



Successful ablation of anomalous posteroseptal accessory pathway associated to coronary sinus diverticulum

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ABSTRACT

Coronary sinus diverticulum is a congenital anomaly that is found in 7-11% of patients carriers of posteroseptal accessory pathway.

We report the case of a 40-year-old woman admitted into our service with an episode of atrial fibrillation with severe hemodynamic compromise. After successful electrical cardioversion, 12-lead electrocardiogram showed the presence of posteroseptal accessory pathway. After failed attempt of endocardial ablation by retrograde aortic access, a second approach was tried directly through the coronary sinus access. Venography revealed the presence of a large diverticulum near the ostium and the accessory pathway was ablated successfully in the neck of it, where electrogram with continuous electrical activity was recorded, presenting a potential expressing the myocardial extension within the coronary sinus.

Key words: Epicardial accessory pathway. Coronary sinus diverticulum, Wolff-Parkinson-White Syndrome.

INTRODUCTION

Radiofrequency catheter ablation (RFCA) constitutes the treatment of choice in patients with preexcited atrial fibrillation (AF) or with recurrent paroxysmal tachycardias related to concealed or manifest accessory pathways (AP), in spite of pharmacological treatment, with a rate of success of approximately 95% [1].

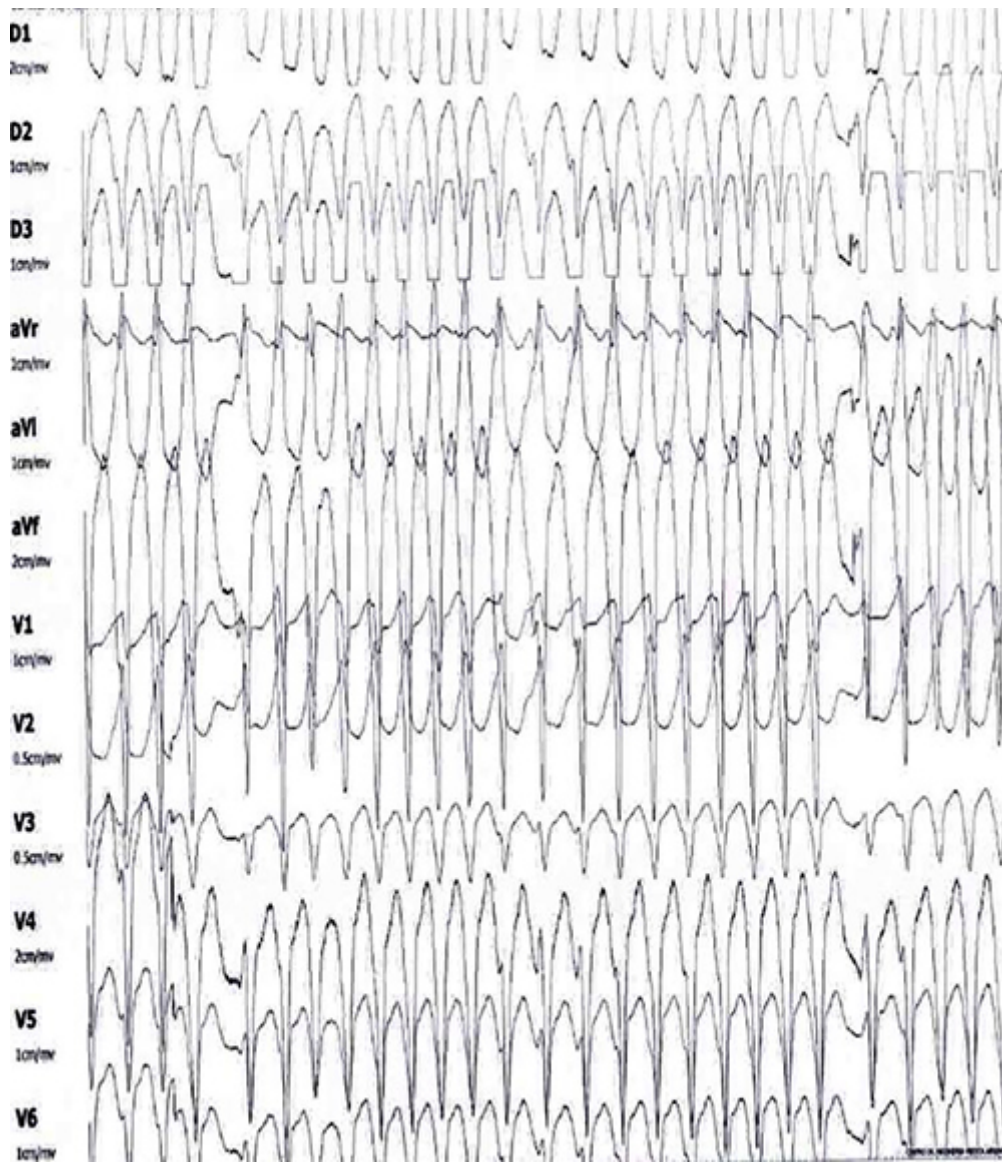
Posteroseptal AP (PSAP) may often be successfully approached by right endocardial access in the PS region of the tricuspid annulus, but in some cases they may have an epicardial location with a high rate of failure during ablation attempts because of the complex anatomical configuration of this region [2].

We report the case of PSAP successfully ablated in the neck of a diverticulum, characterized by coronary sinus venography.

CLINICAL CASE

Forty-year-old woman, admitted into the ER due to preexcited AF with severe hemodynamic compromise (**Figure 1**).

Figure 1. Electrocardiogram during atrial defibrillation episode with minimum preexcited RR interval of 180 ms.



Electrical cardioversion was conducted immediately, being successful and verifying during sinus rhythm, the presence of AP that according to the used algorithms, had an epicardial posteroseptal (PS) location (**Figure 2**).

Figure 2. Electrocardiogram in sinus rhythm, showing the presence of epicardial posteroseptal accessory pathway.

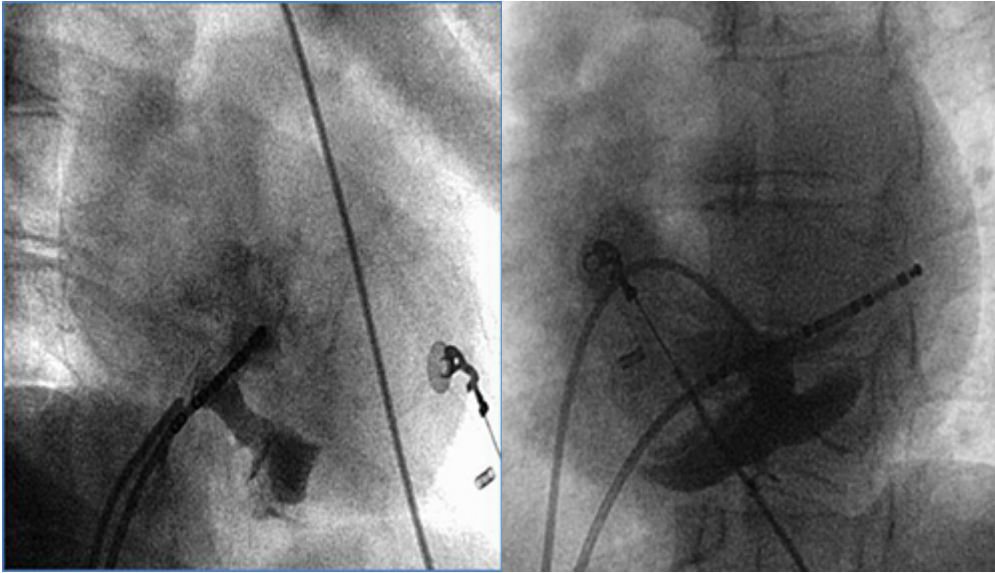


She did not present remarkable pathological history and tests ruled out the presence of structural heart disease.

Under the informed consent, an attempt of ablation by catheter with radiofrequency (RF) was made, using an endocardial approach by retrograde aortic access, which was inefficient.

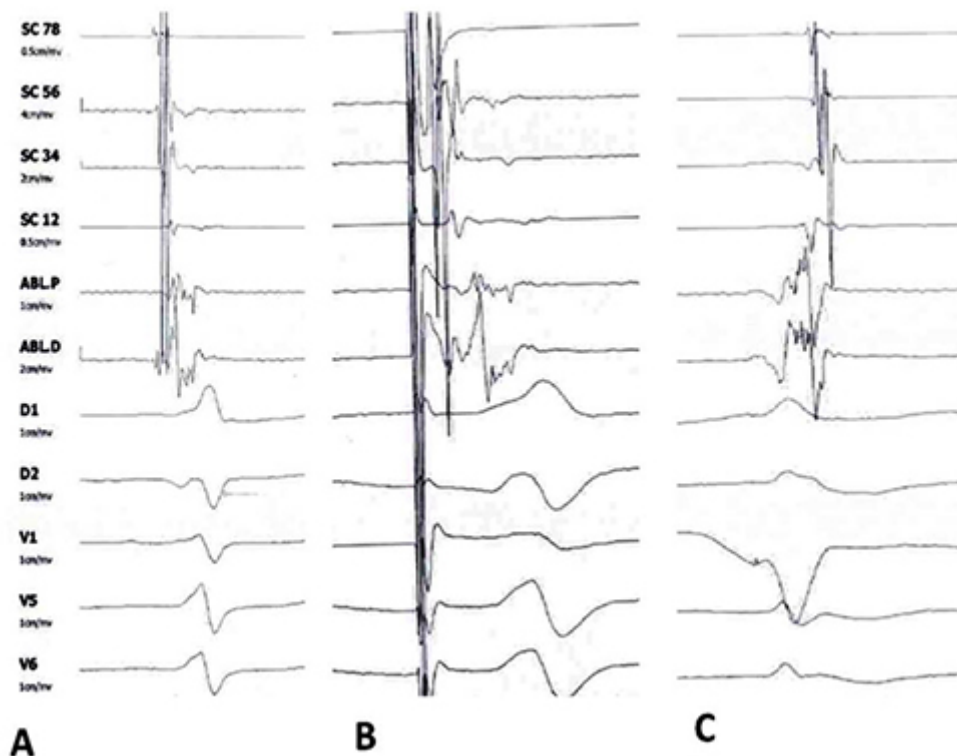
Before the assumption of an epicardial pathway, a second attempt of RF ablation was made, using an access through the coronary sinus. Venography showed the presence of very large saccular diverticulum, with a narrow neck inserted within the proximal portion, close to the ostium (**Figure 3**).

Figure 3. CS venography in LAO and RAO projection, where saccular diverticulum is observed in the proximal region near the ostium.



Quadripolar 4-mm catheter with irrigated tip for mapping was introduced for an ablation through the coronary sinus, verifying in the region of the diverticulum's neck, an electrogram with continuous electrical activity and a potential related to the muscular extension within the coronary sinus, both in sinus rhythm and during atrial and ventricular pacing (**Figure 4**).

Figure 4. Electrograms recorded in the region of the CS diverticulum's neck.
A) Sinus rhythm; B) atrial pacing; C) ventricular pacing.



After successive RF applications in the mentioned region, using a catheter irrigated with saline, with 15 w of power, 50 degrees of temperature and a flow velocity of 17 ml/m, the AP disappeared (**Figure 5**).

Figure 5. Post-ablation electrocardiogram with absence of ventricular preexcitation.



DISCUSSION

Normally, coronary sinus is surrounded by a spiral sleeve of atrial myocardium, extending 25 to 50 mm from its ostium, generating an anatomical and electrical connection with both atria [3]. Although most PSAP present a subendocardial ventricular insertion, in 7.5% of cases the myocardial sac extension of the coronary sinus runs along the middle cardiac vein, posterior cardiac vein or a CS diverticulum's neck, which may generate an anatomical and electrical continuity with the right or left ventricular epicardium, and constitute the substrate for epicardial AP [4].

This congenital anomaly generally presents as a single diverticulum, with wide variations in size (5 to 50 mm) and shape. Some are multilobular, but most are saccular with a discrete neck (narrower than the diverticulum's body but with highly variable diameter), and may originate at any site along the length of the CS, from the region near the ostium to the insertion of the great cardiac vein, but in most cases at a distance no greater than 1.5 cm of the ostium. In 25% of cases they connect directly with the middle cardiac vein [4].

It could be diagnosed with transthoracic or transesophageal echo, cardiac MRI, coronary angiography or retrograde venography by contrast [5].

Also, the coexistence of diverticula in the CS has been reported in patients with tachycardia by AV intranodal reentry or with left lateral AP; a fact traditionally not linked to these arrhythmias [6].

In histological tests, the presence of ordinary myocardial fibers has been shown within it, which constitute its usual structure and in some cases, the existence of specialized tissue with a conduction similar to Purkinje fibers [7].

Electrocardiographic algorithms may lead to the suspicion of AP epicardial location. The ECG of this case shows positive delta wave in DI, negative in DII, DIII and aVF, with r/S complexes in V5, V6, suggesting epicardial PS location. A negative delta wave in DII presents a sensitivity greater than 70% to identify AP in the CS [3,8].

The significance of its identification is based on the fact that these epicardial pathways associated to CS malformations, generally present rapid conduction times, with a greater incidence of AF and sudden cardiac death, and constitute the cause of around 10% of failed ablations when subendocardial access is used, and the application of RF is necessary within the CS to remove it [9].

The rate of success and recurrence rate in these cases is close to 75% and 16.6% respectively, and mainly related to the size of the diverticulum [10].

Due to the proximity of the CS ostium to the posterolateral branch of the right coronary artery, RF application should be made with much caution, because of the risk of causing its stenosis.

The formation of mural thrombi, cardiac tamponade and circumflex artery damage have also been described [11,12].

A higher efficacy and a lower rate of complications have been reported with catheters irrigated with saline [13], or with cryoablation [14], with epicardial ablation through subxiphoid access also being an efficient option [15].

In this report, we present PSAP resistant to conventional ablation by subendocardial access, and we highlight the significance of performing in these cases, a CS venography with the aim of investigating the presence of this congenital anomaly; as well as a detailed mapping to try to identify the potential related to muscular extension within the CS, usually located in the diverticulum's neck, a site on which RF application achieved the removal of the AP in this patient.

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