Outcomes of Cardioversion of Atrial Tachycardia in Children and Young Adults: A Multicenter Retrospective Study

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Objectives: To describe the outcomes and complications after cardioversion in children with atrial flutter (AFL) and atrial fibrillation (AF).

Methods: Multicenter, retrospective case series of patients aged <25 year who underwent cardioversion between 2000-2020. Cardioversions within 30 days of cardiac surgery were excluded.

Results: There were 324 cardioversions in 219 patients (152 male, 69%) aged 16 [IQR 13, 19] years. Structural heart disease (SHD) was present in 126 (58%) patients, cardiomyopathy in 26 (12%) and channelopathy in 7 (3%). More than half the cases had a prior history of arrhythmia (n=201, 62%), 123 (38%) were on antiarrhythmic medication and 63 (19%) had a pacemaker. Cardioversion was performed for AFL in 199 (61%) and AF in 125 (39%). Type of cardioversion used was electrical (DCCV) in 263 (81%) cases, chemical in 42 (13%), rapid atrial pacing (RAP) in 37 (11%) and EPS with ablation in 8 (2%). Success rate was 96% for DCCV, 43% for RAP and 40% for chemical cardioversion. Agents used for chemical cardioversion included flecainide (n=15), propafenone (n=8), procainamide (n=6), ibutilide (n=6), amiodarone (n=5), Sotalol (n=2) and dofetilide (n=1). Serious complications occurred in 10 (3%) cases. Complications following DCCV included hemodynamically significant bradycardia in 4, ventricular tachycardia in 2 and cardiac arrest in 2. Torsade de pointe and rapidly conducted AFL with hemodynamic instability occurred following chemical cardioversion. Most cases (n=214, 66%) were discharged on antiarrhythmic medication, with new medication in 123 (38%), increase in dose in 16 (5%) and no change in 74 (23%). Recurrence was common in 196 (60%) cases during median follow-up of 34 [IQR 5, 88] months. Patients with AF were more likely to have recurrence than those with AFL (HR 1.4 [95% CI 1.1, 2.1], p=0.01), while there was no difference in recurrence based on the presence of SHD or cardiomyopathy (Figure). EPS was performed in 88 (27%) cases during follow-up, following initial presentation in 25 (8%) patients and after recurrence in 63 (19%).

Conclusion: Cardioversions are highly effective with low risk of complication. Chemical cardioversion can be a safe alternative for children, although with a lower success rate than DCCV. Recurrences are common irrespective of underlying cardiac disease, and consideration should be given to early EPS with ablation.

Recurrence of atrial arrhythmia following cardioversion