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Case Report

Spontaneous coronary artery spasm detected by computed tomography coronary angiography: Provoked spasm site similar to intracoronary injection of ergonovine but not acetylcholine

Shozo Sueda (MD FJCC)[a,*], Hiroaki Kohno (MD)[b]

[a] Department of Cardiology, Ehime Niihama Prefectural Hospital, Ehime, Japan
[b] Department of Cardiology, Tsukazaki Hospital, Himeji, Japan

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ABSTRACT

A 61-year-old man was admitted to our hospital due to chest pain on both rest and effort. After the computed tomography coronary angiography, coronary stenosis was recognized at segment 3. Because inferior ischemia on stress myocardial perfusion scintigraphy with 201 thallium chloride induced by adenosine was found, we planned to perform the coronary intervention. After control coronary angiography, no significant stenosis was found in the right coronary artery. Intracoronary acetylcholine testing disclosed diffuse spasm at segment 4, whereas intracoronary ergonovine administration documented the total spasm at segment 3. After the intracoronary administration of nitrate, we diagnosed him with coronary spastic angina without organic stenosis.

<**Learning objective:** We describe a case of coronary spastic angina whose spontaneous coronary spasm was detected by computed tomography coronary angiography incidentally.>

Introduction

Computed tomography coronary angiography (CTCAG) has been employed in the clinic to investigate coronary atherosclerosis. Cardiologists may administer vasodilators after the recognition of no atherosclerotic stenosis by CTCAG in patients suspected of having coronary spasm. Some spontaneous coronary spasms detected by CTCAG have been reported [1–5]. Before the examinations of CTCAG, cardiologists and radiologists in the majority of institutions used some nitrate and beta-blocker. The administration of beta-blocker may aggravate the coronary artery spasm.

We report a case who was suspected of having coronary artery stenosis at segment 3 by CTCAG but we finally diagnosed him as having coronary spastic angina without organic stenosis after the coronary angiography and spasm provocation testing.

Case report

A 61-year-old man was admitted to our hospital because of rest and effort angina. Since one year previously, he had complained of chest symptoms. Sublingual nitroglycerine was effective to relieve his angina attacks. He had no history of smoking or family history of ischemic heart disease. He had taken calcium-channel antagonist (amlodipine besilate 5 mg) and angiotensin-receptor-blocker (valsartan 80 mg) due to hypertension in the morning, while he had no diabetes mellitus or dyslipidemia.

His electrocardiogram on admission was normal and his Master double test showed negative ischemic findings. CTCAG disclosed significant coronary stenosis at segment 3 (Fig. 1A) after the use of a nitroglycerine tape 5 mg and a metoprolol tartrate 20 mg 2 h previously. Because partial redistribution in inferior portion was observed after the stress myocardial perfusion scintigraphy with 201 thallium chloride induced by adenosine (Fig. 2), we planned to perform coronary angiography and coronary intervention in the mid right coronary artery. After the control coronary angiography on both coronary arteries prior to 24-h cessation of medications, no organic stenosis was found. Intracoronary acetylcholine administration of 20 and 50 μg into the left coronary artery did not provoke spasm, whereas diffuse spasm at mid left anterior descending

* Corresponding author at: The Department of Cardiology, Ehime Niihama Prefectural Hospital, Hongou 3 choume 1-1, Niihama, Ehime 792-0042, Japan.
E-mail address: EZF03146@nifty.com (S. Sueda).

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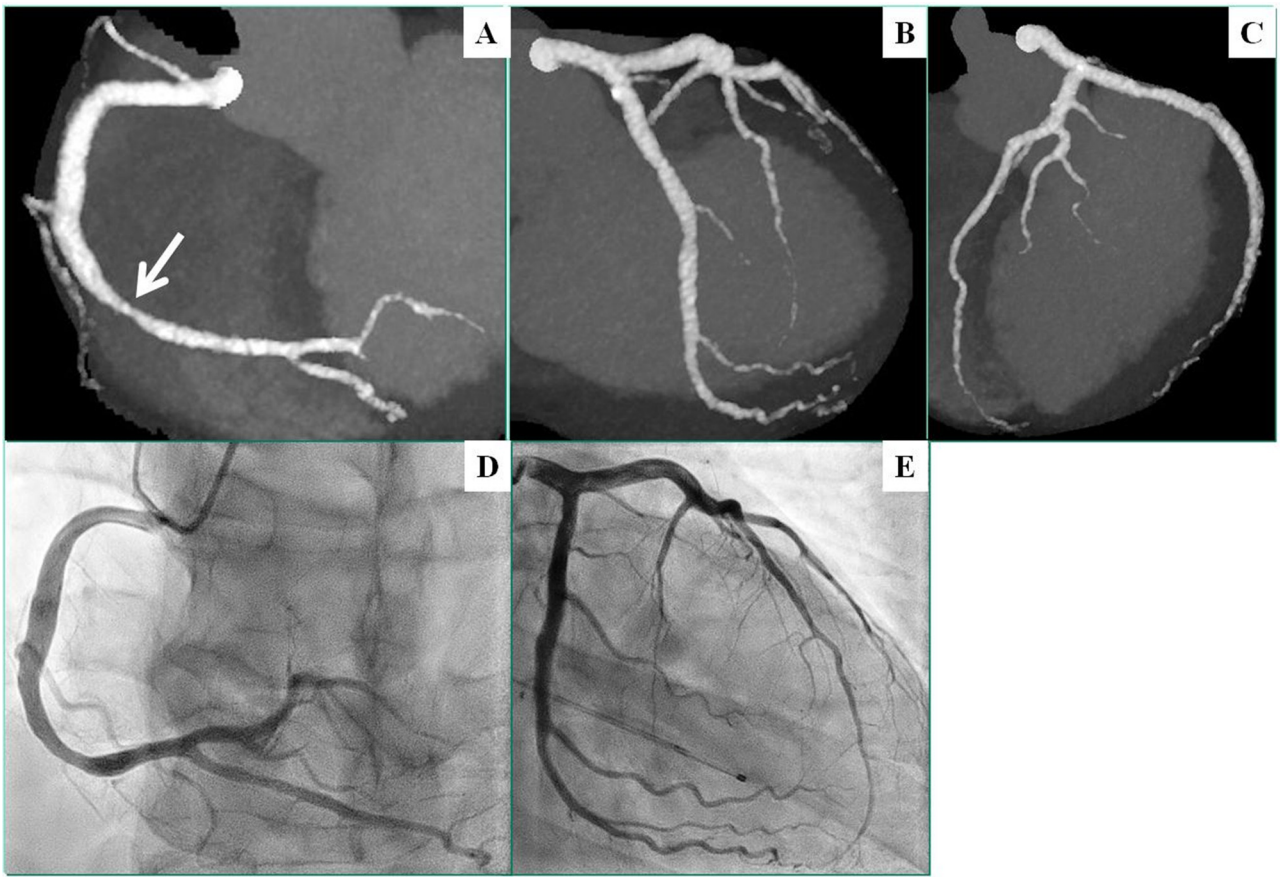

Fig. 1. Computed tomography coronary angiography and control coronaryangiography. (A) Coronary stenosis was found at mid RCA (white arrow) by CTCAG. (B,C) No stenosis was observed in the LCA by CTCAG. (D) No stenosis was found in the RCA by coronary angiography. (E) No stenosis was observed in the LCA by coronary angiography.
RCA, right coronary artery; LCA, left coronary artery; CTCAG, computed tomography coronary angiography.

artery and distal circumflex artery was provoked after the injection of 100 μg acetylcholine accompanied with usual chest pain (Fig. 3B). After the spontaneous dilatation of his left coronary artery, intracoronary injection of 80 μg into the right coronary artery disclosed diffuse spasm at segment 4 (Fig. 3D) accompanied with usual chest pain and ischemic ST depression in inferior leads. After the spontaneous relief of distal right coronary artery spasm for at least 5 min, intracoronary injection of ergonovine 30 μg into the right coronary artery disclosed total spasm at segment 3 (Fig. 3E) accompanied with usual chest pain and ST elevation in inferior leads. We diagnosed him as having coronary spastic angina with triple vessel spasm. We changed a nifedipine CR 20 mg from amlodipine and added isosorbide mononitrate 20 mg before sleep. Since then, he never complained of chest pain.

Discussion

In this article, we report a case with coronary spastic angina which had coronary stenosis by CTCAG but no stenosis by coronary angiography. Intracoronary injection of ergonovine provoked total spasm at segment 3 which showed the coronary stenosis by CTCAG. Spontaneous coronary spasm was detected by CTCAG incidentally. Before examinations of CTCAG, we used a nitroglycerine tape 5 mg under amlodipine 5 mg in this case. In patients with high disease activity of coronary spasm, the administration of nitroglycerine 5 mg was less to relieve the spontaneous coronary spasm. Furthermore, we cardiologists should bear in mind the presence of coronary spasm, irrespective of the finding of coronary stenosis by CTCAG.

In past reports, some authors showed no coronary stenosis after the administration of nitrate although significant coronary stenosis was suspected by the CTCAG. Kawaguchi et al. reported a normal coronary case which had significant narrowing at distal right coronary artery by CTCAG and provoked spasm at the same site by acetylcholine testing [6]. We showed the spontaneous spasm by CTCAG and provoked total spasm at the same site by intracoronary ergonovine testing. However, intracoronary acetylcholine test showed the different response of coronary spasm. As we already reported [7,8], intracoronary injection of acetylcholine provoked diffuse distal spasm, whereas intracoronary administration of ergonovine documented focal and proximal spasm. In this case, intracoronary ergonovine-provoked spasm may be similar to spontaneous spasm.

Cardiologists and radiologists in the majority of institutions employ a nitroglycerine spray/tablet or tape as a vasodilator when performing the CTCAG. Beta-blocker was also used as a bradycardia effect. Considering coronary spasm, beta-blocker use may aggravate coronary constriction in some patients. Especially in patients with high disease activity of coronary spasm, some amount of beta-blocker may stimulate coronary spasm. In this case, premedication of metoprolol 20 mg might aggravate coronary artery constriction at mid right coronary artery during the CTCAG. When we perform a CTCAG in patients with suspected coronary spasm, it may be better to select the administration of the calcium channel antagonists such as diltiazem hydrochloride or verapamil

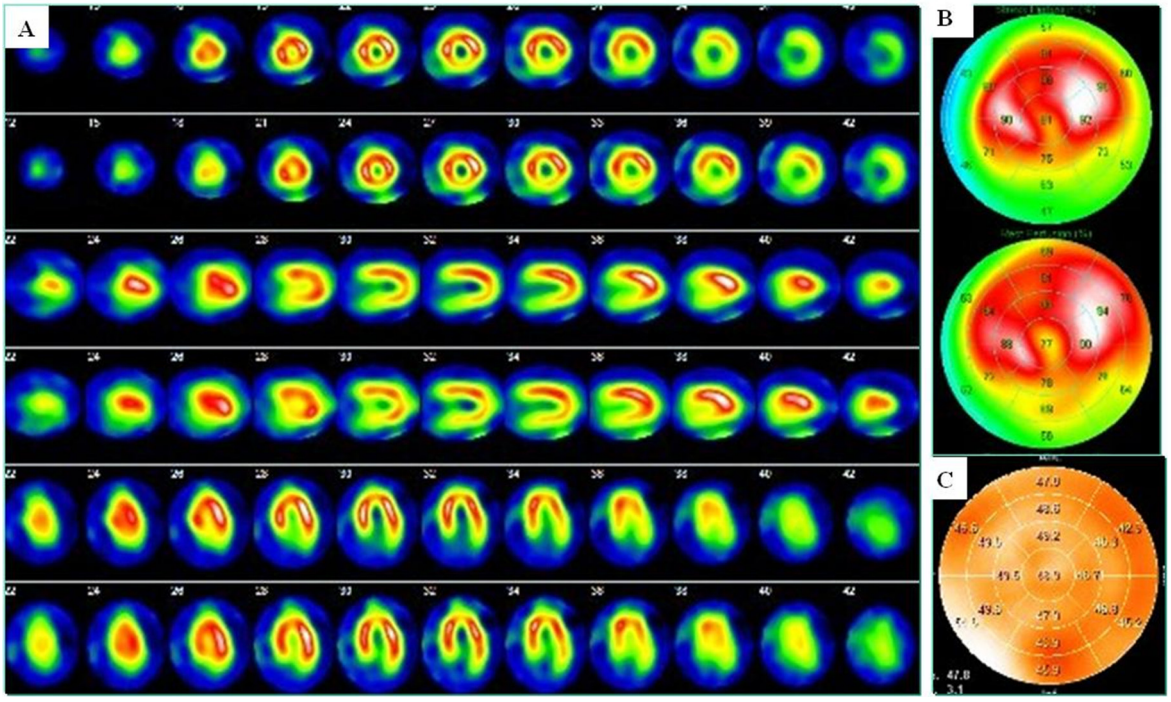

Fig. 2. Stress myocardial perfusion scintigraphy with 201 thallium chloride induced by adenosine. (A) Partial redistribution in inferior portion was found on single-photon emission computed tomography findings. (B) Partial redistribution in inferior portion was observed on Bull's eye findings. (C) Washout rate was 47.8%.

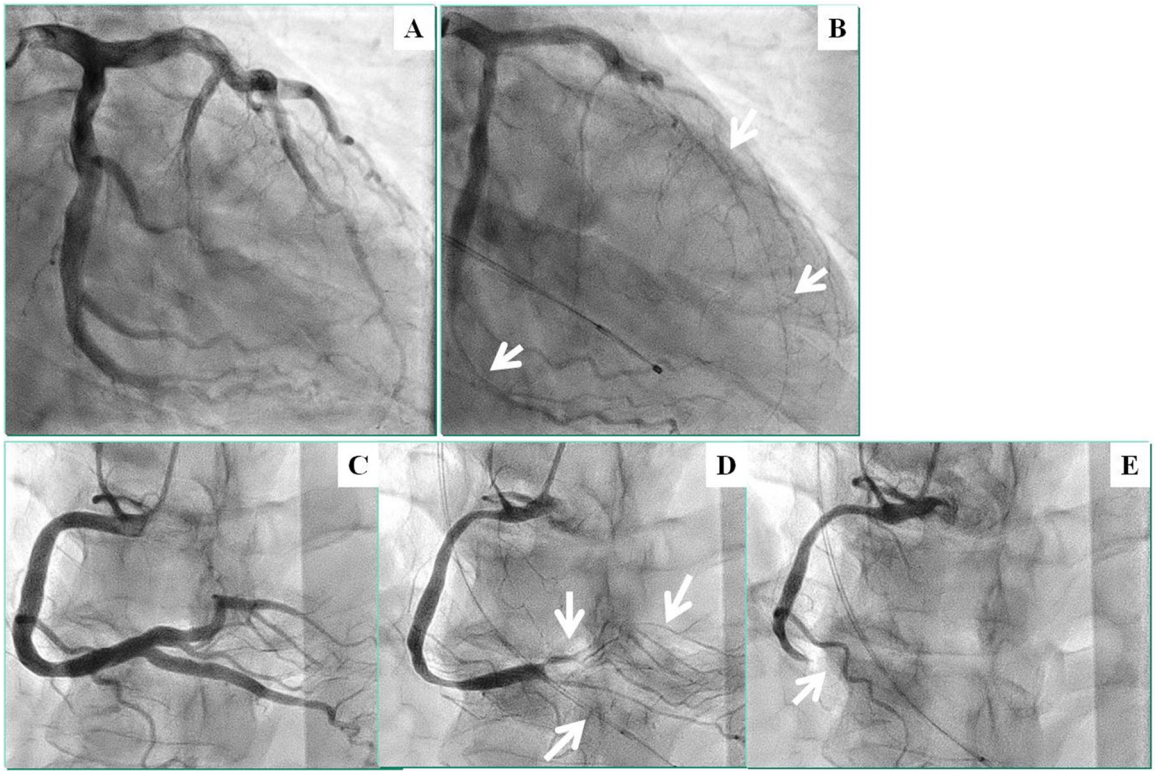

Fig. 3. Coronary angiography and spasm provocation testing. (A) No stenosis was observed after nitrate in the LCA. (B) Diffuse coronary spasm was observed at mid-distal LAD and distal LCX after the administration of ACh 100 μg into the LCA. (C) No stenosis was found after nitrate in the RCA. (D) Diffuse spasm at distal RCA was found after ACh 80 μg into the RCA. (E) Total spasm was documented at segment 3 after the intracoronary ER 30 μg into the RCA.
ACh, acetylcholine; ER, ergonovine; RCA, right coronary artery; LCA, left coronary artery; LAD, left anterior descending artery; LCX, left circumflex artery.

hydrochloride instead of beta-blocker. However, we had no data about the clinical usefulness of calcium channel antagonists during the CTCAG. Irrespective of the finding of coronary stenosis by CTCAG, cardiologists and radiologists should bear in mind the notion of the presence of coronary spasm.

Funding

None.

Conflict of interest

The authors declare that they have no conflicts of interest.

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