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REVIEW

Ablation of supraventricular arrhythmias in adult congenital heart disease: A contemporary review

Ablation des arythmies supraventriculaires sur cardiopathie congénitale à l'âge adulte : revue des résultats et des indications actuelles

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Summary Supraventricular arrhythmias are an important and increasing cause of morbidity in adults with congenital heart disease, requiring specific management strategies. Pharmacological treatment has limited efficacy, and is often associated with some side-effects. Major improvements in catheter ablation techniques have opened new opportunities to better understand underlying mechanisms of supraventricular arrhythmias, offer better therapy, and eventually improve symptoms and quality of life in these patients. An array of tools and

Abbreviations: ACHD, adult congenital heart disease; AF, atrial fibrillation; AP, accessory pathway; CHD, congenital heart disease; IART, intra-atrial reentrant tachycardia; SVA, supraventricular arrhythmia.

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techniques are necessary to access relevant anatomical areas to address the arrhythmogenic substrate. The mechanism of these arrhythmias is mostly related to macroreentry around surgical scars or cavotricuspid isthmus-dependent flutter. The efficacy of catheter ablation is mainly dependent on the underlying congenital heart condition, with the most complex cases typically being associated with atrial switch and Fontan surgeries. Although relatively high rates of recurrence are seen after a single procedure, additional attempts are often helpful to decrease recurrences and improve symptoms. Catheter ablation in such patients continues to present many unique challenges that are best addressed by experienced multidisciplinary teams, at centres equipped with the proper catheters, imaging capabilities, mapping systems and support staff needed to maximize safety and success. Consensus indications have emerged that often support ablation as first-line therapy in these patients. In this comprehensive review, we aim to describe the specific issues associated with ablation of supraventricular arrhythmias in adult congenital heart disease, assess the results in contemporary practice and, finally, review the current indications.

MOTS CLÉS
Ablation par cathéter ;
Tachycardie ;
Supraventriculaire ;
Cardiopathie congénitale

Résumé Les arythmies supraventriculaires sont une cause importante et croissante de morbidité chez les adultes porteurs d'une cardiopathie congénitale. Elles nécessitent une prise en charge spécifique. Le traitement médical a une efficacité limitée et reste associé à des effets secondaires significatifs. Les progrès majeurs de l'ablation par cathéters apportent de nouvelles données sur les mécanismes de ces arythmies, permettent de les traiter en améliorant les symptômes et la qualité de vie. Le mécanisme est le plus souvent une macroréentrée dépendante de l'isthme cavo-tricuspidien ou d'une large cicatrice. L'efficacité de l'ablation par cathéter est dépendante de la cardiopathie sous-jacente. Les cas les plus complexes sont représentés par les switch atriaux et les chirurgies de Fontan. Malgré des récidives après une première procédure, des reprises peuvent être proposées pour améliorer le succès à long terme et les symptômes. L'ablation des arythmies supraventriculaires chez ces patients comporte beaucoup de challenges et spécificités. Elle sera au mieux réalisée par des équipes multidisciplinaires expérimentées, dans des centres équipés des différentes modalités d'imagerie et de cartographie avec différents types de cathéters disponibles afin de diminuer le risque de complication et d'améliorer les résultats. Des indications consensuelles ont été proposées, positionnant souvent l'ablation en première intention chez ces patients. Nous décrirons dans cette revue les particularités de l'ablation des tachycardies supraventriculaires chez les adultes porteurs de cardiopathie congénitale, les résultats actuels et les indications retenues.

Background

The prevalence of adults with congenital heart disease (CHD) has been increasing continuously over the past decades, with improved surgical and interventional procedures leading to better survival. Nowadays, adults with complex CHD account for 60% of all patients with CHD [1]. Nevertheless, even in simple CHD, life expectancy remains lower than in the general population.

Arrhythmias, including supraventricular arrhythmias (SVAs), form an important component in the care of adult CHD (ACHD). Even by 2009, data from the USA had indicated that SVAs occur in 15% of adults with CHD. Furthermore, the prevalence of SVA increases with age, and > 50% of patients with severe CHD who reach the age of 18 years go on to develop atrial arrhythmias by the age of 65 years [2]. SVA incidence and type are dependent on the underlying CHD (Table 1). SVAs are associated with a near 50% increase in mortality. The risk of stroke and heart failure is twice as high as in an age/sex-matched general population. Arrhythmias are also the main cause of emergency admissions [3]. The relationship between SVA and sudden death has been well demonstrated in Wolff-Parkinson-White syndrome [4]. SVAs may rapidly provoke poor haemodynamics in ACHD, as in transposition of the great arteries and atrial switch. SVAs with relatively slow cycle lengths can be conducted to the ventricle in a 1:1 fashion with poor tolerance [5]. The occurrence of SVAs is favoured by surgical atrial scar, pressure or volume overload of cardiac chambers, accessory atrioventricular pathways or dual/atrioventricular node physiology. Mostly, they are related to intra-atrial reentrant tachycardia (IART) around surgical scars or natural anatomical barriers, such as cavotricuspid isthmus-dependent flutter. The incidence of atrial

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