

Case Report

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Right Atrial Appendage Tachycardia: Ablation should be the First Approach?

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ABSTRACT

A 64-year-old female patient with symptomatic premature atrial contraction (PAC) and atrial tachycardia (AT) referred for EPS (electrophysiologic study) and ablation. EPS and successful ablation were performed guided by a 3D activation mapping system NavX (St. Jude Medical, St. Paul, MN, USA) with complete resolution of symptoms and arrhythmia. Site of origin (SOO) was right atrial appendage (RAA).

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Introduction

Focal atrial tachycardias (AT) usually originate at specific anatomic locations in the atria. The right atrial appendage (RAA) is defined as the pectinate anterior region of the right atrium, extending from the posterior of the crista terminalis to the anterior of the triangulated component. Previous studies have identified the RAA as a rare site of focal AT [1,2]. The commonest foci of AT originating in the right atrium are crista terminalis, tricuspid annulus, the para-hisian region, and coronary sinus ostium. Mitral annulus, pulmonary veins and left atrial appendage are the most common locations of AT originating in the left atrium as illustrated at figure 1. Mapping and ablation techniques are the gold standard for location and treatment of AT [3,4].

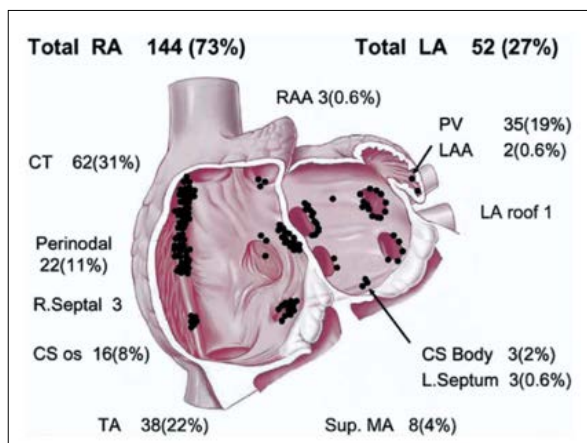


Figure 1: Common sites of origin (SOO) of focal atrial tachycardias. RAA=Right atrial appendage; LAA=left atrial appendage; CT=crista terminalis; CS=coronary sinus; PV=Pulmonary vein; TA: tricuspid annulus

Case Report

We reported a 64 female patient followed because hypertension and dyslipidemia treated with statin and hydrochlorothiazide. Her weight was 56Kg and 1,60m height and were asymptomatic until 6 months ago when started symptoms of palpitations and tachycardia. Electrocardiogram detected frequent premature atrial contraction (PAC) showing P wave morphology very similar to sinus P wave, therefore suggesting RA origin of arrhythmia. (Figure 2).

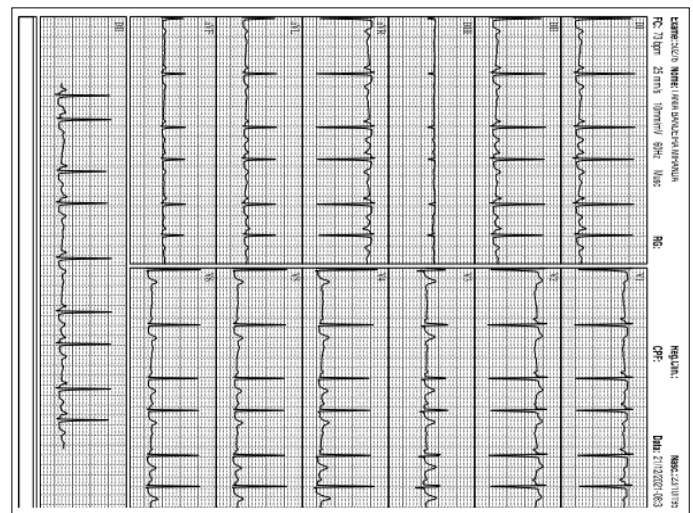


Figure 2: ECG showing PAC with P wave morphology very similar to Sinus P Wave

After the result of 24 hours Holter, 27.601 (29%) PAC and 130 AT episodes were detected and propafenone were initiated but the patient do not tolerate because side effects. Propafenone was replaced for bisoprolol and 24h Holter repeated. New Holter with beta blocker showed 29.286 (34%) PAC and 149 AT episodes (Figure 3).

Totais:		Frequência Cardíaca:	
Duração (h):	22:12	Min:	39 bpm às 05:38:40
Nº Total de QRS's:	85.443	Média:	65 bpm
Ectópicos Ventriculares:	1.317 (2%)	Máx:	104 bpm às 12:14:06
Ectópicos Supraventriculares:	29.286 (34%)	F.C. >= 120 bpm não evidenciada	
Artefatos (%):	<1	F.C. <= 50 bpm durante	00:42:26 h
Arritmias Ventriculares:			
1.317 Isoladas, das quais		Pausas	
0 em 0 episódios de Bigeminismo		0 Pausas (>= 2,0 s.)	
0 Episódios em Pares			
0 Taquicardias			
Arritmias Supraventriculares:			
28.224 Isoladas		Depressão do ST	
278 Pareadas		C1:	0 episódios
149 Taquicardias		C2:	0 episódios
		C3:	0 episódios
		Elevação do ST	
Maior:	8 bat., 115 bpm às 23:15:32	C1:	0 episódios
Mais rápida:	3 bat., 139 bpm às 22:37:27	C2:	0 episódios
Mais lenta:	3 bat., 86 bpm às 23:14:39	C3:	0 episódios

Figure 3: Holter with beta blocker before ablation. High burden premature atrial contraction (PAC) and atrial tachycardia (AT). PAC = 29.286 (34%) and 149 AT episodes

Stress echocardiogram was normal and sleep apnea was ruled out with appropriate exams. She had autoimmune gastritis as another relevant comorbidities.

Therefore, in face of unsuccessful pharmacologic treatment of a symptomatic frequent atrial ectopy and tachycardia, we decided for ablation catheter supported by 3D electroanatomical mapping.

Activation 3D Mapping and Radiofrequency Ablation

Catheter ablation was performed under general anesthesia, guided by an anesthesiologist. Three catheters were positioned within the coronary sinus (CS), right atrium (RA) and left atrium (LA) through three punctures via the femoral vein and a transeptal puncture. Our aim was to search for the earliest activation point during PAC guided by circular and contact-force catheters using a 3D electroanatomic mapping system. Figure 4 and 5 shows a 3D electroanatomic mapping system NAVX Ensite – Abbott company.

We decided to delivery RF applications at the earliest site of activation and adjacent region at posterior surface at right superior pulmonary vein because the chance of recurrence due to exit change of activation.

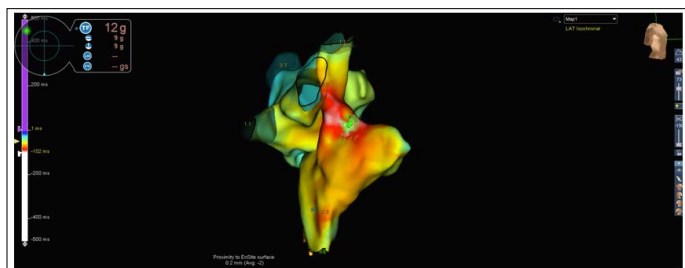


Figure 4: PAC activation mapping showing site of origin at the basal portion of RAA. The colors represent a wavefront activation in both atria during the premature atrial contraction. White area represents the earliest site and green/purple area represents the latest site of electrical activation (represented by a left color bar). The activation is centrifugal as showed at the earliest site of origin spreading through the atrium. Catheter during mapping and ablation with 12g contact force. RAO projection.

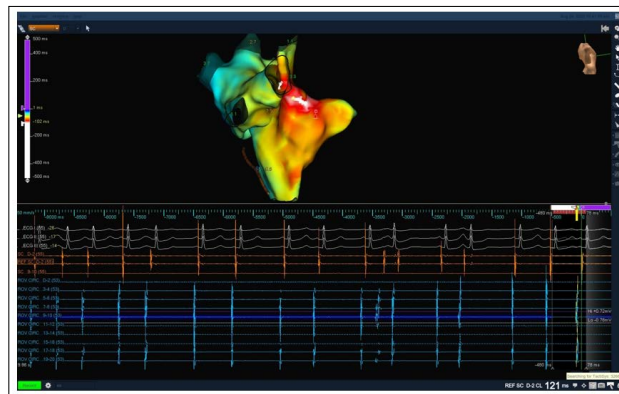


Figure 5: White tags showing RF applications. Frequent PAC sometimes with different coupling intervals

Follow Up

After one year follow up off drugs, patient had no more symptoms and arrhythmia was eliminated. Holter one year after ablation was nearly normal (Figure 6).

Totais:		Frequência Cardíaca:	
Duração (h):	20:14	Min:	53 bpm às 22:14:01
Nº Total de QRS's:	82.326	Média:	69 bpm
Ectópicos Ventriculares:	0 (0%)	Máx:	107 bpm às 12:45:45
Ectópicos Supraventriculares:	89 (<1%)	F.C. >= 120 bpm não evidenciada	
Artefatos (%):	<1	F.C. <= 50 bpm não evidenciada	
Arritmias Ventriculares:			
0 Isoladas, das quais		Pausas	
0 em 0 episódios de Bigeminismo		0 Pausas (>= 2,0 s.)	
0 Episódios em Pares			
0 Taquicardias			
Arritmias Supraventriculares:			
73 Isoladas		Depressão do ST	
5 Pareadas		C1:	0 episódios
1 Taquicardias		C2:	0 episódios
		C3:	0 episódios
		Elevação do ST	
Maior:	6 bat., 162 bpm às 15:00:26	C1:	0 episódios
Mais rápida:	6 bat., 162 bpm às 15:00:26	C2:	0 episódios
Mais lenta:	6 bat., 162 bpm às 15:00:26	C3:	0 episódios

Figure 6: Holter off drugs 1 year after ablation

Discussion

Right atrial appendage tachycardia (RAAT) represents not only a particular anatomic origin of AT but also a group of tachycardias with specific clinical, ECG, and EP characteristics. Compared with other AT, RAAT were more likely to be present in younger male patients and are more frequently incessant. Electrophysiologic characteristics included a greater proportion of successful ablations and a lower incidence of recurrence [1].

The geometry of the RAA may be related to the better ablation efficacy since it is conducive to a stable and firm ablation catheter contact. This better ablation efficacy may also be related to the incessant nature of RAAT, since inconsistent inducibility is a well known limitation of ablation in AT. In contrast, trabeculation of the RAA may be involved in the inadequate power delivery of conventional ablation catheters and the need of irrigated ones. However, such a high use of irrigated catheters could also be involved with a higher success ablation rate in RAAT group. On the other hand, the absence of manifest structural atrial disease in all patients may also be an important explanatory factor in the low recurrence rate over long term follow-up. [1-3].

Freixa et al, reported from a total of 186 patients with focal AT, 15 patients (8%) presented AT originating in the triangulated portion of the RAA. Thus, a total of 171 (92%) focal AT originating outside the RAA were collected [2].

P wave morphology is a useful guide for the localization of focal AT. Usually, a negative P wave in lead V1, with the majority also having low amplitude positive P waves in the inferior leads. While this morphology was characteristic of AT from the RAA, it is not exclusive to this region. AT arising from the tricuspid annulus and the low crista terminalis show a similar morphology in lead V1, although P waves from the low crista terminalis tend to have negative P waves in the inferior leads [4].

Activation 3D mapping is crucial to a good localization of the precise site of origin as well as understanding de mechanism of arrhythmia. This patient had a centrifugal activation spreading the wavefront suggesting an automaticity or triggered activity mechanism.

Because the low recurrence rate of this type of arrhythmia and the very low risk of complications of ablation, a first line approach should be considered, mainly in patients without structural cardiopathy. Besides, pharmacologic treatment was ineffective.

Conclusion

Right atrial appendage tachycardia is an uncommon form of focal AT which ECG pattern can be used to identify it. Electroanatomic 3D activation map is crucial to precise localization of the site of origin and effective treatment with very low recurrence rate.

References

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