

후중격에 위치한 우회로의 전극도자 절제술

이문형 · 안신기 · 구본권 · 장길진 · 김건영 · 김성순

오 동 진

= Abstract =

Catheter Ablation of The Posteroseptal Accessory Pathways

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Background : The ablation of accessory pathways (APs) using radiofrequency (RF) energy has been established as a primary modality of treatment for atrioventricular reentrant tachycardia with proven safety and high rate of success. However, the ablation of posteroseptal (PS) APs had been recognized as being more difficult to ablate than those in other location because of the complex three dimensional anatomy of the posterior space, and multifarious approaches have been proposed. We analyzed electrophysiologic characteristics and results of catheter ablation of 70 consecutive patients, who underwent RF ablation of PS APs with or without booster direct current (DC) shock.

Methods : The AP location was confirmed to be in the PS region, ablation was attempted at the atrial aspect of the tricuspid annulus adjacent to the coronary sinus ostium, within the coronary sinus including middle cardiac vein, or underneath the mitral annulus close to the septum using retrograde transaortic approach if deemed necessary. A continuous, unmodulated sine wave radiofrequency generator was used as the source of energy for ablation. The site was considered optimal for ablation when the electrogram obtained from the ablation catheter had one or more of the following characteristics : (1) short VA intervals with an A : V ratio of 1.0 and discrete, high frequency potentials or fractionated electrograms between local atrial and ventricular deflections (accessory pathway potential) ; (2) ventricular activation occurred simultaneously with or earlier than the delta wave during sinus rhythm with manifest preexcitation ; and (3) atrial activation occurred simultaneously with or earlier than that recorded in the reference coronary sinus electrogram during retrograde AP conduction. Successful criteria was complete loss of anterograde and retrograde AP conduction.

Results : Seventy consecutive patients (male 44, female 26) with PS APs underwent catheter ablation. Manifest preexcitation was present in 40 patients and concealed APs in 30. Two patients had double APs. AP conduction was successfully eliminated in 60 of 70 cases at initial attempt (success rate 85.7%). Successful ablation sites of 60 patients were as follows ; 29 at the left PS region, 14 at the margin of the coronary sinus ostium, 8 in the proximal portion of the coronary sinus, 6 at the tricuspid annulus, and 3 at the inferomedial portion of right atrium. The mean shortest VA interval in successful group was shorter than that in failed group (85 ± 19 msec versus 100 ± 22 msec). Recurrence was noted in 8 patients (13.3%) during a mean follow-up period of 33.1 ± 13.3 months. Five patients with recurrence and two patients of unsuccessful initial attempt underwent the second catheter ablation and 5 patients were successful. Complications occurred in 11 patients ; transient high degree AV block in 8, pneumothorax in 2, and transient cerebral ischemic attack in one patient.

Conclusion : These data suggested that posteroseptal APs could be ablated at the left side or the right side PS region in similar proportion. This series, even though it included learning period, showed slightly lower success rate (87.5%) than that of total APs success rate in our experience (90.8%). Therefore a firm grasp of the anatomic characteristic of the posterior space and meticulous mapping may facilitate the achievement of successful results in the ablation of posteroseptal accessory pathways.

KEY WORDS : Catheter ablation · Posteroseptal accessory pathways.

서 론

Radiofrequency Catheter Ablation)

(Radiofreque -

가

연구대상 및 방법

X -

가

1. 연구대상

1991 6 1995 7

가

1-6)

440

70

가 44 , 가 26

가

39

7.3

(0.1 - 30)

3-6)

2.3

12

68 1
 1 de-
 xtrocardia .
 60 , 12
 2. 연구방법
 1) 전기생리학적 검사
 X- 12
 48
 8 3
 000 1 1000
 가
 7F decapolar
 (Daig Corporation Minnetonka, MN) (2 - mm
 interelectrode distance)
 (9 10)
 (intracardiac electrogram)
 6F quadripolar (Daig Corporation Mi-
 nnetonka, MN)
 His
 (Fig. 1). lead I, aVF, V1
 multichannel
 oscilloscope recorder (VR - 12, EVR, Electronics for
 Medicine, EP Lab, Quinton electrophysiology
 Corp.) 100mm/sec
 (30 500Hz band pass). Programmed electrical sti-
 mulation programmable stimulator (Bloom DTU -
 201 ; Bloom Associates, Ltd. EP - 3, EP Medi-
 cal Inc., Budd Lake, NJ.) 2
 msec pacing threshold 2

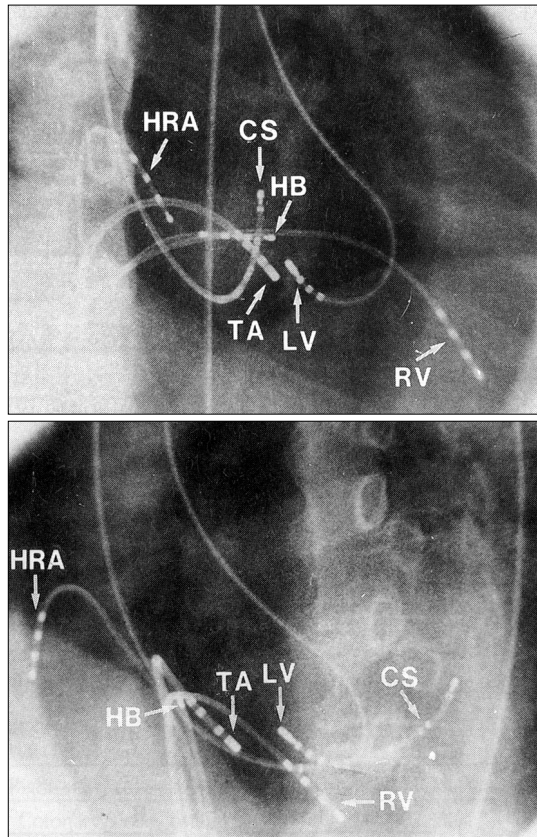


Fig. 1. Radiograms of transcatheter mapping posteroseptal region. Right anterior oblique(top) and left anterior oblique(bottom) views are shown during mapping posteroseptal aspect of tricuspid annulus(TA) and left ventricle(LV). Intracardiac catheters are positioned in high right atrium (HRA), His bundle(HB), right ventricular apex (RV), and coronary sinus(CS).

2) 후중격 방실우회로의 진단
 (anterograde
 and retrograde conduction properties)
 incremental pacing, extrastimulation te-
 chnique
 (right ventricular pacing)
 가 surface QRS -
 atrial interval
 , X -
 1 cm
 (Fig. 1).

3) 방실우회로의 전극도자 절제술

7F quadripolar mapping (EP Technologies Inc., Sunnyvale, CA., Electro-Catheter Corporation Rahway, NJ.) (5-mm interelectrode distance, 4mm large tip)

Radiofrequency energy 500 KHz generator (EPT-1000, EP Technologies Inc. HAT 300, Dr. Osypka GmbH Deditzsch, Germany) RF energy 25-35W, 10-45s

가 가 A (accessory pathway potential)가 가 A/V 1 가 A/V 1 Fig. 2, 3

50-150J

가

(inferomedial)

VA 가

VA

4) 성공적인 전극도자 절제술의 확인

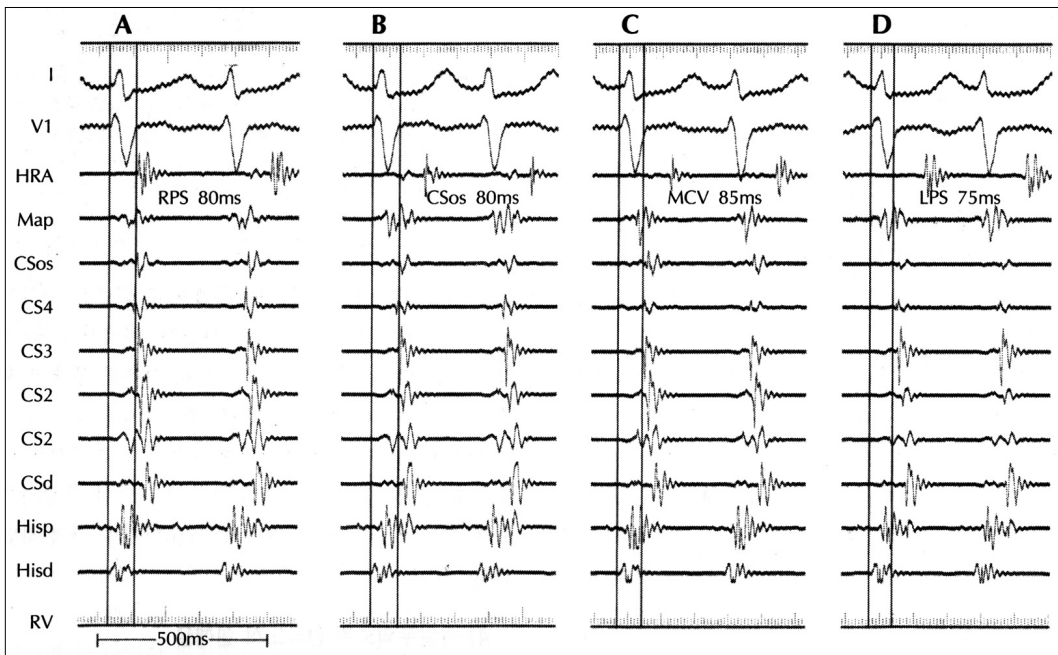


Fig. 2. Local electrogram from one patient during tachycardia. A : right posteroseptum, B : coronary sinus ostium, C : middle cardiac vein, D : left posteroseptum. CSd, CS2, CS3, CS4 and CSos, bipolar electrograms recorded from distal, second, third, fourth and distal electrodes (from tip) of decapolar electrodes catheter that was placed in coronary sinus ; Hisp and Hisd, proximal and distal His bundle electrogram ; HRA, high right atrial electrogram ; Map, electrogram from mapping catheter, I and V1, surface electrographic lead I and V1.



Fig. 3. Recording from same patient as in Fig. 2 shows successful radiofrequency ablation at left posteroseptum within two seconds. Arrow, start of current ; star, loss of accessory pathway conduction with termination of orthodromic reentrant tachycardia. Abbreviations as in Fig. 2.

가

5) 전극도자절제술후 추적관찰

8 (octapolar)

1, 1, 3, 6, 1, 2

delta

12

7

3

24 Holter

결 과

1. 대상환자 및 전기생리학적 검사 성적

70 40

가 30

가 . 2 2 가

1 (left free wall) , 1

30

, 가 40 3

2. 전극도자절제술 성적

70

60 (85.7%)

44

가 29 ,

16

. R F

Booster DC shock

가 31

가 14 가

(Table 1).

60

10

Table 2. Clinical and electrophysiologic parameters in successful patients and failed atients

	Successful cases (n=60)	Failed cases (n=10)	p-value
Male : Female	41 : 19	2 : 8	
Manifested : Concealed	33 : 27	7 : 3	
Age(yrs)	39 ± 15	43 ± 17	NS
VA interval at His(ms)	123 ± 19	126 ± 18	NS
Shortest VA interval(ms)	85 ± 19	100 ± 22	<0.05

VA ; ventricular atrial

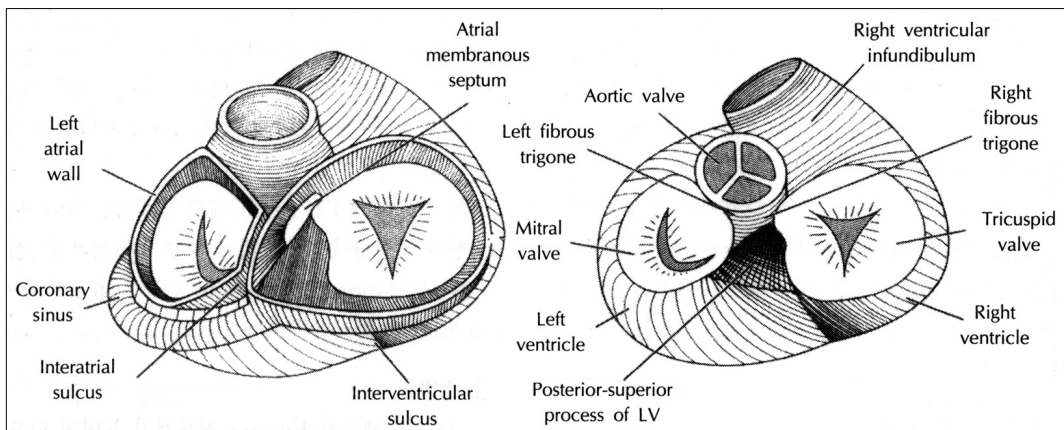


Fig. 4. Anatomy of posteroseptal region. These representations are schematic cranial views of heart before and after removal of atrium from AV junction(left and right, respectively). right atrium and coronary sinus form unit that wraps around left atrium. Interatrial sulcus is to the far left of interventricular sulcus. Note that inferior wall of right atrium lies directly on posterior-superior process(dashed lines), a part of left ventricle that is confined by fibrous trigone(anterior), septal anulus of tricuspid valve(right) and mitral anulus(left).

가 VA(ventricular atrial) 4 10 2
 (Table 2). 1 70
 3. 합병증 57 (81.4%)
 Booster 8 2
 1
 (transient cerebral ische-
 mic attack)가 24
 4. 추적관찰소견 12
 (33.1 ± 13.3) 8 (Fig. 4)
 (13.3%) 3
 , 4 3 , 1 18
 8 Booster DC shock 2
 8 5

Table 3. Results of accessory pathway catheter ablation in Yonsei cardiovascular center (from Jun. 1991 to Jul. 1995)

Location of AP	Number of APs	Success (Rate)
Left free wall	296	286 (96.6%)
Posteroseptal	70	60 (85.7%)
Right free wall	85	66 (77.6%)
Anteroseptal	18	14 (77.8%)
Midseptal	7	7 (100.0%)
Total	476	432 (90.8%)

1968 Cobb⁷⁾ WPW
 12 가 (mapping)
 84.5%
 80 90.8%
 9) 10,11) 96.6%
 (Table 3). Schluter¹⁾
 81%
 93 98%
 3-6) 가
 12) 가
 60 1
 가
 (ventricularatrial activation interval)
 13) 1987 Huang¹⁴⁾
 15) 16) 12
 1970 Durrer¹⁷⁾ WPW
 12 delta QR¹⁵⁾
 31 51. S
 7% 가 22 가 가 가 가 가^{4,16)}
 60 29 (48.4%)
 60
 77 96%
¹⁻⁵⁾ 1995 Wen⁶⁾

Table 4. Successful ablation sites in literature review

Author(year)	left PS(%)	Right PS(%)	No of success / No of APs (%)
Schluter et al. ¹⁾			17/21 (81%)
Jackman et al. ²⁾			41/43 (95%)
Calkins et al. ³⁾			41/44 (93%)
Dhala et al. ⁴⁾			47/48 (98%)
Schluter et al. ⁵⁾			131/140 (94%)
Wen et al. ⁶⁾			112/116 (96%)
Our data			60/70 (86%)

37% (Table 4). **요 약**

연구배경 :
 , 가
 18-24)
 (functional bu - 70
 ndle branch block)
 VA interval
 가 VA
 interval 35msec
 가
 VA interval 30msec
 Dhala ⁴⁾
 2/3 V - A 가 A - V
 erval , 12 VA int -
 , R/S II delta 가
 10%
 Haissaguerre
 가 20% 가 가 가 9%,
 가 6% 가 가
²⁵⁾
 13.1%
결 과 :
 1) 70 (39)
 가 44 , 가 26 2
 40 , 30
 2) 70 60
 85.7%
 가 29 , 가 14 ,
 가 8 , 가 6 ,

가 3
 3) V - A
 4) 8 , 2 ,
 (transient cerebral ischemic att -
 ack)가 1
 5) 33.1 ± 13.3 (12)
 60 8 (13.
 3%) 5
 7 5
 결 론
 가
 (mapping)

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