53	45	32	21	14	9	3	1
Ablation success	34	20	14	12	8	6	4	1
Ablation Failure	13	7	4	3	1	1	0	0