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Utility of Swartz Sheath in Patients with Paroxysmal Supraventricular Tachycardia and Unsuccessful Conventional Radiofrequency Catheter Ablation

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WU, ET AL.: ***Utility of Swartz Sheath in Patients with Paroxysmal Supraventricular Tachycardia and Unsuccessful Conventional Radiofrequency Catheter Ablation. Objective:*** *To investigate the effect of Swartz sheath on raising the success rate of radiofrequency catheter ablation (RFCA) for patients with paroxysmal supraventricular tachycardia (PSVT).* ***Methods:*** *In 47 patients with PSVT failed by conventional RFCA techniques, SR_0 Swartz sheath was utilized in ablation of patients with right atrial tachycardia (AT) and slow atrioventricular nodal pathway in atrioventricular node reentrant tachycardia (AVNRT), SL_1 Swartz sheath was utilized in left accessory pathway (AP) in atrioventricular reentrant tachycardia (AVRT), SR_{1-3} Swartz sheath was separately utilized in different right AP.* ***Results:*** *RFCA of 46 patients with PSVT was successful after utilizing Swartz sheath.* ***Conclusion:*** *It was suggested that the use of Swartz sheath may greatly raised the success rate of RFCA of PSVT. (J HK Coll Cardiol 1999;7:14-17)*

Supraventricular tachycardia, radiofrequency catheter ablation, Swartz sheath

摘要

目的:對47例陣發性室上性心動過速(PVST) 用常規電生理標測我導管射頻消融(RFCA)未成功改用Swartz鞘作為支撐，探討Swartz鞘在提高PSVT消融成功率中作用。方法:右房房性心動過速(AT)和房室結折返性心動過速(AVNRT)慢徑路消融用SR_0 Swartz鞘，左側房室旁路(AP)並房室折返性心動過速(AVRT)穿房間隔後用SL_1鞘，右側AP據不同部位用SR_1, SR_2, SR_3鞘。結果47例PSVT常規方法消融未成功者其中46例改用Swartz鞘作支撐後獲得成功。結論:Swartz鞘的使用明顯提高PSVT患者RFCA的成功率。

關鍵詞:室上性心動過速　射頻導管消融　Swartz 鞘

Introduction

Radiofrequency catheter ablation (RFCA) has been the choice of treatment for paroxysmal supraventricular tachycardia (PSVT) over the recent decade with higher success rate. Due to cardiac anatomic variation in a minority of patients, successful ablation cannot be achieved by conventional catheter ablation technique until supplemented with some special catheter or sheath. We report and investigate the successful experience of the use of Swartz sheath in 47 patients who had failed initial procedure by conventional mapping and ablation methods among consecutive 900 patients with PSVT in our hospital.

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Materials and Methods

Patient population

Between February 1994 and November 1998, 1050 patients underwent ablation in our hospital. In the series of 1050 patients, the first 150 patients were excluded from consideration because of the learning curve effect. Among the next 900 patients, 92 patients underwent initial unsuccessful catheter ablation of PST. Of 92 patients, 47 were included in this study because they subsequently used Swartz sheath in the same procedure in the consideration of instability of ablation catheter or poorer tissue contact at the target site. There were 22 men and 25 women and their mean age were 39±10 (16-66) years. The history of recurrent palpitation ranged in duration from 1 to 26 years (mean 10±12). Three patients had hypertensive cardiac disease. One had coronary heart disease after the operation of coronary artery bypass. One had Ebstein's abnormality. All antiarrhythmic medications were discontinued 5-7 days before procedure.

Electrophysiological study and catheter ablative procedure

Electrophysiological diagnosis and RFCA of atrial tachycardia (AT), atrioventricular nodal reentrant tachycardia (AVNRT) and atrioventricular reentrant tachycardia (AVRT) were referred as previous standard criteria[1-3]. Swartz sheaths of various size were inserted via femoral veins according to different types of tachycardia and different sites of accessory pathway (AP) after initial unsuccessful ablation by conventional techniques. Transeptal procedure was used in left AP ablation[4]. Right anterior oblique 30^o or left anterior oblique 45^o were used as fluoroscopic projections. The successful ablation criteria were the same as in references 1-3.

Electrocardiography and blood pressure were monitored for 24 hours after ablation. Aspirin 300 mg was given orally per day for 3 months. Patients were followed up in 1, 3, 6, 12 months after operation.

Statistics

Data are presented as mean ±SD. Difference between initial unsuccessful attempt and subsequent successful ablation was evaluated by paired t test. A p value <0.05 was considered significant.

Results

Electrophysiological data

Of the 47 patients, one had intra-atrial reentrant tachycardia (two sites, mid-lateral and inferoposterior in the right atrium), 12 had AVNRT, 34 had AVRT. 31 of these 34 patients had one AP, 3 had more than one AP, 3 left AP, 31 right AP. The locations of right APs were 2 anteroseptal, 6 anterior, 19 anterolateral and 7 lateral respectively.

Utility of Swartz sheath

SR_0 was used in AT and AVNRT, SL_1 in left anterolateral wall. Of right APs, SR_1, SR_2, SR_3 were used in 4, 20, 7 patients respectively (Table 1).

Catheter ablative results

After the first failed ablation procedure, we observed unstable ablation catheter under fluoroscopy or variable recorded electrogram at target site in 47 patients. Instability of ablation catheter or inadequate tissue contact was regarded as the failed reason[5]. Swartz sheaths were used in these patients, all had successful ablation except one with right AP. In the course of mapping, a large coronary sinus ostium was suspected in a patient with AVNRT. The recorded atrial electrogram in the ablation catheter (figure 1A) varied significantly, reflecting instability of ablation catheter

Table 1. The demography of Swartz sheaths used in 47 patients

	SR_0	SR_1	SR_2	SR_3	SL_1
AT	1				
AVNRT	12				
Left anterolateral AP					3
Right anteroseptal AP		2			
Right anterior AP		2	1		
Right anterolateral AP			19		
Right lateral AP				7	

that lead to initial ablation failure. After the use of SR0 sheath, the intracardiac signal (figure 1B) and the fluoroscopic appearance (figure 2) were recorded. The ablation catheter contacted tightly the atrial tissue in the posteroseptal area, the change of atrial and ventricular wave were less. Two energy application in this area resulted in the disappearance of slow pathway conduction. Excluding the time required to insert catheters, obtain baseline electrophysiologic measurements and induce and determine the mechanism of tachycardia, during the initial attempt, the ablation time was 42±27 minutes, the fluoroscopic time was 22± 15 minutes, the number of energy applications was 15.4± 7.2. Comparison to these, the ablation time was 22±12 minutes, the fluoroscopic time was 15±8 minutes, the number of energy application was 3.5± 1.8 during the subsequent ablation, the significant difference was listed out in Table 2. No complication and recurrence were observed after follow-up of 19± 9 months (range 4-32 months) in successful patients.

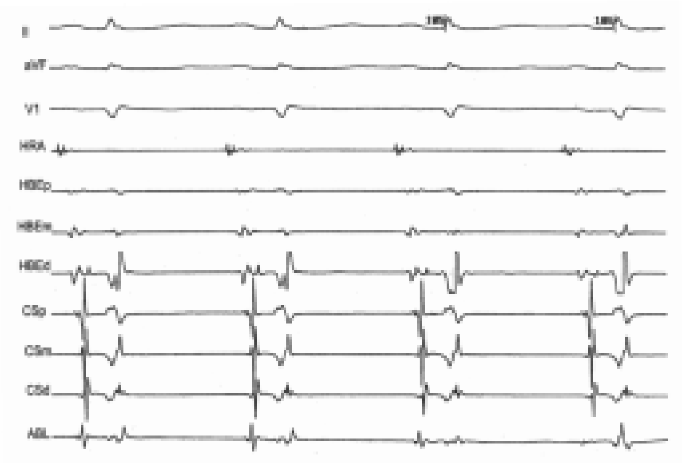

Figure 1A.

Figure 1B.

Figure 1. *Recorded electrogram in a patient with AVNRT. A, Without SR_0 sheath, the electrogram varied significantly, reflecting instability of the ablation catheter. This resulted in initial failed ablation attempt. B, With sheath, stable electrogram at successful target site was observed. lead II, aVR, V1 are surface electrocardiogram. HBEp=proximal His bundle; HBEm=middle His bundle; HBEd=distal His bundle; CSp=proximal coronary siuns; CSm=middle coronary sinus; CSd=distal coronary sinus; ABL=ablation catheter.*

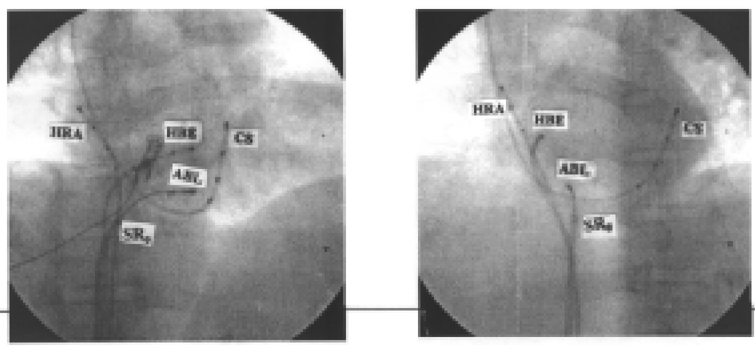

Figure 2. *Right anterior oblique (left) and left anterior oblique (right) fluoroscopic appearance in the same patient as Figure 1. With SR_0 sheath, the ablation catheter contacted tightly the atrial tissue in the posterioseptal area, two energy application in this area resulted in the disappearance of slow pathway conduction.*

Table 2. Comparison of initial unsuccessful ablation and subsequent successful ablation

	Initial unsuccessful ablation	Subsequent sucessful ablation	P value
Ablation time	42±27	22±13	<0.01
Fluoroscopic time	22±15	15±8	<0.05
No. of energy applicaiton	15.4±7.2	3.5±1.8	<0.01

Discussion

In this study, the use of Swartz Sheaths of various size in 47 patients with PSVT, who underwent initial unsuccessful ablation by conventional technique, achieved better target mapping, and shortened procedural time and raised the success rate.

Double ablative catheter mapping and ablation technique has successful result in most patients with right atrial AT, but in a few unsuccessful ablation cases because of instability of the ablation catheter or poorer tissue contact at the target site, the use of SR_0 sheath may get better stability and successful ablation.

Common or hardened Webster ablation catheters generally get food stability in the slow pathway ablation for AVNRT. In some cases, due to structural variation of Koch's triangle area, especially in patients with large coronary sinus ostium (CSO), ablation catheter easily slipped into CSO. After the use of SR_0 sheath, better contact of ablation catheter and less change of A and V waves may ablate slow pathway successfully. The method of the use of SR_0 sheath was locating the tip of sheath near or above CSO, so ablation catheter may anchor in the tricuspid annulus more exactly.

A few left APs locate anterolateral far away from CSO, transaortic mapping under or above the mitral annulus can't search for suitable target sites. Under this circumstance, transseptal approach with the use of long sheath should be used[5]. We used SL_1 sheath in three patients with left anterolateral APs.

In the course of right APs mapping and ablation, ablation catheter can't be stabilized in the tricuspid annulus due to lack of clear "marker", especially right lateral APs, APs located in the folded junction structure between the right atrium and the right ventricle. The various size of Swartz sheaths were used according to different APs, target sites were mapped and ablated correctly. The RF power was usually 30-40 Watts. Our experience of the use of Swartz sheath is: SR_1 may be used in right anteroseptal, SR_2 in right anterior, SR_3 in right anterolateral, SR_3 or SR_4 in right lateral, SL_1 in left anterolateral with the transseptal approach.

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