# [Different characteristics of postoperative atrial tachyarrhythmias between congenital and non-congenital heart disease.](https://www.ncbi.nlm.nih.gov/pubmed/31197584)

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**Take Home Points:**

* Atrial tachyarrhythmias in ACHD vs. non-ACHD differ with regards to arrhythmia mechanism and substrate.
* Atrial tachyarrhythmias develop at earlier age and following longer duration after cardiac surgery in ACHD patients.

***Comment from Dr. Philip Chang (Gainesville, FL), section editor of Congenital Electrophysiology Journal Watch:*** This study by Kondo et al retrospectively reviewed consecutive adult patients with and without CHD undergoing EP study with catheter ablation for the treatment of drug-refractory atrial tachyarrhythmias. Given a general recognition that atrial arrhythmias differ between CHD and non-CHD adult patients, the authors systematically evaluated arrhythmia substrate and mechanism in CHD and non-CHD cohorts with atrial arrhythmias to further characterize and understand their differences.

The study involved a total of 42 adult patients referred for ablation of drug-refractory atrial tachyarrhythmias in the setting of prior cardiac surgery. Procedures were performed between January 2009 and May 2014. Cohort sizes, types of CHD, and types of non-CHD surgery and cardiac conditions are listed in the table below.



Patients underwent invasive EP testing and catheter ablation with non-irrigated or irrigated catheters and 3D electroanatomic mapping assistance. The authors classified atrial arrhythmias as either cavotricuspid isthmus dependent atrial flutter (AFL), intra-atrial reentrant tachycardia (IART), or focal atrial tachycardia (FAT). Several arrhythmias were classified as Other (including 2 cases of AVNRT and 2 left atrial tachycardias) in the analysis. Arrhythmia evaluation involved determination of (right) atrial chamber surface area, voltage characteristics and distribution (with low voltage defined as <0.5 mV), and activation (and entrainment when feasible) mapping of the arrhythmias. Standard catheter ablation techniques were employed for definitive arrhythmia treatment.

A total of 44 arrhythmias were identified among the 26-patient CHD cohort and 21 arrhythmias in the 16-patient non-CHD cohort. ACHD patients were significantly younger at the time of atrial arrhythmia diagnosis and had longer durations of time between prior surgery and present catheter ablation. Non-ACHD patients had a higher incidence of hospitalization for heart failure. Arrhythmia mechanisms and distribution among the different CHD and non-CHD types are depicted and listed in the figure and table below.





Right atrial surface area was significantly larger in the ACHD cohort (197.1±56.4 cm2 vs. 132.4±41.2 cm2) and area of low voltage was also significantly larger in ACHD patients (40.8±33.3 cm2 vs. 13.6±9 cm2) and frequently involved the posterior right atrium. The ACHD cohort had a higher incidence of multiple tachycardia mechanisms in a single patient, IART, and FAT. Right atrial FAT was only seen in ACHD patients and among these patients, the arrhythmia was mapped most frequently to the posterolateral atrium adjacent to the crista terminalis within low-voltage tissue in the posterior atrium. Cavotricuspid isthmus dependent atrial flutter accounted for nearly 75% of non-ACHD atrial tachyarrhythmias ablated. Acutely successful ablation was achieved in all patients with recurrence in 6/26 ACHD patients and 2/16 non-ACHD patients (23% vs. 12.5%).

The study is limited by small cohort sizes and relatively limited ability to evaluate subgroups of ACHD patients where significant differences and diversity can frequently be found. There was also an under-representation of certain CHD types recognized to have high incidence of atrial arrhythmias and complex arrhythmia substrate (namely, TGA/atrial switch patients and older variants of Fontan palliation). Finally, the authors provided very little information regarding left atrial or pulmonary venous atrial arrhythmias, with primary concentration on the right atrium only. As such, the study is really a more detailed descriptive evaluation of right atrial pathology in ACHD vs. non-ACHD. However, the study does further validate and demonstrate distinct differences in arrhythmia types, distribution, and associated substrate between ACHD and non-ACHD patients. Knowledge of prior surgical history including type, number, and location of surgeries performed is critically important and may even be predictive of type and location of arrhythmias. The posterior right atrial wall is frequently abnormal in ACHD patients with atrial arrhythmias, both as noted in this study as well as from this reviewer’s personal, anecdotal experience. Finally, the study’s authors noted that FAT was absent in their adult TOF patients who did not require pulmonary valve replacement during the follow-up period, which also supports the understanding that ongoing hemodynamic derangements have profound impact on arrhythmias in ACHD. Newer and integrated technologies can further characterize arrhythmia substrates and facilitate ablation performance, with hopefully longer term success.