

## Myocardial Infarction Caused by Coronary Vasospasm under General Anaesthesia

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**Summary.** We examined ergonovine-provoked coronary arteriogram and endomyocardial biopsy in a case showing ST elevation in I,  $aV_L$  and  $V_{3-6}$  upon an operation for breast cancer under general anaesthesia and normal coronary arteries. A 63-year-old female exhibited non-Q wave anterior myocardial infarction when operated with general anaesthesia. Introducing ergonovine provocation into the normal right coronary artery induced ST elevations in II, III,  $aV_F$  and  $V_{4-6}$  with chest pain. Chest pain and electrocardiographic change disappeared following the injection of isosorbide dinitrate into the coronary artery. Specimens of the cardiac muscle did not show vascular abnormality. In this case, the mechanism of acute myocardial infarction could be based on the depression of coronary reserve caused by multivessel vasospasm.

### INTRODUCTION

Myocardial infarction is one of the major complications during or following surgery under general anaesthesia, occurring in 0.1% to 0.7% of patients in the perioperative period.<sup>1,2)</sup> The reinfarction rate in patients with a history of myocardial infarction is reported to be higher at around 7%. In patients who had previous infarction within 0-3 and 4-6 months prior to the anaesthesia and surgery, reinfarction rate is much higher being about 37% and 16%, respectively.<sup>2,3)</sup>

Myocardial ischemia and myocardial infarction can occur in patients who have normal coronary arteries. These patients exhibit a limited response of coronary flow to the pacing stress, and the administration of vasodilators and vasoconstrictor stimuli

such as ergonovine can result in precipitations of anginal pain or myocardial ischemia from vasospasm.<sup>4)</sup>

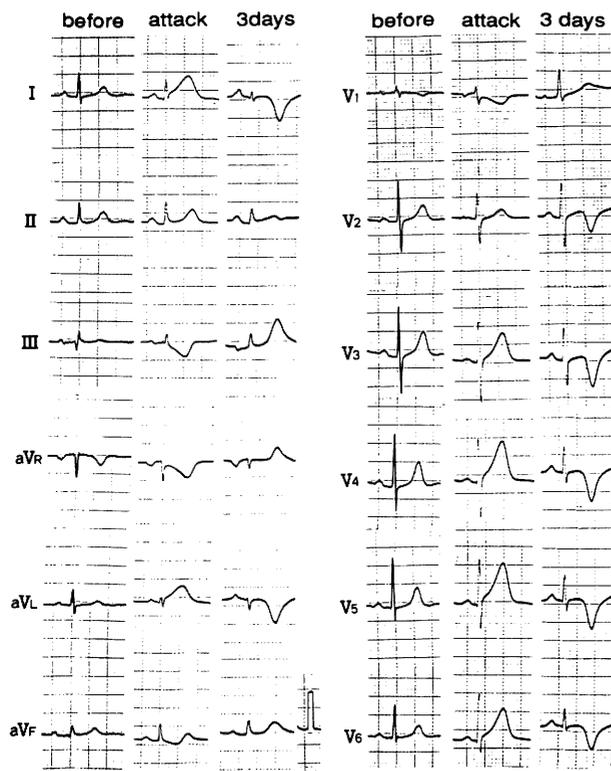
We report a case of infarction during general anaesthesia having normal coronary arteries. Ergonovine induced coronary vasospasm, which was considered the cause of the myocardial infarction.

### CASE

A 63-year-old female was referred to our hospital for myocardial infarction. She was undergoing radical surgery under general anaesthesia (thiopental) when the operation was stopped since the electrocardiographic monitor showed ST elevation and ventricular extrasystoles. Creatinine phosphokinase was found to be high and the 12-lead electrocardiogram showed ST-elevations in I,  $aV_L$ , and  $V_{4-6}$ . Three days later, non-Q wave infarction on the antero-lateral wall of the left ventricle was diagnosed (Fig. 1).

The patient entered our hospital for examination. The patient has been given 300 mg/day of tegafur (UFT which is composed of tegafur and uracil) orally.

Cardiac catheterization showed an elevation of the left ventricular end-diastolic pressure to 20 mmHg. The left ventriculogram and the coronary angiograms were normal. After the routine coronary arteriography, a selective methylergonovine provocation test was performed.<sup>5)</sup> Following ergonovine into the right coronary artery, ST rose in II, III,  $aV_F$  and  $V_{4-6}$  and chest pain occurred (Fig. 2). Both chest pain and electrocardiographic change disappeared soon after injection of isosorbide dinitrate. Intracoronary ergonovine into the left coronary artery was done but



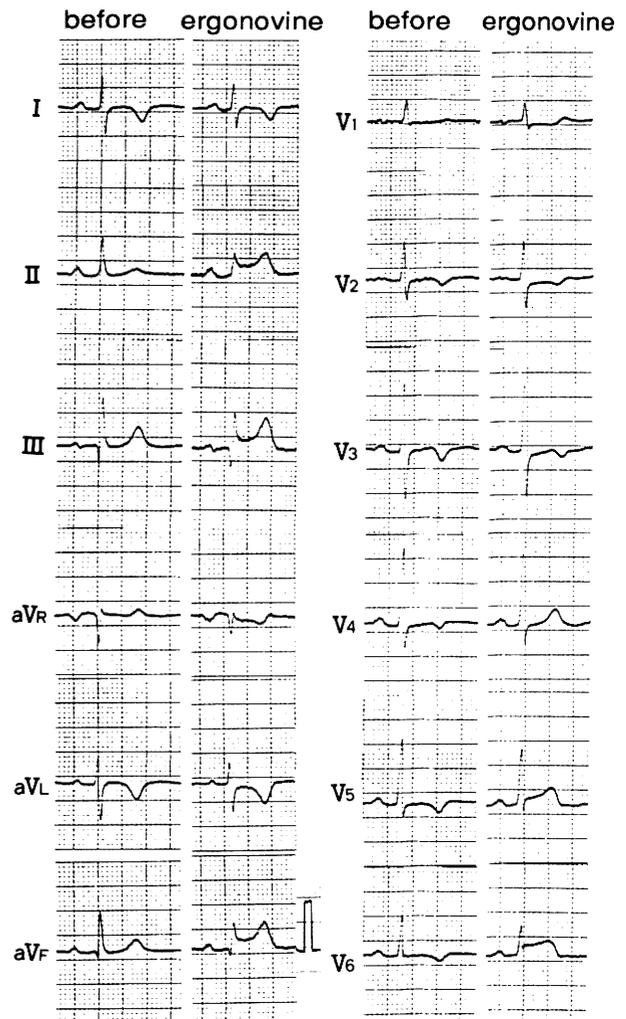
**Fig. 1.** The elevation of the ST segment in I, aV<sub>L</sub> and V<sub>3-6</sub> occurring during general anaesthesia (attack). After 3 days, coronary T wave change in I, aV<sub>L</sub> and V<sub>2-6</sub>, and tall R wave in V<sub>1</sub> were detected (3 days).

no spasm was provoked. The left ventricular end-myocardial biopsy showed marked hypertrophy of the myocardial cells, but no vascular abnormality was found.

We prescribed diltiazem, isosorbide dinitrate, and nicorandil; the patient underwent the right mammary section under general anaesthesia with thiamylal. No ischemic ECG change nor any myocardial infarction recurred, and the procedure was uneventful.

**DISCUSSION**

The female patient in discussion had anterior myocardial infarction during anaesthesia, but her coronary arteries were normal. Chest pain and ST elevation were induced after ergonovine infusion into the right coronary artery, which were relieved promptly after administration of intracoronary isosorbide dinitrate. However, ST elevation was not provoked when ergonovine was given into the left coronary



**Fig. 2.** ST segment elevation in II, III, aV<sub>F</sub> and V<sub>4-6</sub> and chest pain occurring after administration of intracoronary ergonovine (ergonovine).

artery. The provocation test with ergonovine is highly specific to diagnose vasospasm. Though we had a negative result in the provocation in the left coronary artery, the left coronary spasm was likely caused by the anterior myocardial infarction during general anaesthesia. Therefore, the case must have multivessel vasospasm. Whether a spasm of the coronary artery was caused by tegafur or not is unknown, but such a possibility has been reported earlier.<sup>6)</sup>

Ca<sup>++</sup> antagonist is effective for vasospastic angina, and under the prescription of diltiazem, isosorbide dinitrate and nicorandil, the radical mastectomy was uneventful during and following general anaesthesia. She has been well during the follow-up period of one year.

**REFERENCES**

- 1) Rao TLK, Jacobs KH, El-Etr AA: Reinfarction following anesthesia in patients with myocardial infarction. *Anesthesiology* **59**: 499-505, 1983.
- 2) Hertzner NR, Beven EG, Young JR, O'Hara PJ, Ruschhaupt WF, Graor RA, Dewolfe VG, Maljovec LC: Coronary artery disease in peripheral vascular patients: a classification of 1,000 coronary angiograms and results of surgical management. *Ann Surg* **199**: 223-233, 1984.
- 3) Jamieson WRE, Janusz MT, Miyagishima RT, Gerin AN: Influence of ischemic heart disease on early and late mortality after surgery for peripheral occlusive vascular disease. *Circulation* **66**: 192-97, 1982.
- 4) Cannon RO, Schenke WH, Leon MB, Rosing DR, Urohart J, Epstein SE: Limited coronary flow reserve after dipyridamole in patients with ergonovine-induced coronary vasoconstriction. *Circulation* **75**: 163-174, 1987.
- 5) Igarashi Y, Yamazoe M, Suzuki K, Tamura Y, Matsubara T, Tanabe Y, Yamaguchi T, Watanabe K, Aizawa Y, Shibata A: Possible role of coronary artery spasm in unexplained syncope. *Amer J Cardiol* **65**: 713-717, 1990.
- 6) Neal S, Daniel E, Charles E, Craig M, James B: Prinzmetal's Angina during 5-fluorouracil chemotherapy. *Amer J Med* **82**: 566-568, 1987.