

National Registry of Catheter Ablation 2010

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ABSTRACT

Background

Catheter ablation of arrhythmogenic substrates and circuits is a common procedure in current medical practice. The National Registry of Catheter Ablation 2010 was carried out in cardiac electrophysiology centers from the Autonomous City of Buenos Aires and Argentine provinces, coordinated by members of the Arrhythmia Committees of the Argentine Society of Cardiology and the Argentine Federation of Cardiology. Its participation was free and anonymous.

Objective

To know the number of catheter ablation procedures, treated arrhythmogenic substrates, outcomes and complications, using the information provided by participants during the study period.

Methods

A retrospective registry of the procedures was carried out from January 1 to December 31, 2010 with the participation of 24 centers. A database was developed, and once completed by participants, it was unified into a unique central database. Patients and centers were assigned number codes to ensure data anonymity.

Results

Twenty-four centers reported 1500 ablation procedures in 1460 patients. All patients were treated with radiofrequency. The most common substrates approached were atrioventricular nodal reentrant tachycardia (25%), and accessory bundles (25%), atrial flutter (18%) and atrial fibrillation (16%). Overall success rate at the end of the procedures was 93.8%, and complications were present in 2.2% of the procedures. The most common complications were those related to vascular access (0.7%). A single death was recorded, due to pulmonary thromboembolism.

Conclusions

This third Argentine registry on catheter ablation provides important and useful information, and shows an adequate immediate success rate, similar to those reported by previous national registries, with low incidence of morbidity and mortality rates. Therefore, in Argentina, this medical practice maintains similar efficacy and safety levels compared to other publications.

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Key words

> Registry - Electrophysiology - Catheter ablation

Abbreviations

>	TIA	Transient ischemic attack	AHF	Acute heart failure
	AV	Atrioventricular	SAC	Argentine Society of Cardiology
	CABA	Autonomous City of Buenos Aires	VT	Ventricular tachycardia
	FAC	Argentine Federation of Cardiology		

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INTRODUCTION

Catheter ablation is a procedure that has proved to be efficient and safe to treat many cardiac arrhythmias (1-12). However, it is still underused in daily practice. (13) There are recent data about the efficacy and safety of this technique in our country, obtained from registries made independently by the Argentine Federation of Cardiology (FAC) and the Argentine Society of Cardiology (SAC). (14-15) The first joint registry, coordinated by the Electrophysiology, Electrocardiography, Arrhythmia and Pacing Committee of the SAC and the Arrhythmia Committee of the FAC, was conducted to acquire representative data of the results of this procedure in our country.

METHODS

Electrophysiology centers throughout Argentina were invited to voluntarily participate in the study. Each center retrospectively added the data of ablation procedures conducted from January 1 to December 31, 2010, in an off-line database (Microsoft Access®).

The treated substrates were typical and atypical atrial flutter, right and left ventricular extrasystoles, atrial fibrillation, manifest and concealed anteroseptal, mid-septal, posteroseptal accessory bundles of the left and right free wall, typical and atypical atrioventricular nodal reentrant tachycardia, focal atrial tachycardia, right and left idiopathic ventricular tachycardia (VT), post-myocardial infarction VT, reentrant VT between branches and reentrant VT in other heart diseases. The procedure was considered successful when the substrate was removed and/or post-ablation arrhythmia was not inducible, and for atrial fibrillation, the electrical isolation of the pulmonary veins.

Complications included atrioventricular (AV) block (with and without permanent pacemaker implantation), vascular complications related to the access (hematoma, fistula, thrombosis, thrombophlebitis, pseudoaneurysm, pericardial effusion, cardiac tamponade, acute pericarditis, pleural effusion, pneumothorax, ischemia/myocardial infarction, heart failure/acute pulmonary edema, transient ischemic attack (TIA) and permanent stroke, peripheral embolism, death, and other complications.

Data related to the infrastructure of the center and technical and human resources used in the procedures were also analyzed.

Once completed, the databases were emailed to the Registry Coordination, which finally included the data in a single database, assigning a code to each center and patient to ensure anonymity during the analysis. Data were expressed as percentage for the categorical variables and as mean or median for continuous variables.

RESULTS

Characteristics of the participating centers

Twenty four centers from 9 provinces (see Appendix) participated in the study, 38% of which (9 centers) were located in the city of Buenos Aires (CABA), 8% (2 centers) in cities from the province of Buenos Aires near CABA (Greater Buenos Aires), and the remaining 54% in locations from the interior of the country. All the centers were private institutions. Of the 19 centers providing information, 3 (16%) had fewer than

50 inpatient beds, 8 (42%) had between 50 and 100, 3 (16%) had between 100 and 200, and 4 (26%) had more than 200. Only 1 out of 21 centers (5%) did not have cardiovascular surgery. Sixty-two percent of the centers (13/21) had a cardiology fellowship program.

The total sum of inhabitants of the cities where the 24 centers were located was 8,279,445 (21% of the total population of Argentina). The cities had a minimum of 90,305 inhabitants and a maximum of 2,891,082, with an average number of inhabitants per center of 344,977.

Infrastructure and technical resources

Twenty one percent of the centers (5/24) had a 3D navigator and only 1 had intracardiac echocardiography. None of them had a cryoablation system. Twenty nine percent of the centers (7/24) offered professional training programs (fellowships). Of the 17 centers that provided the information, 5 (29%) had their own electrophysiology room, 10 (59%) performed the procedures in catheterization labs and 2 (12%) in the operating room.

Human resources

The total number of procedures was 1500, with an average of 65, a median of 25, a minimum of 2 and a maximum of 312 per center. However, since many centers had the same human resources (the electrophysiologists), when the number of procedures was analyzed in relation to them -and not to the center-, the average was 115 procedures per year, the median 74, the minimum 25 and the maximum 312. Ninety-seven percent (1460) corresponded to single procedures on individual patients, whereas more than one procedure (3% of total) was performed on 40 patients, either due to previous failure or recurrence during the registry period. Radiofrequency was the energy used in all cases.

Results, substrates and arrhythmogenic circuits

Overall and immediate success rate in the electrophysiology room was 93.8%.

The most frequent substrates approached were AV nodal reentrant tachycardia (25%) and accessory bundles (25%), followed by atrial flutter (18%) and atrial fibrillation (16%) (Figure 1). Figure 2 shows the location of the accessory bundles.

The success of the procedure varied depending on the substrate. Figure 3 shows the success rate of the procedure in substrates grouped by type of clinical arrhythmia.

Complications

Complications were observed in 2.2% of the procedures (Table 1).

The substrate with the highest rate of complications was idiopathic left VT (pseudoaneurysm in 2/13 patients) (15.4%), followed by left ventricular extrasystoles (acute heart failure (AHF) in 1/10 patients)

Fig. 1. Distribution of the most commonly ablated substrates
 AFI: Typical and atypical atrial flutter. AF: Atrial fibrillation.
 Accessory bundle: Manifest and concealed accessory bundles, of the left and right anteroseptal, mid-septal and posteroseptal free walls. AV node: Atrioventricular node. AVNRT: Typical and atypical atrioventricular nodal reentrant tachycardia. AT: Atrial tachycardia. VT in heart diseases: Ventricular tachycardia in heart diseases. Idiopathic VT: Idiopathic right and left ventricular tachycardia.

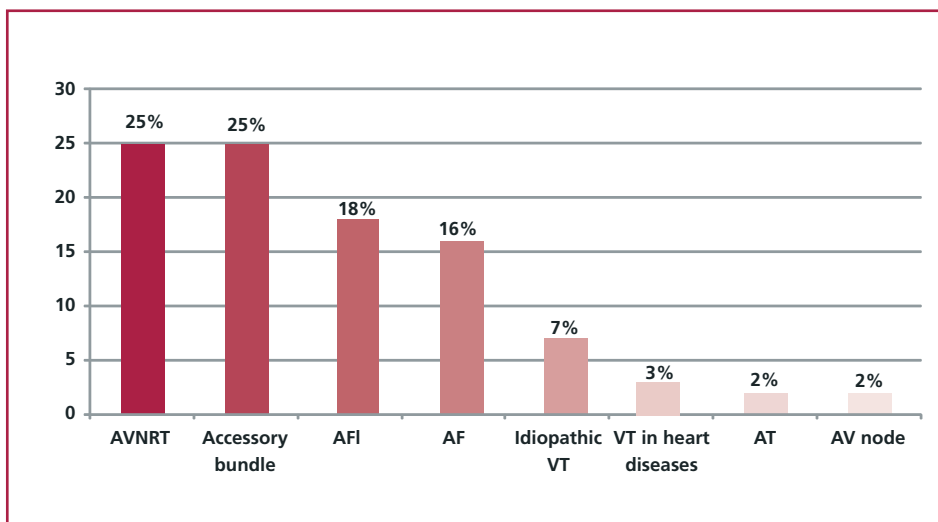


Fig. 2. Percentages of the different locations of accessory bundles.

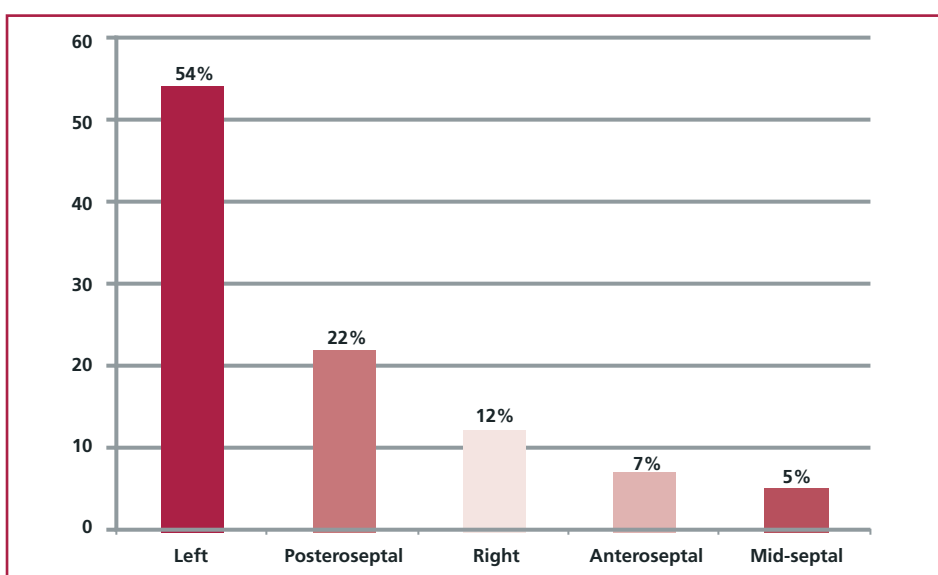
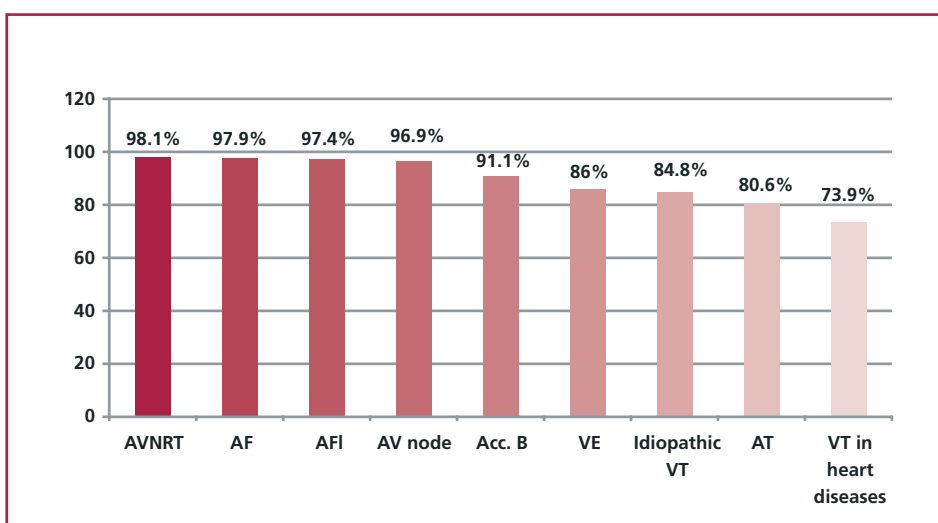


Fig. 3. Percentage of procedure success by substrate. AFI: Typical and atypical atrial flutter. VE: Ventricular extrasystole AF: Atrial fibrillation. Acc. B: Manifest and concealed accessory bundles, of the left and right anteroseptal, mid-septal and posteroseptal free walls, AV Node: Atrioventricular node. AVNRT: Typical and atypical atrioventricular nodal reentrant tachycardia. AT: Atrial tachycardia. VT in heart diseases: Ventricular tachycardia in heart diseases. Idiopathic VT: Idiopathic right and left ventricular tachycardia.



Substrates	Procedures		Success		Complications	
		≠	%	≠	%	
ATYPICAL AFI	27	22	81.5	0		
TYPICAL AFI	247	245	99.2	7	2.8	
RVES	39	36	92.3	0		
LVES	10	8	80	1	10	
AF	235	230	97.9	13	5.5	
Anteroseptal AB	0					
Right AB	10	9	90	0		
Left AB	82	81	98.8	1	1.2	
Mid-septal AB	3	3	100	0		
Posteroseptal AB	16	15	93.8	0		
AV Node	32	31	96.9	0		
Atypical AVNRT	23	21	91.3	0		
Typical AVNRT	352	347	98.6	3	0.9	
AT	67	54	80.6	1	1.5	
VT with heart disease	20	13	65	0		
RV idiopathic VT	37	28	75.7	0		
LV idiopathic VT	13	12	92.3	2	15.4	
Post-AMI VT	25	20	80	2	8	
Branch-branch VT	1	1	100	0		
Anteroseptal WPW	26	19	73.1	0		
Right WPW	36	29	80.6	0		
Left WPW	117	110	94	2	1.7	
Mid-septal WPW	17	12	70.6	0		
Posteroseptal WPW	65	61	93.8	1	1.5	
Total	1500	1407	93.8	33	2.2	

Table 1. Success rate and substrate-based complications

Atypical AFI: Atypical atrial flutter. Typical AFI: Typical atrial flutter. RVES: Right ventricular extrasystoles. LVES Left ventricular extrasystoles. AF: Atrial fibrillation. Anteroseptal AB: Concealed anteroseptal accessory bundle. Right AB: Concealed accessory bundle of the right free wall. Left AB: Concealed accessory bundle of the left free wall. Mid-septal AB: Concealed mid-septal accessory bundle. Posteroseptal AB: Concealed posteroseptal accessory bundle. AV Node: Atrioventricular node. Atypical AVNRT: Atypical atrioventricular nodal reentrant tachycardia. Typical AVNRT: Typical atrioventricular nodal reentrant tachycardia. AT: Focal atrial tachycardia. VT with heart disease: Ventricular tachycardia in other heart diseases. RV idiopathic VT: Idiopathic right ventricular tachycardia. LV idiopathic VT: Idiopathic left ventricular tachycardia. Post-AMI VT: Ventricular tachycardia post myocardial infarction. Branch-branch VT: Reentrant ventricular tachycardia between branches. Anteroseptal WPW: Manifest anteroseptal accessory bundle. Right WPW: Manifest accessory bundle of the right free wall. Left WPW: Manifest accessory bundle of the left free wall. Mid-septal WPW: Manifest mid-septal accessory bundle. Posteroseptal WPW: Manifest posteroseptal accessory bundle.

(10%), VT in patients with coronary heart disease (2/20 patients, 1 with TIA and 1 with AHF) (8%), atrial fibrillation (15/235 patients, 6 with cardiac tamponade, 6 with TIA, 1 with pericardial effusion, 1 with STEMI, and 1 with phrenic paralysis) (5.5%), manifest left accessory bundles (1.7%), manifest posteroseptal accessory bundles (1.5%), focal atrial tachycardia (1.5%), left concealed accessory bundles (1.2%), and typical AV nodal reentrant tachycardia (0.9%). There were no complications in the rest of the substrates. The most common complication was related to vascular access (0.7%), followed by cardiac tamponade (0.4%), TIA (0.3%), no pacemaker-dependent atrioventricular block (0.13%), atrioventricular block requiring per-

manent pacemaker implantation (0.13%), heart failure (0.13%), pericardial effusion (0.07%), pleural effusion (0.07%), stroke (0.07%) and peripheral embolism (0.07%). There was no pericarditis, pneumothorax or acute myocardial infarction/myocardial ischemia. A common atrial flutter ablation-related death was reported due to massive pulmonary thromboembolism in a patient with congenital heart disease (tetralogy of Fallot).

DISCUSSION

Data from registries made in other countries during the last 10 years and recent data from our country show that ablation is an effective and safe procedure.

(14-27) This registry has its own limitations, common to this type of studies representing an incomplete sample of a clinical situation, but they are compensated by surveying a significant number of cases from the real world. Although the number of centers participating in this registry was higher than in previous ones, the number of procedures was similar and the number of provinces represented was lower. Similarly to prior registries, only private centers participated. Data about this practice in the public health care system are unknown.

The number of procedures per center is heterogeneous, with centers performing very few ablation procedures per year. However, as observed in this registry, it is common for the same electrophysiologist or group of electrophysiologists to perform procedures in different centers. This could explain the similar results when centers with low and high volume of procedures per year are compared.

Regarding the substrates, the distribution remains similar to former registries and to that observed in other registries. The four most commonly treated substrates are still AV nodal reentrant tachycardia and accessory bundles, followed by atrial flutter and atrial fibrillation.

The success of the procedure is still very high, with rates similar to those reported previously.

Regarding complications, it is worth noting a significant reduction in the overall rate, most likely associated with the decrease observed in the fourth most commonly treated substrate, atrial fibrillation. However, the rate of complications for ablation procedures targeting idiopathic ventricular arrhythmias was high. This high prevalence is associated with the expression in relative individual percentages and with the small number of procedures included in this substrate. The prevalence of mortality in this registry (0.06%) is similar to that in the last 11 Spanish registries (0.05%), (16-27) in which 35 deaths were reported, associated to 72,379 procedures performed between 2001 and 2011, with the lowest annual prevalence (0.02%) in 2006 and the highest (0.11%) in 2003. Substrate-related mortality included the most complex substrates -as atrial fibrillation and ventricular tachycardia in patients with heart disease- as well as nodal reentrant tachycardia, accessory bundles, atrial flutter, focal atrial tachycardia and AV node. Thrombotic phenomena (pulmonary thromboembolism, stroke, coronary artery occlusion) and cardiac tamponade were some of the preceding complications.

CONCLUSIONS

In Argentina, the ablation procedure of the most commonly treated arrhythmias (intranodal reentrant tachycardia, accessory bundles and atrial flutter) remains highly efficient and safe, similar to other registries, while ablation of atrial fibrillation, compared to previous data, showed a significant improvement of results and a lower rate of complications.

RESUMEN

Registro Nacional de Ablación por Catéter 2010

Introducción y objetivos

La ablación con catéter de sustratos y circuitos arritmogénicos es un procedimiento habitual en la práctica médica actual. El Registro Nacional de Ablación con Catéter 2010 se realizó con centros de electrofisiología cardíaca de la Ciudad Autónoma de Buenos Aires y provincias de la Argentina, coordinado por representantes de los Comités de Arritmias de la Sociedad Argentina de Cardiología y de la Federación Argentina de Cardiología, con participación libre y anónima.

Objetivo

Conocer el número de procedimientos de ablación con catéter, sustratos arritmogénicos tratados, resultados y complicaciones a través de la información suministrada por los participantes durante el período estudiado.

Material y métodos

Se realizó un registro retrospectivo de los procedimientos desde 1 de enero al 31 de diciembre de 2010, en el que participaron 24 centros. Se elaboró una base de datos que, una vez completada por los participantes, se unificó en una sola base central. Se asignaron códigos numéricos a los pacientes y los centros para garantizar el anonimato de los datos.

Resultados

Los 24 centros comunicaron 1.500 procedimientos de ablación en 1.460 pacientes. Todos los pacientes fueron tratados con radiofrecuencia. Los sustratos más frecuentemente tratados fueron: taquicardia por reentrada nodal auriculoventricular (25%), haces accesorios (25%), aleteo auricular (18%) y fibrilación auricular (16%). El éxito global fue del 93,8% y se observaron complicaciones en el 2,2% de los procedimientos. Las complicaciones más frecuentes fueron las relacionadas con el acceso vascular (0,7%). Se comunicó una muerte por tromboembolia pulmonar.

Conclusiones

Este tercer registro argentino sobre ablación con catéter brinda información importante y útil. Muestra una tasa de éxito inmediato adecuada, similar a lo comunicado en otros registros nacionales previos, con una tasa de morbimortalidad baja, por lo que esta práctica médica mantiene en la Argentina niveles de eficacia y seguridad semejantes a lo referido en otras publicaciones.

Palabras clave > Registro - Electrofisiología - Ablación por catéter

Conflicts of interest

None declared.

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