

총 20,680 Joules의 DC Shock에 의해서도 심근손상이 없었던 초오(Aconitum) 중독에 의한 심실성부정맥 치험 1례

진영주 · 이지현 · 최재홍 · 나병규 · 남기병
김동운 · 엄재호 · 조명찬 · 김승택

= Abstract =

A Case of Aconite Intoxication and Recurrent Ventricular Arrhythmia without Apparent Myocardial Damage after 20,680 Joules DC Shock

Young Ju Jin, M.D., Ji Hyun Lee, M.D., Jae Hong Choi, M.D.,
Byoung Gue Na, M.D., Gi Byoung Nam, M.D., Dong Woon Kim, M.D.,
Jae Ho Earm, M.D., Myeong Chan Cho, M.D., Seung Taik Kim, M.D.

*Department of Internal Medicine, College of Medicine, Chungbuk National University,
Cheong-Ju, Korea*

The aconite root has been used in oriental medicine to improve metabolism of debilitated patient and to cure acute dysuria, cardiac weakness, gout, neuralgias and rheumatism. The crude drug 'bu-shi' or 'cho-oh', which is obtained from the Aconitum roots, contains the potent poisons aconitine, mesaconitine, jesaconitine, and hypaconitine, which are C₁₉ diterpenoid ester alkaloids. These alkaloids have been known to induce fatal cardiac arrhythmias, such as ventricular tachycardia, and ventricular fibrillation.

In ventricular tachycardia or fibrillation, cardioversion/defibrillation are the most effective treatment of choice to terminate reentrant arrhythmias. Through animal experiments, it has been known that repeated delivery of high energy DC shocks cause some myocardial damage, and the severity of myocardial damage is proportional to the delivered energy. The paddle size, defibrillation interval and total delivered energy have also been known to be associated with the severity of injury. But in humans, the amount of energy that causes myocardial damage or dysfunction has not been studied. Therefore it is necessary that a quantitative study on this issue in conjunction with the amount of each delivered energy and the interval between electrical shocks should be done. We experienced a 36 year old man who complained nausea, vomiting, dizziness and generalized weakness and showed hemodynamic compromise with recurrent ventricular tachyarrhythmias such as bidirectional ventricular tachycardia, Torsades de pointes and ventricular fibrillation. This patient was resuscitated with repeated cardioversion/defibrillation of 20,680 Joules for 8 hours and 30 minutes, but did not show significant myocardial damage.

KEY WORDS : Aconite · Ventricular tachyarrhythmia · DC shock · Myocardial damage.

서 론

(Ranunculaceae) , AC DC 가 , paddle (cardiac weakness), 가 7), 가 8,9), (Aconiti ciliare) (Aconiti tuber) 가 10). aconitine, mesaconitine, jesaconitine, hypaconitine aconitine , 83 , 20,680 Joule DC cardioversion/defibrillation 1). 가 증 례 가 2-6). Cardioversion : , 36 .

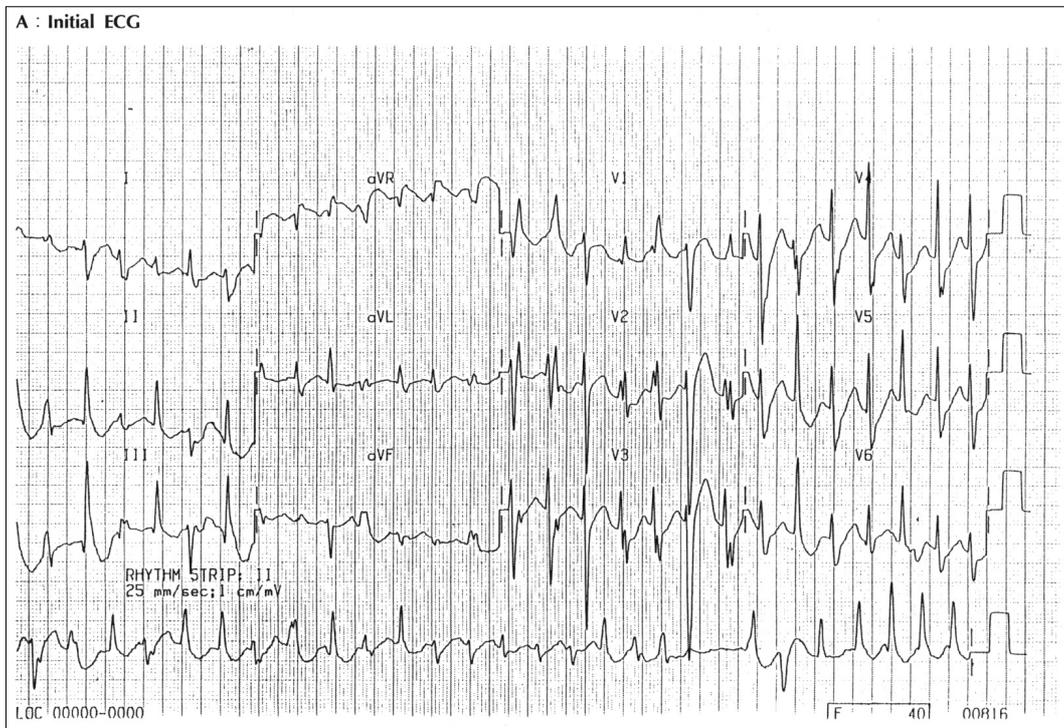


Fig. 1. ECG findings A : Initial ECG : bidirectional ventricular tachycardia.

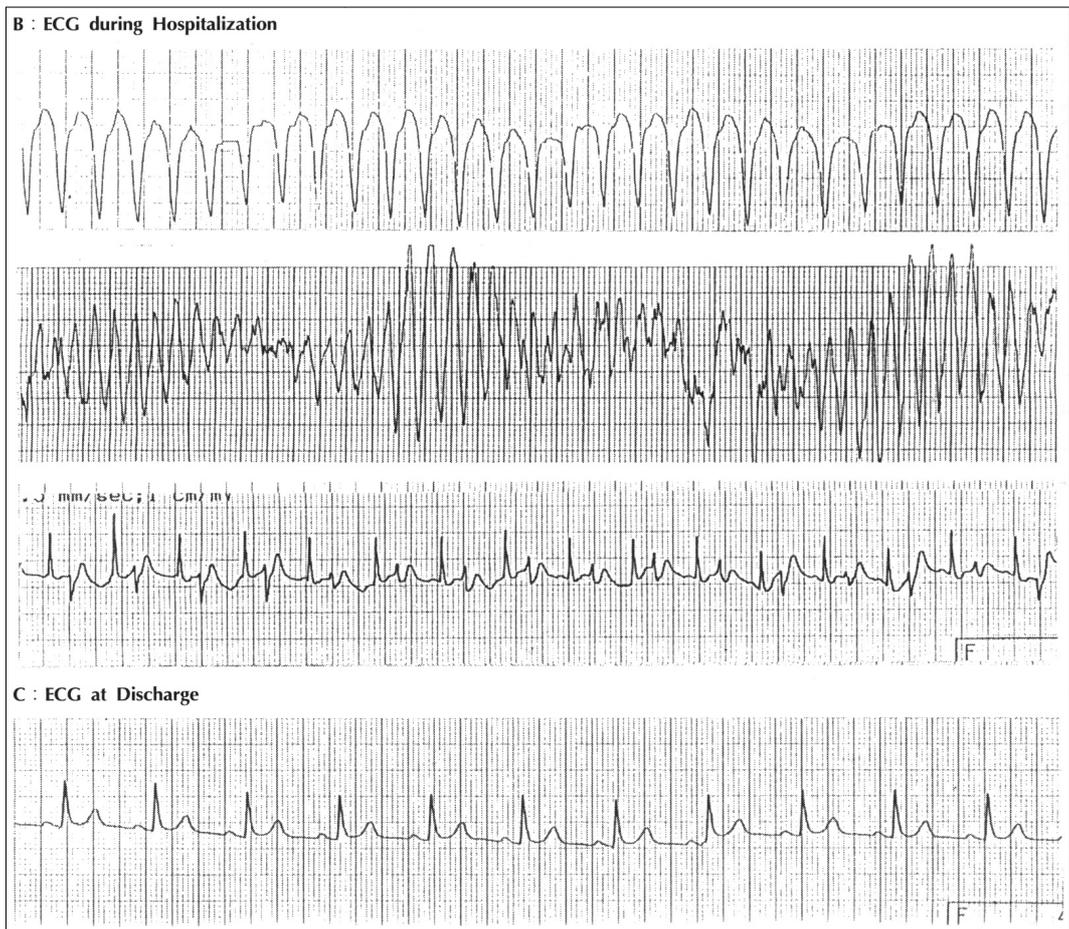


Fig. 1. ECG findings.
 B : ECG during hospitalization
 : Ventricular tachycardia
 Torsades de pointes,
 AV dissociation/junctional tachycardia/ventricular bigemini.
 C : ECG at discharge : Normal sinus rhythm.

1) , 20
 : 8 30 (.
 가 14.6g/dl, 40.9%, 9,800/mm³,
 263,000/mm³ , 가 pH
 12 가 7.16, pCO₂ 29mmHg, pO₂ 85mmHg, HCO₃⁻ 10
 mEq/L, Na⁺ 144mEq/ L, K⁺ 3.7
 mEq/L, Cl⁻ 106mEq/L, total CO₂ 11m Mol/L ,
 : 90/40mmHg, BUN/Creatinine 10/1.0mg/dl,
 190 , AST/ALT 145/109IU/L . ECG
 26 , 36.6 (Fig. 1).
 : (ventri -

cular bigemini), (polymorphic ventricular tachycardia),
 가 50
 60mmHg cardioversion
 cardioversion
 2
 32 cardioversion defibrillation
 5,380 Joule DC energy가
 220mg lidocaine(50mg 50mg 60mg
 60mg : 2% lidocaine 11cc)
 4mg
 . MgSO₄ 2.0gm , K⁺
 6 30 cardioversion
 defibrillation (cardiac massage)가
 51
 15,300Joule 가
 가 pH 6.84,
 pCO₂ 50mmHg, pO₂ 64mmHg, HCO₃⁻ 8.6mEq/L
 8 30
 83 DC cardioversion defibrillation
 20,680 Joule energy가
 , 100 120/60 80mmHg,
 70
 가 가
 pH 7.35, pCO₂ 24.9mmHg, pO₂ 64.4mm
 Hg, HCO₃⁻ 3.7mEq/L
 15 BUN/Creatinine 20/2.3mg /dl
 2 BUN/
 Creatinine 20/1.2mg/dl . 2
 AST/ALT 1,188/313IU/L , CK/
 LDH 3,400/1,684IU/L CK
 MB fraction 343IU/L 가 LDH1
 LDH2 298/319 0.94 .
 CK LDH 4 CK 3,720IU/L
 (CK - MB 1.54IU/L, CK - MM 3,718IU/L) LDH
 749IU/L(LDH1 178IU/L, LDH2 204IU/L)
 5 CK 4,610IU/L(CK - MB 0IU/L, CK -

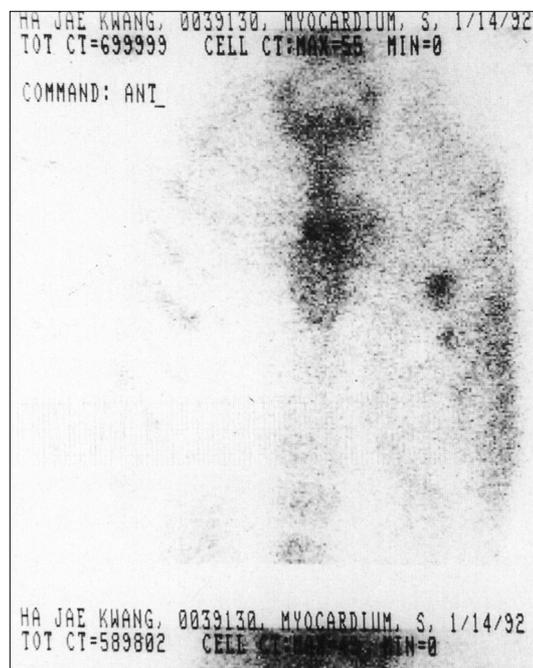


Fig. 2. Myocardial Scan(99mTc-Pyrophosphate).
 It shows diffusely increased uptake in left upper thorax and focal hot uptake in left 4th and 5th ribs which is probably due to injured skeletal muscle and fractured ribs. There is no evidence of myocardial uptake.

MM 4,610IU/L) LDH 729IU/L(LDH1 180IU/L, LDH2 190IU/L) isoenzyme pattern

. 2
 , 3 45%
 가 ^{99m}Tc pyrophosphate
 (Fig. 2), 5
 gated blood pool scan
 52% . 12

고 안

(Aconiti tuber), (Aconiti ciliare)
 (Aconitum) (Ranunculaceae)

1).

aconitine

higena - 12).

ine 11). Aconitine (resting membrane potential)

aconitine, mesaconitine, hyaconitine phase 4 depolarization

jesaconitine C¹⁹) diterpenoid ester 가 (automaticity) 13),

alkaloid 1),

14) (reentry mechanism)

. Higenamine catecholamine analogue (fibrillation) 가

- cAMP . Torsades de pointes(Fig. 1)

가 , junctional tachycardia(Fig. 1)가

Ca²⁺ 가 , VPB가 fixed coupling interval(Fig. 1)

. (pause)가

triggered activity, automat-

, 3 10mg , , , icity, reentry

1). Aconitine cardioversion

가 , , triggered acti-

ivity Torsades de pointes 가

. Aconitine (specific antidote)가 ,

. (activated charcoal) aconitine aconitine (645.7kDa) 12).

가 lidocaine, proc-

가 ainamide , 6), K⁺

2-6), atropine 가

, 1 , 2 , 3 4), aconitine 가

, 1 (bundle bra- 가

ch block), junctional escape rhythm, bidirectional , aconitine ,

ventricular tachycardia , aconitine ,

aconitine , 가

. Aconitine alkaloid 가

sodium channel , ,

(excitable tissue) .

(plat- (plat-

eau period) sodium (inward Na⁺ cu- class (flecainide), class (amiodarone) 12),

rrent) 가 .

(afterdepolarization) triggered act- QT , Torsades de pointes

ivity , ,

- 19 (3) : 240, 1976
- 6) 위상양·유지정·문무언·홍기방·최규태·안득주 : 초오중독에 대한 *atropine*의 시험례. 대한내과학회 잡지 20 (2) : 171, 1977
 - 7) Lown B, Neuman J, et al : *Comparison of alternating current with direct current electroshock across the closed chest. Am J Cardiol* pp223, 1962
 - 8) Dahl CF, Ewy GA, Warner ED, Thomas ED : *Myocardial necrosis from direct current countershock-Effect of paddle electrode size and time interval between discharges. Circulation* 50 : 956, 1974
 - 9) Davis JS, Lie JT, Bentinct DC, Titus JL, Tacker WA and Geddes LA : *Cardiac damage due to electrical current and energy. Processings of the cardiac defibrillation conference, Purdue University, West Lafayette, Indiana* pp27, 1975
 - 10) Kosuge T and Yokota M : *Studies on cardiac principles of aconitine root. Chem Pharm Bull* 24 : 176, 1976
 - 11) Tai YT, But PP, Young K, Lau CP : *Cardiotoxicity after accidental herb-induced aconite poisoning. Lancet* 340 (8830) : 1254, 1992
 - 12) Tanz RD, Robbins JB, Kemple KL, Allen PA : *Pharmacology of aconitine-induced automaticity of cat papillary muscle-Effect of dose, tension, rate and endogenous catecholamines. J Pharmacol Exp Ther* 185 : 427, 1978
 - 13) Sharma PL : *Mechanism of stretch and pressure on stimulus formation in the dog, with observation on the role of cholinergic factors. Brit J Pharmacol* pp368, 1963
 - 14) Adaniya H, Hayami H, Hiraoka M, Sawanobori T : *Effects of magnesium on polymorphic ventricular tachycardia induced by aconitine. J Cardiovasc Pharmacol* 24 : 721, 1994
 - 15) Lown B : *Electrical reversion of cardiac arrhythmias. Br Heart J* 29 : 469, 1967
 - 16) Smith GT, Beeuwkes R, Tomkiewicz M, Abe T and Lown B : *Pathological changes in skin and skeletal muscle following alternating current and capacitor discharge. Am J Pathol* 47 : 1, 1965
 - 17) DeSilva RA, Graboys TB, Podrid PJ, Lown B : *Cardioversion and defibrillation. Am Heart J* 100 (6) : 881, 1980
 - 18) VanVleet JF, Tacker WA, Cechner PE, Gedes LA, Ferrans VF, et al : *Effect of shock strength on survival and acute cardiac damage induced by open-chest defibrillation of dogs. Med Instrum* 12 : 55, 1978
 - 19) Ehsani A, Ewy GA and Sobel BE : *Effects of electrical countershock on serum creatine phosphokinase (CPK) isoenzyme activity. Am J Cardiol* 37 : 12, 1976
 - 20) Warner ED, Dahl C and Ewy GA : *Myocardial injury from transthoracic defibrillation countershock. Arch Pathol* 99 : 55, 1975
 - 21) Yarbrough R, Ussery G and Whitley J : *A comparison of the effect of AC and DC countershocks on ventricular function in thoracotomized dogs. Am J Cardiol* 14 : 504, 1964
 - 22) Koning G, Veefkind AH and Dreschler WA : *Biochemical and functional characterization of cardiac damage after experimental direct defibrillation (Abstr). Med Instrum* 12 : 55, 1978