

Using Remote Magnetic Navigation for the Ablation of Arrhythmia in Congenital Heart Disease

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The treatment of arrhythmia in patients with transposition of great arteries (TGA) and total cavopulmonary connection (TCPC) is particularly difficult with respect to complex anatomy, scar distribution, and chamber accessibility, frequently requiring puncture of surgically created septation.

Methods A series of 10 patients (7 male, mean age 29+/-7.2yrs) with congenital heart disease (TGA 5, previous TCPC 4, other 1) were treated by utilizing the remote magnetic navigation system in conjunction with a 3D electroanatomical mapping system with preprocedure imaging. Clinical tachycardia (mean CL 280+/-59.8 ms) was mapped using remote navigation via a retrograde arterial access in all cases. Arrhythmia mechanisms included macroreentrant atrial tachycardia (MAT) (4), MAT in the pulmonary venous atrium (3), focal AT (5). All initial ablations were carried out using either a solid tip magnetic ablation catheter (6) or an irrigated tip magnetic catheter (4), resulting in termination in 9 pts. Switching to manual ablation did not permit stable access to the target area in 1 pt. Ablation was facilitated by catheter inversion of the magnetic catheter to improve contact and lesion formation. Procedure parameters are summarized in table 1.

Conclusions Remote navigation in conjunction with 3D electroanatomical mapping merged with pre-procedure imaging allowed accurate delineation of the tachycardia substrate in patients with complex congenital heart disease. Permitting successful treatment with low radiation exposure by facilitating access and stable catheter positioning in conventionally difficult to reach atrio-venous compartments. Inversion of the magnetic catheter improves stability and lesion formation.

Table 1.

	Median	Standard deviation
Procedure time (mins)	218	57.7
Fluoroscopy time (mins)	5.7	4.1
Fluoroscopy dose (cGycm ²)	945.2	529
Total RF applications	16	16
F/U (days)	224	105.1

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Summary

- Abstract presented at the American Heart Association 2009 Scientific Sessions on 10 patients with congenital heart disease.
- Atria were accessed via a retrograde approach across both the aortic valve and either the mitral or tricuspid valves to avoid puncturing the intra-atrial baffle.
- Despite having tortuous anatomy, use of magnetic navigation in concert with advanced imaging provides the necessary tools to successfully treat arrhythmias in patients with congenital heart disease.
- Catheter management is unique with magnetic catheters and a specific technique has been developed to increase contact force, stability and lesion formation while using these very soft and safe catheters.
- Procedure times for these kinds of complex anatomical challenges were low.
- Fluoroscopy time and radiation dose were extremely low.
- Magnetic navigation proves to be a useful tool in a series of congenital heart disease patients presenting with complex arrhythmias.