

## 심한 이형 협심증 환자에서 경구 Nitric Oxide Donor(Molsidomine) 효과

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### The Effects of Oral Nitric Oxide Donor (Molsidomine) in Patients with Variant Angina Unresponsive to Conventional Anti-Anginal Drugs

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#### ABSTRACT

**Background** : We observed the changes of clinical characteristics after oral Molsidomine, a nitric oxide donor, in patients who have documented coronary artery spasm by ergonovine coronary angiogram and refractory to conventional anti-anginal therapy. **Method** : Molsidomine, oral nitric oxide donor, was administrated over 12 weeks in 20 patients (6 male, 14 female,  $54 \pm 11.5$  years) in order to observe the clinical effects in patients with coronary artery spasm unresponsive to nitrate and calcium channel blockers. Changes in the frequency of pain and sublingual nitroglycerin use, blood pressure, heart rate, side effects, electrocardiogram, and laboratory findings were evaluated before and after Molsidomine therapy. **Results** : The frequencies of pain and sublingual nitroglycerin use were  $3.9 \pm 0.9$ /week before treatment and decreased to  $2.9 \pm 0.9$ /week at 4th week after the additional Molsidomine treatment (pre-treatment vs. 4th week ;  $p < 0.001$ ), to  $1.0 \pm 0.8$ /week at 8th week (4th week vs. 8th week ;  $p < 0.001$ ), and to  $0.7 \pm 0.8$ /week at 12th week. Systolic blood pressure decreased after treatment, but there were no significant changes in diastolic blood pressure, heart rate, resting electrocardiogram and laboratory findings. Molsidomine was discontinued in one patient because of headache. **Conclusions** : Molsidomine is an effective and well tolerated anti-ischemic agent in patients with variant angina refractory to conventional anti-anginal therapy. (Korean Circulation J 1998;28(9):1577-1582)

**KEY WORDS** : Molsidomine · Variant angina.

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## 서 론

## 대상 및 방법

Furchgott Zawadzki<sup>1)</sup> (endot - helium - derived relaxing factor : EDRF) nitric oxide(NO) 50%  
<sup>2)(3)</sup> 가 NO 가 NO<sup>4)(5)</sup> 21  
<sup>6)(7)</sup> NO 가 NO 가  
<sup>8)</sup> 가 가  
<sup>9)</sup> NO 가 가  
Molsidomine 1  
6 mg 가  
(tolerance) Molsidomine 가  
가 NO NO 4 1  
donor NO donor가 8 mg  
, 12  
Molsidomine(N - ethoxycarbonyl - 3 - mor - pholino - syndnonimine, Fig. 1)<sup>10 - 16)</sup>  
Molsidomine 통 계  
SIN - 1 (3 - morpholino - syndnonimine) ,  
SIN - 1A paired t test  
. SIN - 1 p value가 0.05  
SIN - 1A cGMP  
가<sup>16)(17)</sup> 가 guanylate cyclase  
cysteine s - nitrosothiols  
<sup>18)(19)</sup> SIN - 1 가  
<sup>20)</sup>  
Molsidomine , 1 6 8 mg  
Molsidomine 12  
1) 12 가 가 6 ,  
14 54 ± 11.5 . Mols -  
idomine isoso -  
rbid - 5 - mononitrate isosorbid dinitrate  
, nitrate isosorbid - 5 - mononitrate  
가 62 ± 15.6 mg , isosorbid dinitrate가 168 ± 65.7  
mg , 9 ± 3.5 .

2) Molsidomine 124 ± 16.2  
mmHg, 4 121 ± 16.4 mmHg, 8 120 ± 14.  
2 mmHg, 12 121 ± 14.1 mmHg ,  
79 ± 13.1 mmHg, 77 ± 9.0 mmHg, 77 ±  
9.6 mmHg, 77 ± 9.7 mmHg .  
72 ± 7.3, 71 ± 5.1, 71 ± 5.5, 71 ± 5.5 .  
( p<0.005, p<0.05, p<0.05)

3) Molsidomine 12  
5.09 ± 0.60, 5.09  
± 0.60 × 10<sup>3</sup>/mm<sup>3</sup>, 248 ± 25.1,  
240 ± 27.6 × 10<sup>3</sup>/mm<sup>3</sup>, AST  
15 ± 4.9, 17 ± 35 U, ALT 21 ± 2.1, 25 ± 2.4  
U BUN 13.4 ± 1.6,  
13.5 ± 2.1 U, creatinine 0.7 ± 0.14, 0.9 ± 0.21  
U , 200 ± 7.1, 20  
1 ± 4.9 mg/dl, 135 ± 9.6, 137 ± 3.5 mg/dl,  
48 ± 2.8, 50 ± 2.8 mg/dl

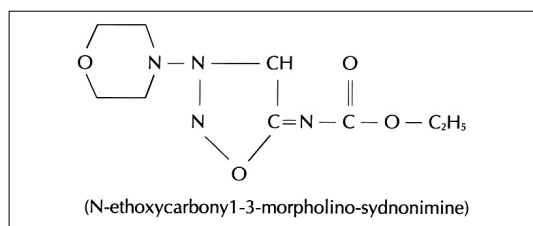


Fig. 1. The chemical structure of Molsidomine.

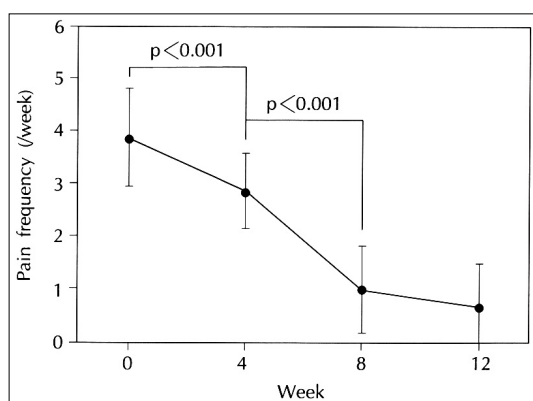


Fig. 2. Frequency of angina requiring sublingual nitroglycerin decreased at 4 and 8 weeks after Molsidomine treatment (p<0.001).

가 . Molsidomine  
7 , ST  
1 , T 7 , 3 , 1 ,  
1 , Molsidomine  
가 .  
4) Molsidomine 18 6  
mg 2 4 8 mg  
. Molsidomine

3.9 ± 0.9  
, 4 2.9 ± 0.7 , 8 1.0 ± 0.8  
, 12 0.7 ± 0.8 4  
4 8 , 가  
( p<0.001),  
(Fig. 2).

5) 21 1 Molsidomine 가  
(4.8%),  
2 .

## 고 안

Molsidomine의 약리작용

Molsidomine  
SIN - 1 ,  
SIN - 1A . SIN - 1A가

(16)(17)  
gua -  
nylate cyclase cGMP  
가 . cGMP

methy -  
lene blue cGMP 가  
SIN - 1 , M & B 22,948  
cGMP phosphodiesterase SIN -  
1 (16)

임상효과

Molsidomine , 가  
(10 - 16)(21 - 24) Majid (11)  
Molsidomine

Molsidomine  
가 , ST  
, Messin <sup>25)</sup>  
Molsidomine 4 mg 8 mg  
cGMP 가  
cGMP 46/50 kDa 가 , <sup>29)</sup>  
가 , <sup>30)</sup> IIb/IIIa  
P - selectin <sup>31)</sup> Jeong <sup>27)</sup> 15  
Molsidomine  
, Weber <sup>15)</sup>  
Molsidomine  
, Dalla - Volta <sup>26)</sup> 33  
, 48  
Molsidomine 6 8 mg  
내성 발현  
SIN - 1  
Molsi -  
domine 가  
가 guanylate cyclase  
cysteine s - nitrosothiols <sup>18 - 20)</sup>  
, SIN - 1 가  
Lehmann <sup>32)</sup> ISDN Mo -  
12 isosor -  
bid dinitrate(ISDN) Molsidomine 24  
가 , ISDN , Molsi -  
domine 가  
Molsidomine 24  
가 가  
Molsidomine 5 ISDN 2 Molsidomine 가  
, Molsidomine ,  
2 1  
. Jeong <sup>27)</sup> Molsidomine 4 가  
12  
부작용  
Renard <sup>28)</sup> Molsidomine 가  
8 mg Molsidomine ,  
가 ,  
Molsidomine 1  
, 2  
가 ,  
Dalla - Volta <sup>25)</sup> 10%  
가  
1  
, 2

본 연구의 제한점  
Molsidomine

(cost effectiveness)  
가  
omine  
domine

요 약  
연구배경 :  
가 가 NO donor Molsidomine  
(Molsiton®)

대상 및 방법 :  
( 6 , 14 ; 54 ± 11.5 )  
Molsidomine 1 6 m  
4 1 8 mg  
, 12

결 과 :  
124 ± 16.2 mmHg, 4  
121 ± 16.4 mmHg, 8 120 ± 14.2 mmHg, 12  
121 ± 14.1 mmHg  
( p<0.005, p<0.05, p<0.05),

가 . Molsidomine  
3.9 ± 0.9 4 2.9 ± 0.7 , 8  
1.0 ± 0.8 , 12 0.7 ± 0.8

4 4 8 8  
가 ( p<0.001),  
1  
2  
결 론 :  
Molsidomine

중심 단어 : Molsidomine

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