

심방세동 환자에서 Sotalol과 Amiodarone의 치료효과

오혜림 · 김우식 · 이병욱 · 강홍선 · 조정휘 · 김권삼 · 송정상 · 배종화

Efficacy of Sotalol and Amiodarone for Atrial Fibrillation

Hye Lim Oh, MD, Woo Shik Kim, MD, Byoung Wook Lee, MD, Heung Sun Kang, MD,
Chung Whee Choue, MD, Kwon Sam Kim, MD, Jung Sang Song, MD and Jong Hoa Bae, MD

Division of Cardiology, Department of Internal Medicine, Kyung Hee University College of Medicine,
Seoul, Korea

ABSTRACT

Background and Objectives : Atrial fibrillation (AF) is the most frequently encountered arrhythmia in clinical practice. Pharmacologic therapy has been advocated for both the immediate restoration of sinus rhythm and the prevention of recurrent AF. Because conventional antiarrhythmic therapy is often ineffective in maintaining sinus rhythm or is associated with adverse side effects in patients with AF, recent interest has been focused on the use of class antiarrhythmic agents. This study investigated the efficacy and safety of sotalol and amiodarone for the conversion of chronic AF and prevention of recurrent AF. **Materials and Method :** Thirty six patients with AF were firstly first received sotalol by prospective study protocol. The patients were classified as having paroxysmal AF (PAF, N = 12) or chronic AF (CAF, N = 24) based on their AF pattern. If the patients with CAF did not convert to sinus rhythm or the patients with PAF recurred in AF, the patients were received a second agentsagent (amiodarone). Patients were followed up for one year. **Results :** Among the 12 patients with PAF receiving sotalol, 10 (83.3%) patients remained in normal sinus rhythm for an average 9.4 ± 3.6 months. Sotalol was replaced by amiodarone in the remainig remaining 2 patients with arrhythmia recurrence and 1 of the 2 patients remained in sinus rhythm during the follow-up period. In the case of the 24 patients with CAF, conversion to sinus rhythm was achieved in 5 (20.8%) patients with sotalol. Among the patients with CAF who were did not respond to sotalol, 17 patients received amiodarone subsequently and 3 patients successfully converted to sinus rhythm. There were no proarrhythmic effects related to both agents either agent during the study period. **Conclusion :** Both sotalol and amiodarone appear to be less effective in the termination of CAF, but however the sequential use of these two agents seem to be very effective for the prevention of a recurrence of PAF. (**Korean Circulation J 2001;31(2):210-216**)

KEY WORDS : Atrial fibrillation · Sotalol · Amiodarone.

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: 2000 7 24
: 2001 2 28
: , 130 - 702 1
: (02) 958 - 8169 · : (02) 958 - 8160 E - mail : CWChoue@khmc.or.kr

2
ocol 2 amiodarone
(Fig. 1).
1
1 4 1
sotalol amiodarone
65
INR 2 3
, 65 75
warfarin , 75
가 3 war -
farin aspirin
4
digoxin
통계방법
± (mean ± SD)
Mann - Whitney Test
p 0.05

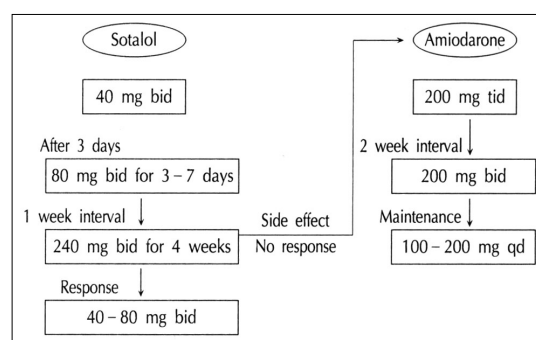


Fig. 1. Drug treatment schedule.

결 과

발작성 심방세동

12 61.5 ± 13.2
7 : 5
5 (42%) 2 , 2 ,
1 , 3 (25%)
12
96 ± 27 (Table 1). 12
sotalol 10 (83.3%) 9.4 ± 3.6
120 ± 78 mg , 2
3 , 8

Table 1. Clinical characteristics of patients

	PAF (n = 12)	CAF (n = 24)
Age (yrs)	61.5 ± 13.2	62.0 ± 9.8
Gender (M/F)	7/5	19/6
Baseline heart rate (beat/min)	96 ± 27	96 ± 26
Cardiomegaly (X-ray)	3 (25%)	9 (37.5%)
Cardiovascular disease	5 (42%)	16 (67%)
HTN	2	8
VHD (MS : MR)	2 : 0	1 : 2
CMP	1	2
CAD	0	1

HTN = hypertension, VHD = valvular heart disease, MS = mitral stenosis, MR = mitral regurgitation, CMP = cardiomyopathy, CAD = coronary heart disease

Table 2. Sotalol response in paroxysmal atrial fibrillation (PAF)

	Response group	Failure group
Number of patients (%)	10 (83.3%)	2 (16.7%)*
Age (yr)	63.5 ± 12.0	51.5 ± 19.0
LA diameter (mm)	40 ± 10	44 ± 16
LVEF (%)	65 ± 14	65 ± 3
Baseline heart rate (beat/min)	97 ± 35	89 ± 20

*Two patients received amiodarone. One patient had no recurrence of PAF, another patient had the recurrence of PAF

p = NS for all values, LA = left atrium
LVEF = left ventricular ejection fraction

10 mm 44 ± 16 mm 40 ±

(Table 2).

2 amiodarone

1 amiodarone

100 mg 3

Sotalol 2

50

7

만성 심방세동

24 62 ± 9.8

19 : 6

16 (67%) 8 , 1 ,

2 , 1 , 1

9 (37.5%)

96 ±

26 (Table 1). 5 (20.8%) 가 sotalol

3

2

9

15.9 ± 11.8 ,

16.9 ± 20.6

(Table 3). 19

17 가 amiodarone 3

(17.6%) ,

(Table 4).

Sotalol 2 , , QTc

(>500 msec) , 1

1 가 sotalol

1

Table 3. Sotalol response in chronic atrial fibrillation (CAF)

	Conversion	No conversion
Number of patients (%)	5 (20.8%)	19 (79.2%)
Age (yrs)	57 ± 14	63 ± 9
LA diameter (mm)	42 ± 5	48 ± 8
LVEF (%)	61 ± 6	55 ± 13
Duration of AF (mo)	15.9 ± 11.8	16.9 ± 20.6
Heart rate (beat/min)	111 ± 30	92 ± 25
Concomitant treatment with digoxin (no)	1 (20%)	6 (32%)

p = NS for all values, LA = left atrium
LVEF = left ventricular ejection fraction

Table 4. Amiodarone response in chronic atrial fibrillation (CAF)

	Conversion	No conversion
Number of patients (%)	3 (17.6%)	14 (82.4%)
Age (yrs)	57 ± 1.4	64 ± 10.3
LA diameter (mm)	42 ± 0.7	49 ± 6.9
LVEF (%)	61 ± 0.7	55 ± 11.4
Duration of AF (mo)	11.9 ± 13.0	19.1 ± 20.9
Heart rate (beat/min)	112 ± 13	92 ± 16
Concomitant treatment with digoxin (no)	1	4

p = NS for all values, LA = left atrium
LVEF = left ventricular ejection fraction

Table 5. Adverse effect during treatment

Adverse effect	No of patients
Sotalol group	
Bradycardia (<50/min)	4
GI trouble	1
QTc prolongation (<500 msec)	1
Heart failure aggravation	1
Sinus arrest (severe bradycardia)	1
Amiodarone group	
Hypothyroidism	1
Total	9/36 (25%)

2 가 Sotalol
amiodarone 1 1

고 안

가 , sotalol 20%
가 quinidine 60%
가
가 sotalol
class , sotalol amiodarone
가
가
가 7 (58.3%) 6
가 , 4 (33.3%) 1
⁸⁾⁹⁾
가 , sotalol
sotalol amiodarone (20.8%)
(91.7%). , sotalol sotalol 가
(20.8%), ¹⁶⁾(Sotalol's reverse use depen-
sotalol amiodarone dence)
(17.6%, : 36.4%).
Sotalol 가 가 , ¹⁷⁾
sotalol reverse use dependence
가
Amiodarone
27% 86%
¹⁸⁻²⁴⁾ Middlekauff
15 27
quinidine 48% sotalol 6 52%,
amiodarone 53 79%
sotalol quinidine
가
. Reimold ⁹⁾ 1.9 class Ia Tieleman ²⁶⁾
100 129 600 mg
sotalol propafenone 4 23 (18%)
none , 3 , 6 , 12 , desethyl-
가 (sotalol ; 49%, , Amiodarone
46%, 37%, propafenone ; 46%, 41%, 30% ; P = NS), desethylamiodarone
가
. , Hohnloser ¹⁵⁾ 50
quinidine sotalol sotalol

2 1 1 , 가 sotalol

3 (17.6%) amiodarone 8 가 , 1 sotalol amiodarone

(16.8 ± 18.9) , am -

iodarone (600 mg) (2) 가

결 론

Amiodarone digoxin digoxin sotalol ami -

di - odarone

goxin , 가

5 0.125 0.25 mg digoxin

amiodarone digoxin 가

digoxin

amiodarone warfarin 가

warfarin 1/3

15 2.5 class

3.75 mg 가

amiodarone

1

1

100 200 mg

. Sotalol 8

, 가

4 3

, 2

(Table 5).

Sotalol sotalol

class QT

, torsade de poin -

tes가 .²⁸⁾ torsade de pointes

가

가 , Ben -

ditt²⁹⁾ Edvardsson³⁰⁾

60mL/min sotalol

, class

, QT

sotalol torsade de pointes

중심 단어 : · Sotalol · Amiodarone.

REFERENCES

- 1) Hillestad L, Bjerkelund C, Dale J, Maltau J, Storstein O. *Quinidine of maintenance of sinus rhythm after electroconversion of chronic atrial fibrillation: A controlled clinical study.* Br Heart J 1971;33:518-21.
- 2) Hartel G, Louhija A, Kontinen A. *Disopyramide in the prevention of recurrence of atrial fibrillation after electroconversion.* Clin Pharmacol Ther 1974;15:551-5.
- 3) Lloyd EA, Gersh BJ, Forman R. *The efficacy of quinidine and disopyramide in the maintenance of sinus rhythm after electroconversion from atrial fibrillation.* S Afr Med J 1984;65:367-9.
- 4) Sodermark T, Jonsson B, Olsson A, Oro L, Wallin H, Edhag O, et al. *Effect of quinidine on maintaining of sinus rhythm after conversion of atrial fibrillation or flutter: A multicentre study from Stockholm.* Br Heart J 1975;37:486-92.
- 5) Karlson BW, Torstensson I, Abjorn C, Jansson SO, Peterson LE. *Disopyramide in the maintenance of sinus rhythm after electroconversion of atrial fibrillation: A placebo-controlled one-year follow-up study.* Eur Heart J 1988;9: 284-90.
- 6) Coplen SE, Antman EM, Berlin JA, Hewitt P, Chalmers TC. *Efficacy and safety of quinidine therapy for maintenance of sinus rhythm after cardioversion: A meta-analysis*

- of randomized control trials. *Circulation* 1990;82:1106-16.
- 7) Flaker GC, Blackshear JL, McBride R, Kronmal RA, Halperin JL, Hart RG. *Antiarrhythmic drug therapy and cardiac mortality in atrial fibrillation: the stroke prevention in atrial fibrillation investigators*. *J Am Coll Cardiol* 1992; 20:527-32.
 - 8) Juul-Moller S, Edvardsson N, Rehnqvist-Ahlberg N. *Sotalol versus quinidine for the maintenance of sinus rhythm after direct current conversion of atrial fibrillation*. *Circulation* 1990;82:1932-9.
 - 9) Reimold SC, Cantillon CO, Freidman PL, Antman EM. *Propafenone versus sotalol for suppression of recurrent symptomatic atrial fibrillation*. *Am J Cardiol* 1993;71: 558-63.
 - 10) Chun SH, Sager PT, Stevenson WG, Nademanee K, Middlekauff HR, Singh BN. *Long-term efficacy of amiodarone for the maintenance of normal sinus rhythm in patients with refractory atrial fibrillation or flutter*. *Am J Cardiol* 1995;76:47-50.
 - 11) Hohnloser SH, Meinertz T, Dammacher T, Steiert K, Jahnchen E, Zehender M, et al. *Electrocardiographic and antiarrhythmic effects of intravenous amiodarone results of a prospective, placebo-controlled study*. *Am Heart J* 1991;121:89-95.
 - 12) Kim IJ, Chung WT, Kim JW, Son DH, Shin YW, Shin YK. *Therapeutic trial of low dose amiodarone in ventricular arrhythmia*. *Korean circulation J* 1988;18:455-61.
 - 13) Jeon ES. *Efficacy of amiodarone for treatment of atrial fibrillation*. *Chungnam Medical J* 1988;15:421-30.
 - 14) Hong YK, Seo HS, Oh DJ, Ro YM. *Relation between the efficacy of amiodarone on chronic atrial fibrillation and left atrial size and fibrillatory wave form*. *Korean circulation J* 1989;19:125-31.
 - 15) Hohnloser SH, van de Loo A, Baedeker F. *Efficacy and proarrhythmic hazards of pharmacologic cardioversion of atrial fibrillation: prospective comparison of sotalol versus quinidine*. *J Am Coll Cardiol* 1995;26:852-8.
 - 16) Hohnloser SH, Woosley RL. *Sotalol*. *N Engl J Med* 1994; 331:31-8.
 - 17) Wang J, Bourne GW, Wang Z, Villemare C, Talajic M, Nattel S. *Comparative mechanisms of antiarrhythmic drug action in experimental atrial fibrillation*. *Circulation* 1993; 88:1030-44.
 - 18) Horowitz LN, Spielman SR, Greenspan AM, Mintz GS, Morganroth J, Brown R, et al. *Use of amiodarone in the treatment of persistent and paroxysmal atrial fibrillation resistant to quinidine therapy*. *J Am Coll Cardiol* 1985;6: 1402-7.
 - 19) Gold RL, Haffajee CI, Charos G, Sloan K, Baker S, Alpert JS. *Amiodarone for refractory atrial fibrillation*. *Am J Cardiol* 1986;57:124-7.
 - 20) Blevins RD, Kerin NZ, Benaderet D, Frumin M, Faitel K, Jarandilla R, et al. *Amiodarone in the management of refractory atrial fibrillation*. *Arch Intern Med* 1987;147: 1401-4.
 - 21) Brodsky MA, Allen BJ, Walker CJ, Casey TP, Luckett CR, Henry WL. *Amiodarone for maintenance of sinus rhythm after conversion of atrial fibrillation in the setting of a dilated left atrium*. *Am J Cardiol* 1987;60:572-5.
 - 22) Santos AL, Aleixo AM, Landeiro J, Luis AS. *Conversion of atrial fibrillation to sinus rhythm with amiodarone*. *Acta Med Port* 1979;1:15-23.
 - 23) Rowland E, McKenna WJ, Krikler DM. *Amiodarone for the conversion of established atrial fibrillation and flutter*. *Br J Clin Pract* 1986;44:39-41.
 - 24) Zehender M, Hohnloser S, Muller B, Meinertz T, Just H. *Effects of amiodarone versus quinidine and verapamil in patients with chronic atrial fibrillation: results of a comparative study and 2-year follow-up*. *J Am Coll Cardiol* 1992;19:1054-9.
 - 25) Middlekauff HR, Wiener I, Stevenson WG. *Low-dose amiodarone for atrial fibrillation*. *Am J Cardiol* 1993;72: 75F-81F.
 - 26) Tieleman RG, Gosselink AT, Crijns HJ, Van Gelder IC, van den Berg MP, de Kam PS, et al. *Efficacy, safety, and determinants of conversion of atrial fibrillation and flutter with oral amiodarone*. *Am J Cardiol* 1997;79:53-7.
 - 27) Soyka LF, Wirtz C, Spangenberg RB. *Clinical safety profile of sotalol in patients with arrhythmias*. *Am J Cardiol* 1990;65:74A-81A.
 - 28) Benditt DG, Williams JH, Jin J, Deering TF, Zucker R, Browne K, et al. *Maintenance of sinus rhythm with oral d,l-sotalol therapy in patients with symptomatic atrial fibrillation and/or atrial flutter*. *Am J Cardiol* 1999;84: 270-7.
 - 29) Edvardsson J, Huikuri H, Kenneback G, Timmermans AJM, Ullman B, Verschueren. *Antiarrhythmic efficacy by a class III agent without beta-blockade in chronic atrial fibrillation: double-blind randomized comparison of dl-sotalol, d-sotalol and placebo: A European Multicenter Study (Abstr.)*. *J Am Cardiol* 1996;27(suppl 1):46A.