

An Autopsy Case of Postpartum Acute Myocardial Infarction Associated with Postpartum Ergot Alkaloids Administration in Old-Aged Pregnant Women

Minseob Eom,¹ Jeong-Heon Lee,² Jae-Hun Chung,^{3,4} and Ho Lee^{3,4}

¹Department of Forensic Medicine, National Institute of Scientific Investigation, Seoul, Korea;

²Department of Obstetrics and Gynecology, ³Center for Healthcare Technology Development, and ⁴Department of Forensic Medicine, Chonbuk National University College of Medicine, Jeonju, Korea.

Cases of acute myocardial infarction (AMI) that occur during pregnancy or postpartum are rarely reported. Ergot derivatives are known to induce the spasmodic contraction of coronary arteries. Administration of ergot derivatives can cause AMI, even in normal healthy people. In several reported cases, ergot derivatives triggered severe AMI during the postpartum period. Here, we report the case of a forty-year-old woman who was successfully impregnated by artificial fertilization and died after treatment with ergot derivatives. The autopsy revealed AMI with severe coronary atherosclerosis. This is the first case that reports aggravation of pre-existent severe coronary atherosclerosis after postpartum infusion of ergot derivatives.

Key Words: Myocardial infarction, old age, woman, postpartum, ergot alkaloids

INTRODUCTION

Acute myocardial infarction (AMI) that occurs during pregnancy or postpartum is very rare.¹⁻³ Since 1922, few cases have been reported. Ergot derivatives are known to induce the spasmodic contraction of coronary arteries⁴ and are also used to diagnose ischemic heart diseases during car-

diac catheterization.⁵ Use of these ergot derivatives can cause acute AMI in normal, healthy people.⁶ Ergot derivatives are infused to induce contraction of the uterus after a cesarean section. The infusion of these reagents causes severe AMI during the postpartum period.⁷⁻¹² We examined a forty-year-old woman who was successfully impregnated via artificial fertilization. She died after ergot derivatives were administered. The autopsy showed a case of AMI with severe coronary atherosclerosis.

CASE REPORT

Due to infertility, a 40-year-old woman visited a local obstetric clinic and was impregnated via artificial fertilization. This was the first pregnancy for the woman, and she visited the clinic once a week to get a prenatal diagnosis after thirty-six weeks of gestation. At the thirty-eighth week, she was admitted to the clinic because of a low-lying placenta. Admission electrocardiograph (ECG) records showed abnormal findings, including right ventricular hypertrophy, right atrial enlargement, and right electrical axis deviation (Fig. 1A). The delivery was performed by general anesthesia with N₂O and ethrane. Due to the loss of approximately 1,500 mL blood, two pints of blood were supplied during the operation. She gave birth to a healthy boy who weighed approximately 3.8 kilograms. After the delivery, she received one ampule of ergot derivatives (proprie-

Received January 28, 2005

Accepted April 2, 2005

This research was supported by the Korean Ministry of Science and Technology through the Center for Healthcare Technology Development.

Reprint address: requests to Dr. Ho Lee, Department of Forensic Medicine, Chonbuk National University College of Medicine, 2-20 San, Keumam-dong, Dukjin-gu, Jeonju, Chonbuk 561-180, Korea. Tel: 82-63-270-3064, Fax: 82-63-270-3135, E-mail: foremed@chonbuk.ac.kr

tary name: erugin). However, her postoperative ECG showed doubtful signs of ischemic heart disease (Fig. 1B). She was transferred to an emergency room (ER) of a general hospital. The medical records showed: systolic blood pressure of 96 mmHg, pulse of 92 beats/min, 21 respirations/min, and a body temperature of 37.2°C. She started to complain about chest pain, and the ECG showed an acute myocardial infarction of the inferior wall. Additionally, the analysis of cardiac enzymes showed following findings: 162 U/L CK, 221 U/L CK-MB, 530 U/L LDH, and negative Troponin-T. Although these results were compatible with an acute myocardial infarction, she received sufficient amounts of fluid and nitroglycerin due to her hypovolemic state and acute MI. Five minutes later she showed an abrupt convulsion of a generalized type and lost consciousness. Cardiac arrest occurred, and cardiopulmonary resuscitation with intubation for one hour could not save her. She did not have any genetic or cardiac diseases, or any other risk factors for coronary atherosclerosis such as diabetes mellitus, smoking, hyperlipidemia, or a hypertensive disorder. The artificial fertilization was the only medical history.

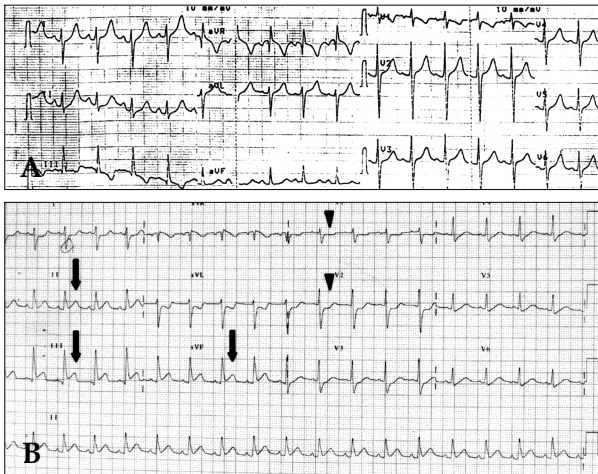


Fig. 1. 12-lead ECGs before (A) and after (B) the operation. A) A surface ECG shows sinus tachycardia (105 beats/min). Right axis deviation (RAD) and increased R/S ratio in lead V1 suggest right ventricular hypertrophy. B) A surface ECG shows a similar rate of sinus tachycardia and RAD. ST elevations (arrows) are noted in limb leads II, III, aVF. ST depressions (arrow heads) in precordial leads (V1-2) suggest acute infero-posterior myocardial infarction.

Autopsy findings

She was approximately 162 cm tall and weighed 65 kg. The external examination revealed CPR marks on her chest, a lower abdominal operative scar, several injection marks, and a small amount of vaginal bleeding from the deceased body. Internally, the heart weighed about 388.0 g, which is heavier than the normal range (Fig. 2). Gross and histological examinations revealed that the right coronary artery, left anterior descending branch of left coronary artery, and the left circumflex artery were hardened by severe atherosclerosis and calcification. An obstructive vascular lumen was also found (Fig. 3). The liver weighed about 1,985 g, and showed partial fatty degenera-



Fig. 2. Heart weighs about 388 g and shows flabby appearance.

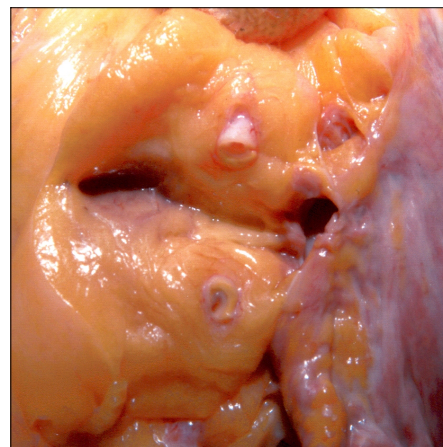


Fig. 3. Left anterior descending coronary artery is near-totally obstructed by atherosclerosis with calcification.

tion. There was no indication of any specific disease or injury. No toxic agents or alcohol components were detected in the blood or gastric contents.

DISCUSSION

Acute myocardial infarction rarely occurs in women of child-bearing age, the frequency of AMI among pregnant women is approximately 1 in 10,000.¹ Premenopausal women without risk factors such as diabetes mellitus, hyperlipidemia, and severe hypertension have rarely AMI or coronary atherosclerosis.¹³ Since the first report was published in 1922,² few cases have been reported.³ In 1996, Roth and Elkayam³ reported 125 cases of pregnancy-related AMI, which had serious effects on the prognosis of pregnant women as well as neonates. This study revealed that the AMI occurrence rate tends to increase in old-aged pregnancy (more than 35 years old, WHO), and with smoking, stress, and drug addiction. All pregnant women are at risk of AMI, but it is mostly seen in women older than 33 years who are in their third trimester. Additionally, the occurrence rate in multiparous women is higher than in primiparas. AMI chiefly invades the anterior wall of the left ventricle. The maternal death rate is approximately 21%, and usually occurs within two weeks of onset. Although the fetal death rate is usually closely related to maternal death rate, it is 13% in the case of AMI. Apart from thrombus formation, morphological findings have demonstrated coronary atherosclerosis in 42% of all pregnant women and 29% in normal coronary arteries. In our case, the deceased woman has had no risk factors except old age. However, all three major coronary arteries were 95% obstructed with atherosclerosis. A partial calcification was also observed. A histological examination showed no infarction, but an EKG revealed infarction of the inferior wall.

Ergot derivatives have usually been used to treat migraines. This medicine is also widely used in the obstetric field as an oxytocic agent after delivery. Although a person with a cardiac disease is a contraindication for use of this medicine, there are relatively few cardiac complications. Additio-

nally, since ischemic changes in cardiac muscle after an ergot derivative-induced delivery are very rare, anesthesiologists are apt to overlook a possible occurrence of the ischemia. Anesthesiological reports which discuss AMI are rare. On the other hand, approximately seven cases of ergot derivative-related AMI after delivery have been reported in obstetrics or heart-related journals.⁷⁻¹² Ergot derivatives are known to reduce the capacity of the intravascular lumen by 15-20% in normal coronary arteries.⁵ The pathogenesis of arterial spasms strong enough to induce myocardial infarction is uncertain. However, known risk factors are: old-aged pregnancy (over 30 years old), smoking, alcohol abuse, and a past medical history of migraines.⁸⁻¹² Recent reports have indicated that AMI rates among Asians are higher than in Caucasians and Blacks.¹⁴ In conclusion, it is reasonable to postulate that the infusion of ergot-derivatives induces AMI, although this medicine is commonly used.

To date, ergot derivatives have been commonly used to induce uterine contractions without considering AMI. Our report is the first that refers to a pregnant woman who died with a severe aggravation of AMI after the administration of ergot-derivatives. Overall, cardiac problems in pregnant women should be always checked before delivery, especially in cases artificial fertilization in old-aged women. All pregnant women with several risk factors need to be carefully monitored for AMI; the person in charge of drug selection should always be alert and pay attention.

REFERENCES

1. Hankins GD, Wendel GD Jr, Leveno KJ, Stoneham J. Myocardial infarction during pregnancy: a review. *Obstet Gynecol* 1985;65:139-46.
2. Sullivan JM, Ramanathan KB. Management of medical problems in pregnancy- severe cardiac disease. *N Engl J Med* 1985;313:304-9.
3. Roth A, Elkayam U. Acute myocardial infarction associated with pregnancy. *Ann Intern Med* 1996;125: 751-62.
4. De Groot AN, van Dongen PWJ, Vree TB, Hekster YA, van Roosmalen J. Ergot alkaloids. Current status and review of clinical pharmacology and therapeutic use compared with other oxytocics in obstetrics and gynaecology. *Drugs* 1998;56:523-35.

5. Lange RA, Hillis LD. Assessment of cardiovascular function, Diagnostic and therapeutic cardiac catheterization, 2nd ed. Baltimore: Williams & Wilkins; 1994. p. 394-429.
6. Nall KS, Feldman B. Postpartum myocardial infarction induced by methergine. *Am J Emerg Med* 1998;16:502-4.
7. Tsui BC, Stewart B, Fitzmaurice A, Williams R. Cardiac arrest and myocardial infarction induced by postpartum intravenous ergonovine administration. *Anesthesiology* 2001;94:363-4.
8. Taylor G, Cohen B. Ergonovine-induced coronary artery spasm and myocardial infarction after normal delivery. *Obstet Gynecol* 1985;66:821-2.
9. Liao JK, Cockrill BA, Yurchak PM. Acute myocardial infarction after ergonovine administration for uterine bleeding. *Am J Cardiol* 1991;68:823-4.
10. Fujiwara Y, Yamanaka O, Nakamura T, Yokoi H, Yamaguchi H. Acute myocardial infarction induced by ergonovine administration for artificially induced abortion. *Jpn Heart J* 1993;34:803-8.
11. Ko WJ, Ho HN, Chu SH. Postpartum myocardial infarction rescued with an intraaortic balloon pump and extracorporeal membrane oxygenator. *Int J Cardiol* 1998;63:81-4.
12. Yaegashi N, Miura M, Okamura K. Acute myocardial infarction associated with postpartum ergot alkaloid administration. *Int J Gynecol Obstet* 1999;64:67-8.
13. Kumar V, Abbas AK, Fausto N. Pathologic basis of disease. 7th ed. Philadelphia: Elsevier Saunders; 2004. p.520.
14. Pristipino C, Beltrame JF, Finocchiaro ML, Hattori R, Fujita M, Mongiardo R, et al. Major racial differences in coronary constrictor response between Japanese and Caucasians with recent myocardial infarction. *Circulation* 2000;101:1102-8.