Efficacy and Safety of Cryoablation for AV nodal reentrant tachycardia in Pediatric Patients

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Background:
Atrioventricular nodal reentrant tachycardia (AVNRT) is the second most common type of supraventricular tachycardia in children. Cryoablation has been shown to have excellent safety profile, but it is still thought to have lower efficacy compared to radiofrequency ablation (RFA). Given the small but true risk of AV block with RFA, we have chosen to use cryoablation as the primary modality for the treatment of AVNRT in our center. This study reports our institutional experience with cryoablation of AVNRT.

Methods:
This is a retrospective review of patients 21 years of age or younger with AVNRT who underwent cryoablation between 2008 and 2014 in our center. Three-dimensional mapping using the NavX system with limited fluoroscopy was used for catheter navigation. Cryoablation catheters with 4 (2%), 6 (53%), and 8 mm (45%) tips were used. The slow pathway of the AV node was targeted and acute success was defined as no inducible AVNRT following cryoablation.

Results:
A total of 76 patients underwent cryoablation (mean age 12.7 ± 3.4, range: 4-19, mean weight: 54.8 kg, mean height: 158 cm, mean BSA: 1.6 m^2). Mean fluoroscopy time was 10.5 ± 7.5 minutes (range: 0-35.4). Sixty-six patients had documented narrow complex tachycardia (NCT) prior to the EP procedure. Seventy-two patients had inducible AVNRT during the study and the remaining had dual AV nodal physiology with clinically documented NCT. The slow-fast (typical) AVNRT was found in 81% of the patients, fast-slow or slow-slow (atypical) AVNRT was found in 9.5% and both typical and atypical AVNRT were found in 9.5%. This study focused on those patients who were treated solely with cryoablation, without resorting to radiofrequency ablation. Acute success was achieved in 100% of cases. Forty-seven patients (62%) had complete elimination of the slow pathway, and the remaining (38%) had persistence of the slow pathway, with or without single AV nodal echo beats. Successful ablation location was posteroseptal in 67%, midseptal in 28% and other in 5%. Five patients (6.5%) were found to have additional accessory pathway that was ablated during the procedure. During our first year of cryoablation, we had one patient who developed high degree heart block during cryoablation and underwent placement of a permanent transvenous pacemaker 3 days later. He had spontaneous return of normal AV conduction 5 days later. Otherwise there was no permanent conduction abnormality in any of the patients. Average follow-up time was 13.4 months (range: 1-52). Of the 73 patients with available follow-up, recurrence was seen in 3 (4.1%), all less than 1 year after their initial ablation. No clinical or procedural variables related to recurrence could be identified other than that 2 of our recurrences occurred during the first 2 years of our use of cryoablation. With increased experience, there has only been 1 recurrence in the last 5 years.

Conclusions:
Cryoablation appears to have excellent acute success and very low recurrence rates in the treatment of AVNRT, no different from radiofrequency ablation. Given the excellent safety profile, we believe that it should be the treatment of choice for AVNRT in pediatric patients.