

Wolff-Parkinson-White 증후군 환자에서 도자 절제의 장기적인 성공의 예측

김윤년 · 김기식 · 한성욱 · 허승호

Prediction of Long-term Success after Initially Successful Radiofrequency Catheter Ablation in Patients with Wolff Parkinson White Syndrome

Yoon Nyun Kim, MD, Kee Sik Kim, MD, Seong Wook Han, MD and Seung Ho Hur, MD

Department of Internal Medicine, School of Medicine, Keimyung University, Taegu, Korea

ABSTRACT

Background : Radiofrequency (RF) catheter ablation of accessory pathways is generally accepted as the procedure of choice for symptomatic patients with tachycardia. The success rate of RF catheter ablation has been reported to be greater than 90%. Several previous studies have demonstrated that the recurrence rate of accessory pathway function following initially successful ablation is about 10%. However, accessory pathway conduction may recur even after an apparently successful ablation, possibly due to transient modification of the pathway rather than permanent destruction of the accessory pathway. During RF catheter ablation, prediction of permanent destruction of pathway, ensuring long-term success of the catheter ablation, is very important.

Methods : All ablation procedures were performed using a 4 mm tipped deflectable catheter (Diag, Webster or EPT). RF energy was delivered using an RF generator (Radionics RFG-3C). After positioning the ablation catheter at the target site, RF energy of 40 -60 V was applied for 30 -60 sec. After successful elimination of accessory pathway conduction, all patients underwent routine history taking, physical examination, and a 12 lead electrocardiogram recording at 1 week and 1, 2, 3, and 12 months after ablation. The AV interval, AV ratio, presence of AP potential, and time from RF delivery to loss of delta were measured at the time of the last local electrograms at the successful sites. **Statistics :** The continuous variables were evaluated using an unpaired Students T test and the discrete, variables using chi-square test and fishers exact test between the groups, with and without recurrence, during follow-up. **Results :** RF catheter ablation was initially successful in 35 patients with Wolff-Parkinson-White syndrome. Following initially successful RF ablation, follow-up examinations were done during 55 ± 40 weeks. The time from RF delivery to loss of delta was shorter in the group without recurrence during follow-up. Times from RF energy to loss of delta of less than 5 sec were indicative for long-term success without recurrence. **Conclusion :** The time required to eliminate an accessory pathway conduction is a predictor for long term success. However, local electrogram characteristics during successful RF catheter ablation may not be useful for predicting the long term success of RF catheter ablation in patients with manifest accessory atrioventricular connections. (Korean Circulation J 2001;31(8):794-800)

KEY WORDS : RF catheter ablation · Wolff-Parkinson-White syndrome · Recurrence.

: 2001 4 25
: 2001 6 8
: , 700 - 712 194
: (053) 250 - 7432 · : (053) 250 - 7434 E - mail : ynkim@dsmc.or.kr

, His ,
 서 론 4
 10 Bloom stimulator
 Wolff - Parkinson - White(WPW) 가
 (accessory pathway) 4 mm
 1 - 6)
 7 - 12) 가
 Radionics 3C
 40 60 Volt 30
 가
 13 - 15) 1980 가 3
 PPG po -
 lygraph 100 mm/sec
 200 mm/sec
 1996 1 1996
 90% 16 - 23) 12 WPW
 가
 35 A V , A
 V (AoVo), A V
 26) (ApVp), (accessory pa -
 thway potential) , delta
 가
 가 3
 delta
 St -
 udent 's test chi - square test
 fischer 's exact test
 p 0.05
 방 법 결 과
 WPW 35 25 : 10
 lidocaine . 35 WPW
 55 3
 6 7 Fr 3 ,
 37 20 , 64

(Table 1).
 가
 0.03 6.33
 0.62 AoVo 20 msec 120 msec 23 9
 51.56 msec ApVp 20 msec 3 1
 120 msec 51.9 msec 45.0
 56.7

(Table 2).

50 volt

4.2 ,

37.2

34.6

7.20

0.65 0.30

5

가

Table 1. Clinical characteristics of subject

Total patients	35
Male : Female	25 : 10
Follow-up (wks)	55.05 ± 40.45
Recur/Total patients	3/35
Age(yr)	37.0 ± 12.4 (20 - 64)

32 23

5

(p<0.05)(Table 3).

고 찰

Table 2. Characteristics of local electrograms in the successful sites of RF catheter ablation in patients with WPW syndrome

	Range	Mean
A wave/V wave ratio	0.03 - 6.33	0.62 ± 1.16
Time from RF delivery to loss of delta (sec)	0.6 - 14	4.48 ± 3.91
AoVo time (msec)	20 - 120	51.56 ± 23.09

AoVo time : Interval from the onset of a wave to the onset of V wave, A wave : atrial wave in the local electrogram, V wave : ventricular wave in the local electrogram

27)28)

10

Table 3. Characteristics of local electrogram parameter, RF parameters and other variables

	No recurred Gr	Recurred Gr	p
Age (yr)	32.33 ± 12.87	34.6 ± 14.16	NS
AV ratio	0.65 ± 1.22	0.30 ± 0.19	NS
AoVo (msec)	54.14 ± 22.52	26.67 ± 11.55	<0.05
ApVp (msec)	53.10 ± 18.73	40.00 ± 0.00	<0.05
AP potential (Y/N)	39% (9/23)	0% (0/3)	NS
RF Duration (sec)	45.00 ± 15.03	56.67 ± 15.28	NS
Time From RF delivery to loss of delta (sec)	4.23 ± 3.84	7.20 ± 2.43	NS
Less than 5 sec from RF to loss of delta wave	72% (23/32)	0% (0/3)	<0.05
RF Energy (Volt)	50.03 ± 5.20	50.00 ± 0.00	NS

A : atrial wave in the intracardiac electrogram, V : Ventricular wave in the intracardiac electrogram, AoVo : From the onset of a wave to the onset of v wave, ApVp : From the peak of a wave to the peak of positive wave of v wave, NS : not significant

300 750 KHz
 30 W
 AV
 가 AV 가
 AV (AoVo) (ApVp)
 가
 가
 가
 mapping
 29 - 34)
 가 70 100 C
 24)25)
 가
 가
 3 5
 가 10%
 Chen 25)
 가
 60 msec
 가
 31)
 10%
 24 - 26)35 - 39) Calkins 24)
 538 35 (6.5%)
 270 25 9.3%
 가
 가
 가
 가
 가
 가
 가
 가
 가
 WPW (A
 wave, V wave)
 AV 가
 AV 가
 가
 가
 가
 delta
 delta
 delta
 delta
 5
 delta
 가

delta

본 연구의 제한점

결 과 :

35 WPW
25 : 10 35 3
55
가
0.65 0.33

가

(54.14 ± 22.52 msec 26.67 ± 11.47 msec p<0.05,
53.10 ± 18.73 msec 40.00 msec p<0.01).

예상되는 효과 및 활용 방법

가

가

가

5

5

가

(p<0.05).

가

결 론 :

요 약

가 가

연구목적

중심 단어 :

1996

1997 Asian Pacific Electrophysiology and Pacing Symposium

REFERENCES

- 1) Gallagher JJ, Sealy WC, Kasell J, Wallace AG. *Multiple accessory pathways in patients with the pre-excitation syndrome. Circulation* 1976;54:571-91.
- 2) Nelson SD, Kou WH, Annesley T, de Buitleur M, Morady F. *Significance of ST segment depression during paroxysmal supraventricular tachycardia. J Am Coll Cardiol*

방 법 :

WPW

가

가 35

가

- 1988;12:383-7.
- 3) Riva SI, Della Bella P, Fassini G, Carbuicchio C, Tondo C. *Value of analysis of ST segment changes during tachycardia in determining type of narrow QRS complex tachycardia.* *J Am Coll Cardiol* 1996;27:1480-5.
- 4) Scheinman MM, Wang YS, Van Har GF, Lesh MD. *Electrocardiographic and electrophysiologic characteristics of anterior, midseptal, and right anterior free wall accessory pathways.* *J Am Coll Cardiol* 1992;20:1220-9.
- 5) Dorostkar PC, Silka MJ, Morady F, Dick M 2nd. *Clinical course of persistent junctional reciprocating tachycardia.* *J Am Coll Cardiol* 1999;33:366-75.
- 6) Ticho BS, Saul JP, Hulse JE, De W, Lulu J, Walsh EP. *Variable location of accessory pathways associated with the permanent form of junctional reciprocating tachycardia and confirmation with radiofrequency ablation.* *Am J Cardiol* 1992;70:1559-64.
- 7) Rinkenberger RL, Prystowsky EN, Heger JJ, Troup PJ, Kackman WM, Zipes DP. *Effects of intravenous and chronic oral verapamil administration in patients with supraventricular tachyarrhythmias.* *Circulation* 1980;62:996-1010.
- 8) diMarco JP, Sellers TD, Lerman BB, Greenberg ML, Berne RM, Belardinelli L. *Diagnostic and therapeutic use of adenosine in patients with supraventricular tachyarrhythmias.* *J Am Coll Cardiol* 1985;6:417-25.
- 9) Ward DE, Jones S, Shinebourne EA. *Use of flecainide acetate for refractory junctional tachycardias in children with Wolff-Parkinson-White syndrome.* *Am J Cardiol* 1986;57:787-90.
- 10) Ludmer PL, McGowan NE, Antman EM, Friedman PL. *Efficacy of propafenone in Wolff-Parkinson-White syndrome: electrophysiologic findings and long-term follow-up.* *J Am Coll Cardiol* 1987;9:1357-63.
- 11) Musto B, D'Onofrio A, Cavallaro C, Musto A. *Electrophysiological effects and clinical efficacy of propafenone in children with recurrent paroxysmal supraventricular tachycardia.* *Circulation* 1988;78:863-9.
- 12) Manolis AS, Estes NA 3rd. *Reversal of electrophysiologic effects of flecainide on the accessory pathway by isoproterenol in the Wolff-Parkinson-White syndrome.* *Am J Cardiol* 1989;64:194-8.
- 13) Cox JL, Gallagher JJ, Cain ME. *Experience with 118 consecutive patients undergoing operation for Wolff-Parkinson-White syndrome.* *J Thorac Cardiovasc Surg* 1985;90:490-501.
- 14) Lawrie GM, Lin HT, Wyndham CR, DeBaake ME. *Surgical treatment of supraventricular arrhythmias. Results in 67 patients.* *Ann Surg* 1987;205:700-11.
- 15) Johnson DC, Nunn GR, Richards DA, Uther JB, Ross DL. *Surgical therapy for supraventricular tachycardia, a potentially curable disorder.* *J Thorac Cardiovasc Surg* 1987;93:913-8.
- 16) Scheinman MM. *Catheter ablation for cardiac arrhythmias, personnel, and facilities.* *Pacing Clin Electrophysiol* 1992;15:715-21.
- 17) Kay GN, Epstein AE, Dailey SM, Plumb VJ. *Role of radiofrequency ablation in the management of supraventricular arrhythmias: experience in 760 consecutive patients.* *J Cardiovasc Electrophysiol* 1993;4:371-89.
- 18) de Buitelir M, Sousa J, Bolling SF, el-Atassi R, Calkins H, Langberg JJ, et al. *Reduction in medical care cost associated with radiofrequency catheter ablation of accessory pathways.* *Am J Cardiol* 1991;68:1656-61.
- 19) Jackman WM, Wang XZ, Friday KJ, Roman CA, Moulton KP, Beckman KJ, et al. *Catheter ablation of accessory atrioventricular pathways (Wolff-Parkinson-White syndrome) by radio-frequency current.* *N Engl J Med* 1991;324:1605-11.
- 20) Kuck KH, Schluter M, Geiger M, Siebels J, Duckeck W. *Radiofrequency current catheter ablation accessory atrioventricular pathway.* *Lancet* 1991;337:1557-61.
- 21) Calkins H, Langberg J, Sousa J, el-Atassi R, Leon A, Kou W, et al. *Radiofrequency catheter ablation of accessory atrioventricular connections in 250 patients.* *Circulation* 1992;85:1337-46.
- 22) Lesh MD, Van Hare GF, Schamp DJ, Chien W, Lee MA, Griffin JC, et al. *Curative percutaneous catheter ablation using radiofrequency energy for accessory pathways in all locations: results in 100 consecutive patients.* *J Am Coll Cardiol* 1992;19:1303-9.
- 23) Calkins H, Yong P, Miller JM, Olshansky B, Carlson M, Saul JP, et al. *Catheter ablation of accessory pathways, atrioventricular nodal reentrant tachycardia, and the atrioventricular junction: final results of a prospective, multicenter clinical trial.* *Circulation* 1999;99:262-70.
- 24) Calkins H, Prystowsky E, Berger RD, Saul JP, Klein LS, Liem LB, et al. *Recurrence of conduction following radiofrequency catheter ablation procedures: relationship to ablation target and electrode temperature.* *J Cardiovasc Electrophysiol* 1996;7:704-12.
- 25) Chen X, Kottkamp H, Hindricks G, Williams S, Haverkamp W, Martinez-Rubio A, et al. *Recurrence and late block of accessory pathway conduction following radiofrequency catheter ablation.* *J Cardiovasc Electrophysiol* 1994;5:650-8.
- 26) Langberg JJ, Calkins H, Kim YN, Sousa J, el-Atassi R, Leon A, et al. *Recurrence of conduction in accessory atrioventricular connections after initially successful radiofrequency catheter ablation.* *J Am Coll Cardiol* 1992;19:1588-92.
- 27) Hauer RN, Straks W, Borst C, Robles de Medina EO. *Electrical catheter ablation in the left and right ventricular wall in dogs: relation between delivered energy and histopathologic changes.* *J Am Coll Cardiol* 1986;8:637-43.
- 28) Warin J, Haissaguerre M, Lemetayer P, Guilem J, Blanchot P. *Catheter radiofrequency ablation of the myocardium.* *J Appl Cardiol* 1986;1:469-86.
- 29) Morady F, Calkins H, Langberg JJ, Armstrong WF, de Buitelir M, el-Atassi R, et al. *A prospective randomized comparison of direct current and radiofrequency ablation of the atrioventricular junction.* *J Am Coll Cardiol* 1993;21:102-9.
- 30) Olgin JE, Scheinman MM. *Comparison of high energy direct current and radiofrequency catheter ablation of the atrioventricular junction.* *J Am Coll Cardiol* 1993;21:557-64.
- 31) Calkins H, Kim YN, Schmaltz S, Sousa J, El-Atassi R, Leon A, et al. *Electrogram criteria for identification of appropriate target sites for radiofrequency catheter ablation of accessory atrioventricular connections.* *Circulation*

- tion 1992;85:565-73.
- 32) Calkins H, Sousa J, El-Atassi R, Resenheck S, de Buitelir M, Kou WH, *et al.* *Diagnosis and cure of the Wolff-Parkinson-White syndrome or paroxysmal supraventricular tachycardias during a single electrophysiologic test.* *N Engl J Med* 1991;324:1612-8.
 - 33) Silka MJ, Kron J, Halperin BD, Griffith K, Crandall B, Oliver RP, *et al.* *Analysis of local electrogram characteristics correlated with successful radiofrequency catheter ablation of accessory atrioventricular pathways.* *Pacing Clin Electrophysiol* 1992;15:1000-7.
 - 34) Swartz JF, Tracy CM, Fletcher RD. *Radiofrequency endocardial catheter ablation of accessory atrioventricular pathway atrial insertion sites.* *Circulation* 1993;87:487-99.
 - 35) Mann DE, Kelly PA, Adler SW, Fuenzalida CE, Reiter MJ. *Palpitations occur frequently following radiofrequency catheter ablation for supraventricular tachycardia, but do not predict pathway recurrence.* *Pacing Clin Electrophysiol* 1993;16:1645-9.
 - 36) Walker KW, Silka MJ, Haupt D, Kron J, McAnulty JH, Halperin BD. *Use of adenosine to identify patients at risk for recurrence of accessory pathway conduction after initially successful radiofrequency catheter ablation.* *Pacing Clin Electrophysiol* 1995;18:441-6.
 - 37) Timmermans C, Smeets JL, Rodriguez LM, Oreto G, Medina E, Notheis W, *et al.* *Recurrence rate after accessory pathway ablation.* *Br Heart J* 1994;72:571-4.
 - 38) Wang L, Hu D, Ding Y, Powell AC, Davis MJ. *Predictors of early and late recurrence of atrioventricular accessory pathway conduction after apparently successful radiofrequency catheter ablation.* *Int J Cardiol* 1994;46:61-5.
 - 39) Twidale N, Wang XZ, Beckman KJ, McClelland JH, Moulton KP, Prior MI, *et al.* *Factors associated with recurrence of accessory pathway conduction after radiofrequency catheter ablation.* *Pacing Clin Electrophysiol* 1991;14:2042-8.