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PAEDIATRIC ELECTROPHYSIOLOGY: WHERE DO WE GO TO?

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Abstract

Radiofrequency catheter ablation has become the first-line curative therapeutic modality of symptomatic patients in adults and children. The success rate of the ablation procedure is high and severe complications are uncommon. However, patients with CHD and SVT who undergo RF ablation have diverse anatomic and arrhythmia substrates. Compared to patients with anatomically normal hearts, this special population has a lower acute success rate. We will present our experience over the last decade and will specially focus on the most recent technical developments. In conclusion, radiofrequency catheter ablation recently is a reliable and safe tool. However, further advances in technology will open new indication fields, i.e. the epicardial approach for successful ablation in Brugada patients.

INTRODUCTION

Radiofrequency catheter ablation has become the first-line curative therapeutic modality of symptomatic patients in adults and children. The success rate of the ablation procedure is high and severe complications are uncommon. However, patients with CHD and SVT who undergo RF ablation have diverse anatomic and arrhythmia substrates. Compared to patients with anatomically normal hearts, this special population has a lower acute success rate. We will present our experience over the last decade and will specially focus on the most recent technical developments.

METHODS

The study design was a retrospective cohort study of consecutive children undergoing electrophysiology (EP) studies with or without radiofrequency ablation (RFA) at a tertiary care paediatric cardiology centre during the last decade. Medical records and EP studies data of all patients were reviewed, demographic and procedural variables

retrieved from this data and transferred into case report forms. The study protocol was approved by the local ethics committee (ethics committee of the Medical University of Vienna).

1. RESULTS

1.1 Patient demographic characteristics

A total of 317 children underwent EP study with or without RFA. One-hundred-fifty-nine patients (50.2%) were females, median age at time of EP study was 13.7 years (minimum 0.7; maximum 18.6) and median body weight was 49 kg (11; 105). Two patients were infants, seven patients (2.2%) were between 1 and 5 years, 73 patients between 6 and 10 years (23%), 118 patients (37.2%) between 11 and 14 years, and 117 patients (36.9%) between 15 and 18 years. Twenty-nine patients (9.1%) had congenital heart defects as underlying disease.

1.2 Procedural data

EP studies were performed under general anaesthesia in all patients. Vascular access was achieved via femoral vessels on both sides. Median fluoroscopy time was 12 minutes (1 – 104 min).

1.3 EP-studies results

As most frequent diagnosis, atrio-ventricular re-entry tachycardia (AVRT) was found in 49%, while in another 29%, atrio-ventricular nodal tachycardia (AVNRT) could be documented. Only 4% of EP studies (all of them performed in patients with syncope) were without pathological findings.

1.4 Radiofrequency ablation outcome

Of the 317 study patients undergoing EP studies, RFA was performed in 292 patients (295 diagnoses), while 27 patients (28 diagnosis) underwent EP study only. Radiofrequency ablation was successful in 279 patients (96.2%) for 283 EP diagnoses (95.9%), while in 11 patients (3.8%) with 12 EP diagnoses (4.1%), successful ablation of the arrhythmogenic substrate could not be achieved. Table 1 gives an overview of primary success of RFA.

1.5 Complications of EP studies and RFA

Overall mortality after EP study or RFA was 0%. There were five cases (2.9%) of complications associated with the procedure itself. In one infant of seven months, pericardial haemorrhage occurred during the EP study and surgical drainage of the pericardial effusion was needed. In four patients, vascular complications of the femoral vessels at puncture site occurred (one pseudoaneurysm, three arteriovenous fistulas).

Conclusion

Radiofrequency catheter ablation recently is a reliable and safe tool; however, further advances in technology will open new indication fields, i.e. the epicardial approach for successful ablation in Brugada patients.

Table 1. Primary successful ablation procedures in 292 paediatric patients.

	n	**successful**	**failed**
Total	292	289	3 (1%)
AVRT (Bypass tract)	160	159	1 (0.6%)
AVNRT	92	92	0
VT, VES, Outflowtract-ES/-VT	14	13	1 (7%)
Artial Flutter / - Fibrillation	9	9	0
EAT	7	7	0
PJRT	4	4	0
Mahaim-pathway	4	4	0
Inappropriate ST	2	1	1