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Is 'less or more' in pediatric cryoablation for atrioventricular nodal reentry tachycardia?

The traditional endpoints to achieve in radiofrequency (RF) ablation of atrioventricular nodal reentry tachycardia (AVNRT) include the absence of inducible AVNRT and to demonstrate no sustained slow pathway conduction. Absence of re-inducibility with or without isoproterenol is the minimum requirement for a successful ablation provided that baseline AVNRT is present. Complete ablation of slow pathway is possibly the ideal endpoint in patients with intact fast pathway anterograde conduction. However, this may entail more extensive ablation of the right inferior input of the AVN at the base of the triangle of Koch, may require to give ablations closed to the compact AVN, and at times to the left inferior input. The tradeoff is an increase risk in AV block. A number of studies [1–3] have suggested that modification of the slow pathway by RF may be an adequate compromise. Thus abolishing 1:1 slow pathway AV conduction (defined as an AH jump of ≥50 ms per 10 ms decrement in atrial pacing cycle length), and at most only one single echo's are considered acceptable endpoints of successful slow pathway modification. These electrophysical properties are considered to represent significant reduction in volume or property of the slow pathway to sustain AVNRT, or other slow pathways that manifest only after elimination of the culprit for clinical AVNRT [1–3]. Whether modification only vs complete slow pathway ablation results in more recurrence remain controversial [1–5], with recurrence rate in the region of 1–5%. A common issue is the risk of AVN block (about 1%), which increase for more extensive ablation. Thus 'less may be more' is often the endpoint used in RF ablation of AVNRT.

This fear of AVN block by RF is largely taken off by using cryoenergy for AVNRT ablation. Cryoablation allows more aggressive ablation and elimination of slow pathway. AVN conduction almost always recover if prompt discontinuation of cryoenergy when AV block or AH prolongation occur. Alternatively, cryomapping by bringing down the temperature to −30 °C, and if no anterograde fast is affected, full cryoablation to −70 °C is continued. A meta-analysis [6] suggests cryoablation and RF ablation of AVNRT have similar acute success rate (96.9 vs 97.8%), but at a higher recurrence rate of 9.7% vs 3.8% (P = 0.003). Persistent AVN block that required pacing occurred in 0% vs 0.75%, respectively. Earlier studies suggest a higher intraprocedural failure rate for cryoablation, thus a waiting time of 30–45 minutes is suggested to obscene for recurrence, and complete elimination of slow pathway is reported to be more effective [7]. A 'more' ablation strategy has been recommended for cryoablation of AVNRT.

This concept is challenged by Dr Dasgupta's article published in this issue of the journal [8]. These authors performed a single center retrospective cohort review in the electrophysiology laboratory at Children's Healthcare of Atlanta, USA on all pediatric cases with typical AVNRT ablation between January 2015andJanuary 2018. They classified patients according to the endpoint achieved: slow pathway modification only (Group A, 19 patients) or complete slow pathway ablation (Group B, 25 patients) after cryoablation. They showed that residual slow pathway conduction manifested only by AH jump and single AVN echo did not affect the clinical success rate at one year, which was high at 100%. This compared well with group B patients after complete selective slow pathway ablation with similar success rate (96%). The key endpoints are the absence of AVNRT re-inducibility (noting only 68.4% and 76.0% had baseline inducible AVNRT) and abolishment of sustained slow pathway conduction on atrial pacing, despite all of them had single recurrent echo beats. There was no AVN block nor complication in their series. No clinical variables that predict failure to achieve complete slow pathway ablation were identified.

The limitations of this study are inherent in any retrospective single center report, with absence of data on operator experience, choice of cryoablation versus RF ablation was not randomized, and small data set. All these have been pointed out by the authors. In addition, some procedural differences such as a waiting time for 60 minutes was introduced in group A, but not in group B. Also, the use of criteria of PR interval > RR interval during incremental atrial pacing as criteria for continued slow pathway conduction instead of the traditional one. Finally, it would be helpful to see how the slow pathway conduction property might have been modified without its complete ablation. Data on the baseline and post cryoablation AVN conduction curves would be helpful. This may show the benefit of cryoenergy slow pathway modification by reducing the extent of AH prolongation, or the prolonged 1:1 slow pathway conduction that alone would be enough to account to the AVN modification success as has been observed in RF ablation [9]. Strictly speaking, the endpoints between Group A and B were not randomized. Rather, it was the strategy that accept modification only despite the intent of complete slow pathway ablation that was tested.

Nevertheless, the current article adds important experience to the endpoints of cryoablation for AVNRT, especially in the pediatric population in whom avoidance of AVN block and its consequence are of major importance. Accepting some of the limitations of being a non-randomized retrospective study, the report shows that accepting the similar endpoints for slow pathway ablation as in RF ablation appeared to be a reasonable compromise between more aggressive approach (and the associated complications) and the success rate. Prior studies [6,7,10] have suggested residual

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dual AVN conduction might increase the risk of AVNRT recurrence after cryoablation. However, in a multi-variable analysis, modification versus complete slow pathway ablation did not influence success rate of AVN ablation using the recently available more powerful 6 or 8 mm cryoablation catheters in adults [11]. Indeed, a recent multicenter US study [12] showed that complete slow pathway ablation could only be achieved in 72% of adult patients despite the use of 'best practice' criteria for cryoablation. They showed a respectable overall 95% acute and 93% 6-month success rates. Striving for complete slow pathway ablation remains the current gold standard in cryoablation, but the clinical circumstance should justify the risk for prolonged and extensive ablation. Accepting 'less' can be a good alternative.

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