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Case Report

Vasospastic angina resulting in sudden cardiac arrest, initially misdiagnosed as a psychiatric disorder

Teruo Okabe (MD)*, Hiroki Kitakata (MD), Hiroya Iwahori (MD), Yasuo Kurita (MD), Narutaka Ohashi (MD), Satoshi Ogawa (MD, FJCC)

Cardiovascular Center, International University of Health and Welfare, Mita Hospital, Tokyo, Japan

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ABSTRACT

A 51-year-old-woman with a history of ablation therapy due to Wolff–Parkinson–White syndrome had been suffering from ambiguous chest pain, prompting investigation by several cardiologists. After being dissatisfied with a psychiatric disorder diagnosis, she was admitted to our hospital for further investigation. She lost her consciousness due to a sudden cardiac arrest shortly after admission. A provocation test indicated vasospastic angina associated with a diffuse spastic pattern of her left anterior descending artery.

<**Learning objective:** This case demonstrates that implantation of a cardioverter defibrillator may be avoided if the angiographic pattern of the vasospasm is recognized, the condition is correctly diagnosed, and appropriate medications are prescribed.>

Introduction

The number of patients suffering from vasospastic angina, or Prinzmetal angina, is relatively low compared with the number experiencing exertional angina. Although some aspects of the disease mechanism remain unclear [1], the pathogenesis of coronary artery spasm is reported to be different from that of atherosclerotic stenosis; patients with vasospastic angina do not typically have significant coronary stenosis angiographically. This makes the non-invasive diagnosis of the disease difficult unless an attack occurs during an electrocardiogram (ECG) [1,2]. Thus, there is the dangerous possibility of ignoring the seriousness of the symptoms, because, in many cases, true coronary function abnormalities are not evident. As a result, pharmacological and non-pharmacological coronary spasm provocation tests, during coronary angiography, have been established as useful diagnostic tools for vasospastic angina [3].

We treated a patient who was eventually diagnosed with vasospastic angina using a pharmacological provocation test. She presented with frequent ambiguous chest pain, initially diagnosed as a psychiatric disorder by several cardiologists, and finally collapsed because of ventricular fibrillation.

Case report

A 51-year-old woman underwent catheter ablation due to Wolff–Parkinson–White syndrome several years prior to this admission. Two months prior to this admission, she began suffering from intermittent ambiguous chest pain that was not correlated with exertion and dyspnea. The frequency and strength of the pain gradually worsened with the simultaneous occurrence of severe dizziness. She had met with another doctor because she developed faintness after taking a sublingual nitroglycerin tablet after experiencing chest pain. Although she was prescribed nicorandil (60 mg/day) and diltiazem hydrochloride (100 mg/day) at the hospital, her chest pain continued. She underwent cardiac ultrasonography, 24-h continuous ECG monitoring, and multislice coronary computed tomography. However, there were no significant findings that could explain her symptoms. Additionally, as she had a personal ECG machine, she recorded ECGs many times when she experienced chest pain, but abnormalities were not recorded. Until then, she had not undergone the pharmacological provocation test in order to make the differential diagnosis about vasospastic angina, mostly because her way of complaining symptoms was judged to be over-exaggerated.

Finally, the patient visited our hospital after being diagnosed with a psychiatric disorder. The patient was admitted for a thorough examination of the mechanism of her symptoms. Upon admission, all medicines were discontinued for 11 days prior to a pharmacological provocation test, using the catheter technique,

* Corresponding author at: 1-4-3 Mita, Minato-ku, Tokyo 108-8329, Japan. Tel.: +81 03 3451 8121; fax: +81 03 3454 0067.
E-mail address: tmsb105@iuhw.ac.jp (T. Okabe).

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and 24-h continuous ECG monitoring was implemented; we were deeply skeptical about her having vasospastic angina. Early the following morning (07:05), she called a nurse because of chest pain; the cardiac monitor indicated a short run of ventricular tachycardia. Both her symptoms and the arrhythmia disappeared within a couple of minutes, causing no vital sign abnormalities (Fig. 1a). Shortly thereafter (07:17) the monitor showed another episode of ventricular tachycardia, and the patient lost consciousness. Her blood pressure was unmeasurable and ventricular fibrillation was ascertained, on the monitor, following a period of sustained ventricular tachycardia (Fig. 1b). Cardiopulmonary resuscitation was performed immediately, with intravenous administration of epinephrine (1 mg) until the first electrical defibrillation (260 J) was performed; it failed. A second defibrillation was performed after the administration of another dose of epinephrine (1 mg), resulting in conversion to a sinus rhythm. The patient then began continuous venous administration of nicorandil (2 mg/h) with benidipine hydrochloride (4 mg, orally) every 8 h. This was followed by oral administration of both nicorandil (15 mg/day) and benidipine hydrochloride (12 mg/day). A coronary angiogram, performed on post-admission day 12, did not show any significant stenotic abnormalities except for a hypoplastic right coronary artery (Fig. 2a and b).

A pharmacological provocation test was performed with an intracoronary administration of acetylcholine. Immediately after the injection of acetylcholine (20 μg), the patient's left anterior descending artery and diagonal branches became diffusely spastic (Fig. 2c), with significant ST-segment depression in the II, III, aVF,

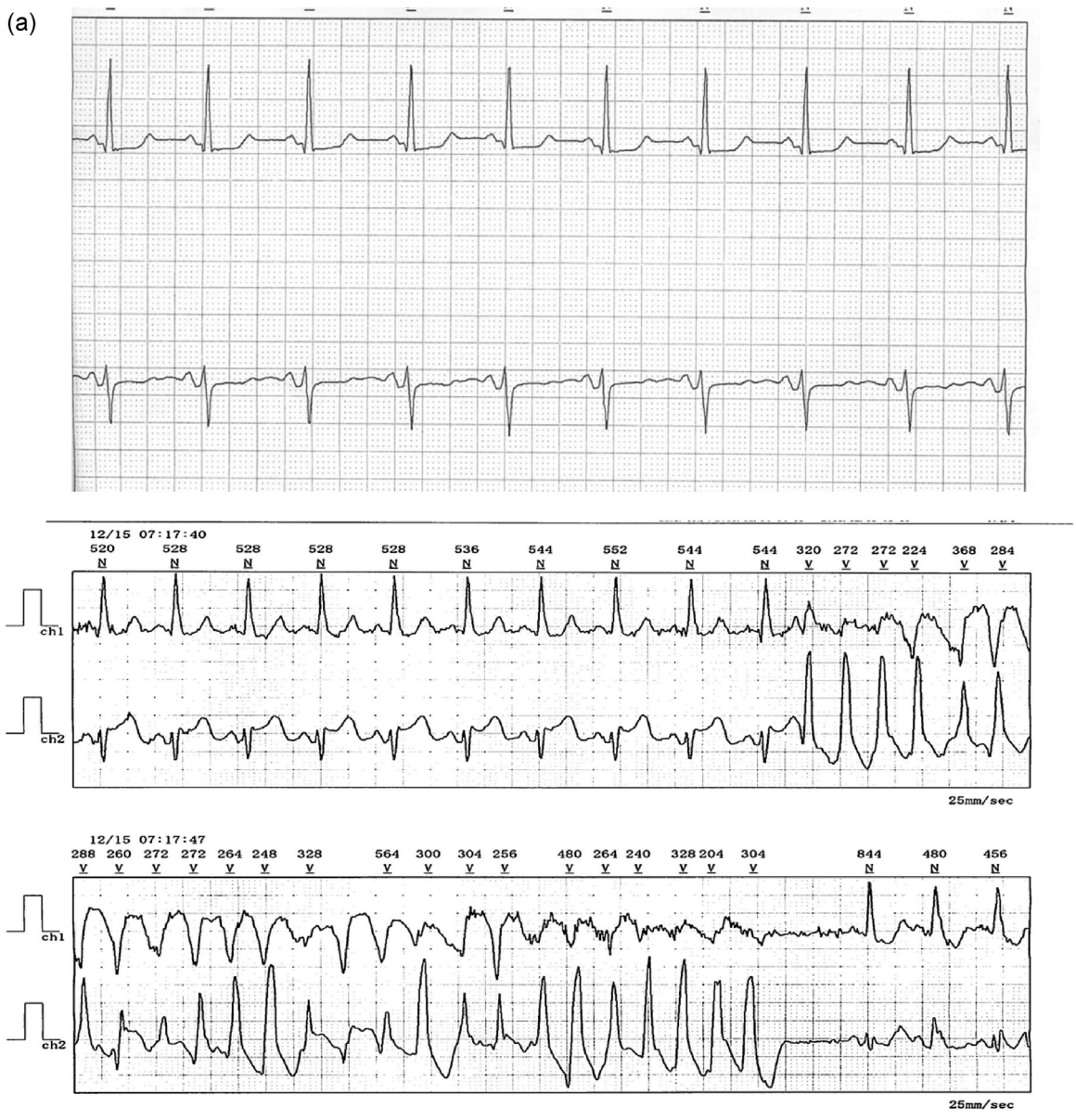

Fig. 1. (a) 24-h continuous electrocardiogram. (Upper) Just before the initial chest pain. (Lower) At the time of the initial chest pain complaint, after admission. There was a mild ST-segment elevation in the lower channel followed by non-sustained ventricular tachycardia. (b) 24-h continuous electrocardiogram. (Upper) Just before ventricular tachycardia. (Lower) At the time of loss of consciousness, following admission. There was ventricular fibrillation after a short period of ventricular tachycardia.

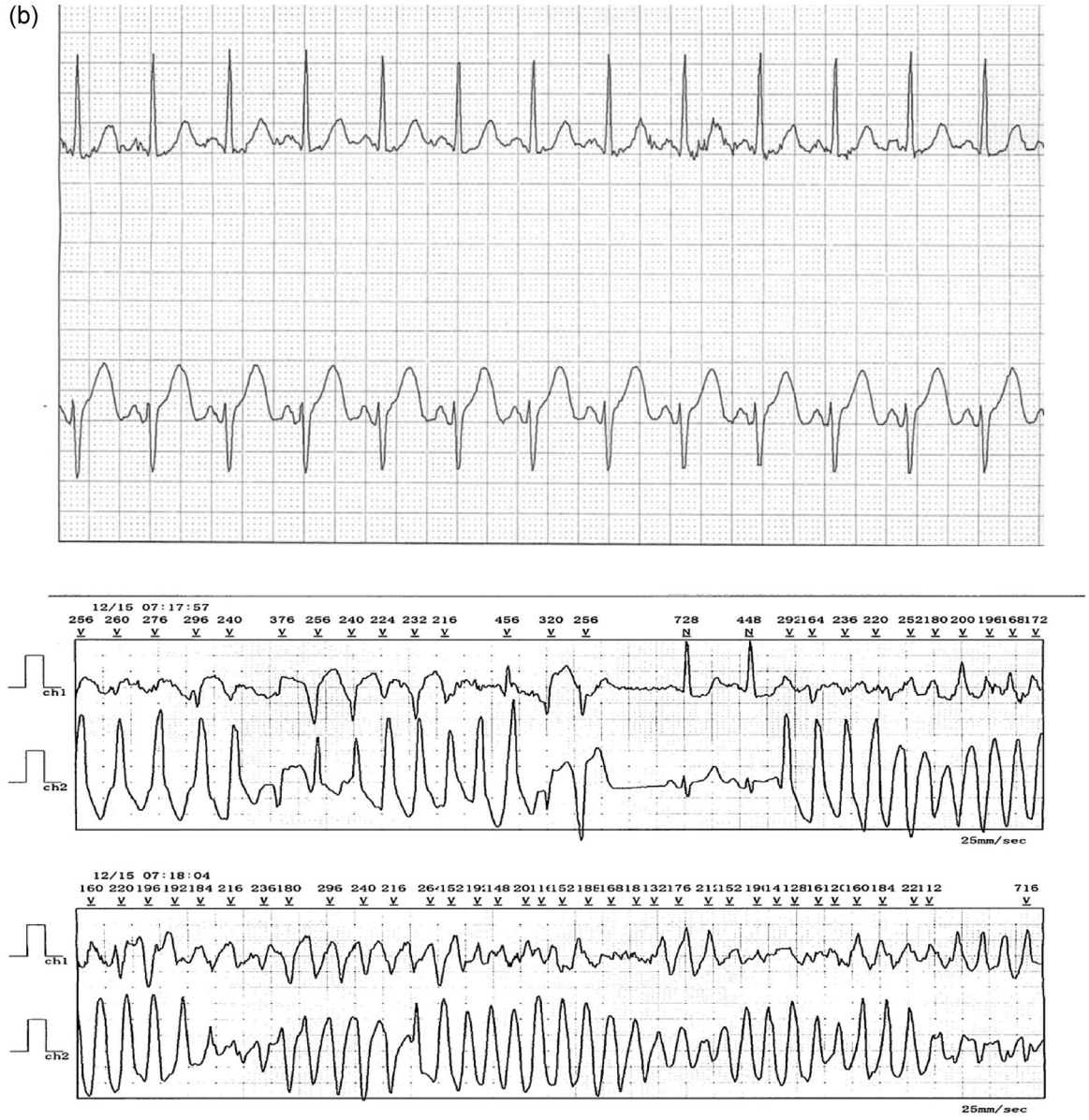

Fig. 1. (*Continued*).

and V2–5 leads; simultaneously she felt severe chest pain (Fig. 3b). Nitroglycerine was administered into her left anterior descending artery, resulting in the total disappearance of the spasm and her symptoms. The patient has been taking sustained-release diltiazem (diltiazem R, 200 mg/day), benidipine hydrochloride (12 mg/day), and nicorandil (15 mg/day) since undergoing the provocation test, without any adverse cardiac events during the 6-month follow-up period.

Discussion

Sometimes, the diagnosis of spastic angina is difficult because of few opportunities to prove the existence of the disease, compared with typical exertional angina. In many patients, there might be no significant organic vascular disease, and imaging and exercise tests are inefficient at detecting the disease [1–3]. However, coronary artery spasms play a pivotal role in the pathogenesis of ischemic heart disease, including sudden cardiac arrest, and may therefore be one of the most important functional abnormalities of the coronary artery [4–7]. The only non-invasive opportunity to picture the disease is during 24-h continuous ECG, performed during the heart attack. Therefore, the only remaining, effective diagnostic modality is an invasive provocation test, requiring the use of a catheter technique [3]; this test is believed to be too taxing for common use.

The present case was misdiagnosed as a psychiatric disorder after several cardiologists attempted to diagnose the patient based on her ambiguous symptoms and the use of several different diagnostic modalities. Even though the disease appeared to have been severe (the final attack resulted in ventricular fibrillation), the disease could not be diagnosed using standard non-invasive means. According to previous reports, the incidence of out-of-hospital cardiac arrests (OHCAs) among vasospastic angina patients is 50-fold higher than among the general Japanese population [4,8]. This case was essentially a case of OHCAs, because

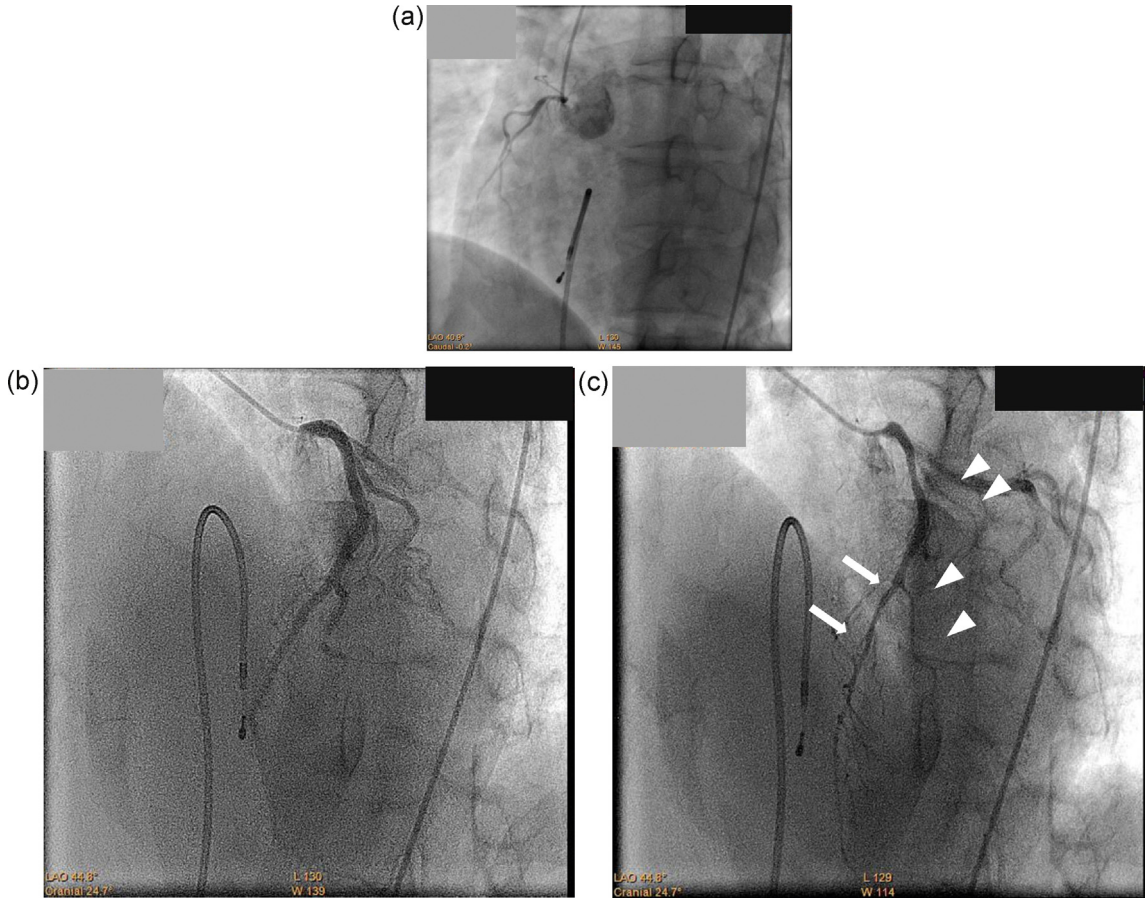

Fig. 2. Coronary angiograms. (a) The right coronary artery. (b) The left coronary artery as a control. (c) Coronary angiogram showing the diffuse spastic pattern of the left anterior descending artery (white arrows) and of diagonal arteries (white arrowheads).

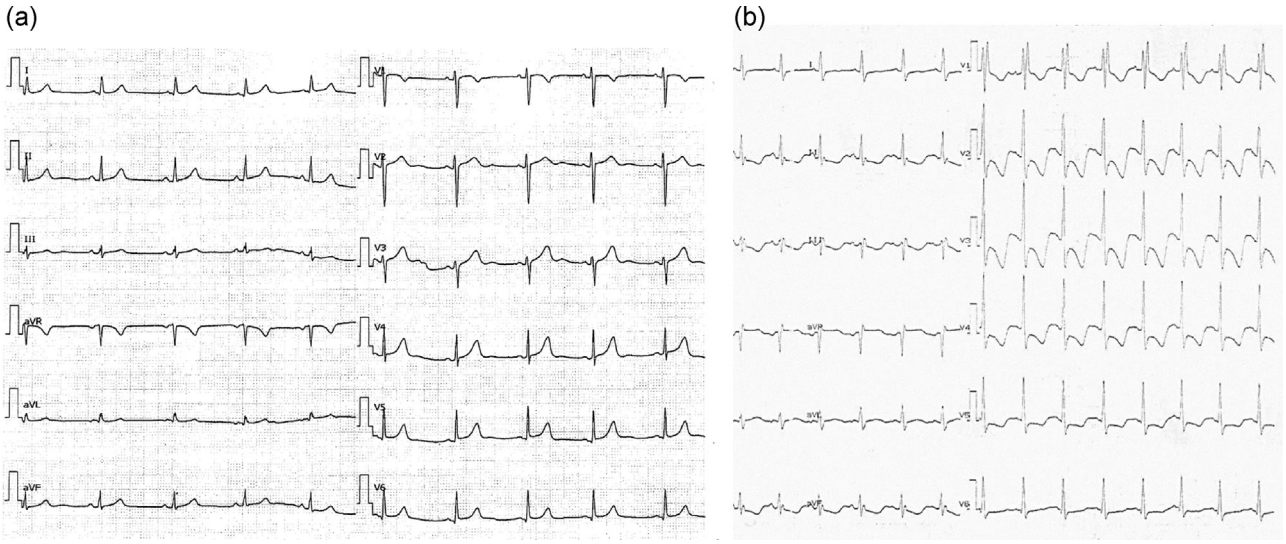

Fig. 3. (a) The control electrocardiogram. (b) Electrocardiogram at the time of provocation.

the first ventricular fibrillation occurred on the day of admission. Takagi et al. suggested a Japanese coronary spasm association (JCSA) risk score to estimate future adverse cardiac events in vasospastic angina patients [9]. The JCSA score consists of 7 factors predictive of major adverse cardiac events, including a history of OHCA (4 points), current smoking (2), angina at rest (2), significant organic stenosis (2), multivessel spasms (2), ST-segment elevation (1), and β-blocker use (1). Patients with a high score (total score ≥6) suffered a significantly higher rate of major adverse cardiac events compared with those with a lower score (total score <6) [9]. The present patient was regarded as belonging to the high-score group because she had a history of OHCA and at rest angina,

yielding a total score of 6. Based on her JCSA score, she should have been followed carefully, including a prescription for a calcium channel blocker, and the possibility of receiving an implantable cardioverter defibrillator. On the other hand, her angiographic characteristics in the provocation test indicated a diffuse left anterior descending artery pattern, which is not included as a positive criterion in the current vasospastic angina guidelines [1,10].

The angiographic patterns of acetylcholine-induced coronary artery spasms should be subdivided into focal and diffuse spasm patterns because an acetylcholine-induced diffuse spasm pattern may represent the consequence of endothelial dysfunction rather than a focal spasm [1]. Although there are several controversies regarding whether angiographic patterns, induced by acetylcholine, are associated with disease prognosis [1,3], Sato et al. reported that an acetylcholine-provoked diffuse spasm did not correlate with the incidence of major adverse cardiovascular events during a median follow-up period of 32 months. Furthermore, a multivariate Cox hazard regression analysis indicated that the diffuse spasm pattern was a significant negative predictor of major adverse cardiovascular events [1]. Having said that, the rate of major adverse cardiovascular events even in the diffuse spasm pattern was 3.5% during a follow-up period of 60 months, which appeared to be much higher compared with the general Japanese population. Additionally, since the amount of the administration of acetylcholine was only 20 μg in the present case, the final configuration provoked by more acetylcholine (50 μg and 100 μg) was not presumed. From that perspective, whenever trying to investigate the patient's prognosis in the wake of the angiographic pattern of acetylcholine-induced coronary artery spasm, we have to pay attention to the possibility that the angiographic spasm pattern could morph into another pattern dependent upon external conditions such as the amount of injected drug.

Accordingly, we will have to perform the pharmacological provocation test under full optimal medical therapy in the near future in order to decide the necessity of the implantation of an implantable cardioverter defibrillator.

Conclusion

From the present case, two dangerous possibilities associated with vasospastic angina are evident. First, there may be a tendency to misdiagnose its ambiguous symptoms as a psychiatric disorder. Additionally, some cases of vasospastic angina are directly associated with sudden death.

Conflict of interest

We declare that we have no conflict of interest.

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