

---

**CASE REPORT**

---

---

**ACUTE MYOCARDIAL INFARCTION AFTER  
A NORMAL EXERCISE STRESS TEST: A CASE REPORT**

---

**Parvez A. ZARGAR**  
**Showkat HUSSAIN DAR**  
**Ishrat HUSSAIN DAR**  
**Rakesh KUMAR KOUL**

*Department of Medicine,  
Government Medical College,*

*Srinagar J&K, India*

*Received: 26.06.2009  
Accepted: 16.09.2009*

**Correspondence to:**  
*Ishrat Hussain Dar  
Consultant  
Department of Medicine,  
Government Medical College,  
Srinagar J&K,  
INDIA – 190010*

*e-mail: dardrishrathussain@yahoo.com*

**ABSTRACT**

A 51 year old patient developed precordial pain at rest lasting for about 30 minutes. He was taken up for exercise protocol 6 days after the episode and his treadmill test was essentially normal. Ten minutes after the exercise protocol patient developed acute onset chest pain and electrocardiogram revealed inferior wall myocardial infarction. He was successfully thrombolysed. Coronary angiography done few weeks later revealed 60-70% stenosis in the mid right coronary artery which was dilated and stented with a drug eluting stent.

**Keywords:** *myocardial infarction, stress test, stenosis, drug eluting stent*

---

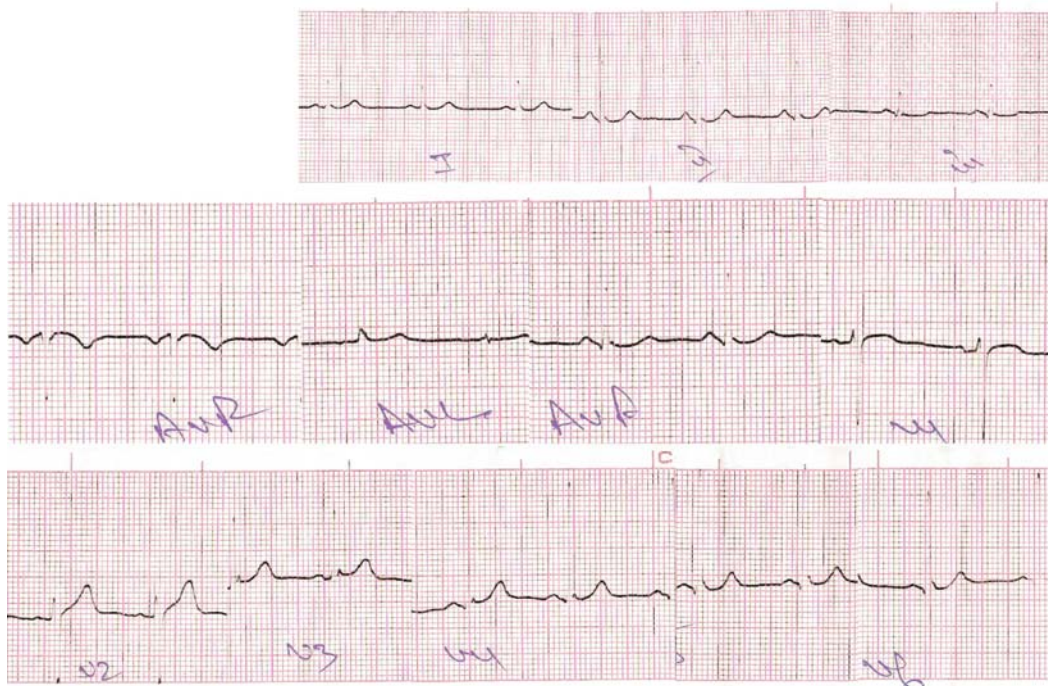
**INTRODUCTION**

Exercise stress testing is a simple, safe and reliable diagnostic tool for the evaluation of patients with known or suspected coronary heart disease. It is the most common diagnostic procedure for the evaluation of coronary artery disease with an excellent safety record. The prevalence of non-fatal life threatening complications ranges from 1.4 to 9 every 10000 cases.<sup>1,2</sup> Acute myocardial infarction after a normal electrocardiogram (ECG) responds to maximum exercise testing is quite rare with only a few cases reported in literature.<sup>3-8</sup> Here a case of acute myocardial infarction occurring just after a normal treadmill test is reported.

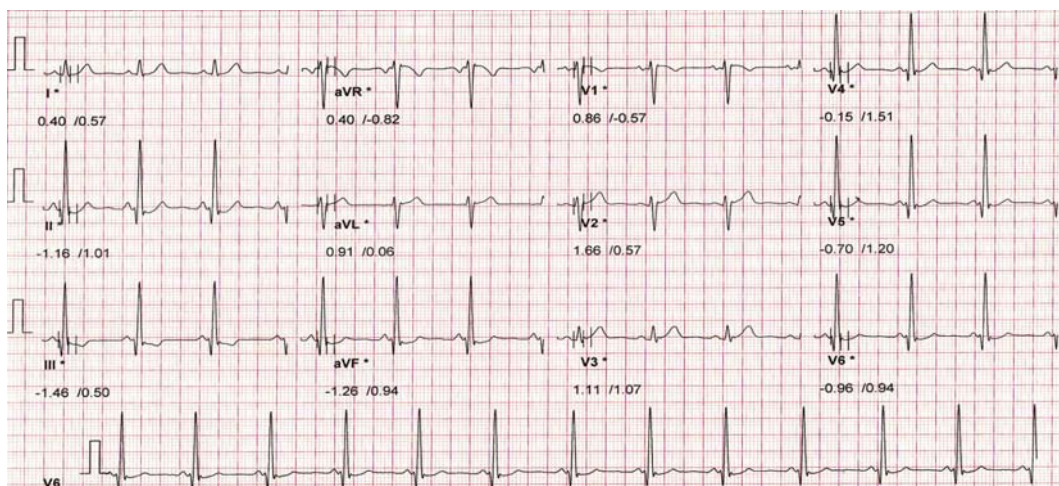
---

**CASE REPORT**

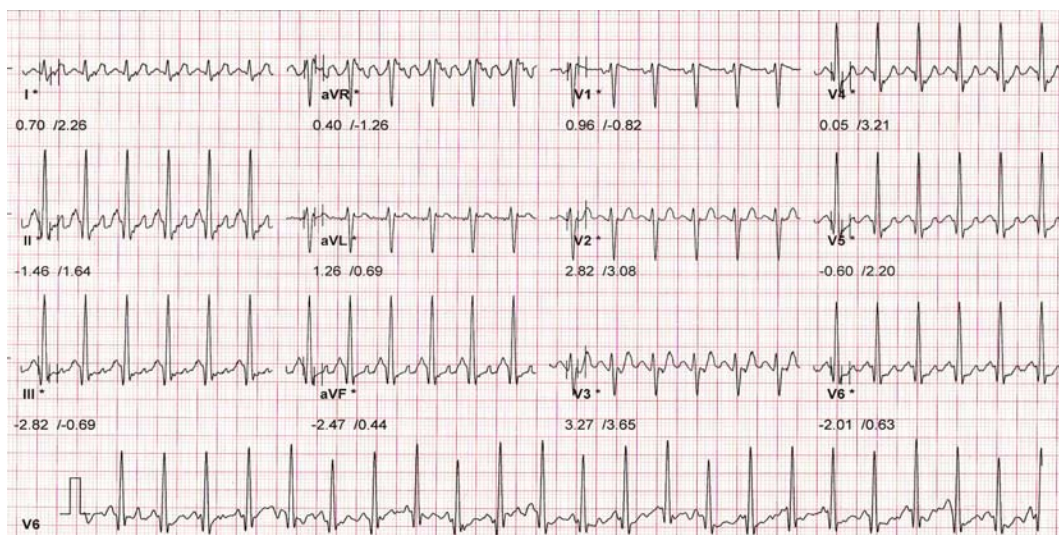
A 51 year old male patient, smoker, normotensive, has had an attack of precordial pain at rest which had lasted for 30 minutes. He took a consultation for his complaint after 4 days. He had no functional limitation and no past history suggestive of coronary artery disease, diabetes or hypertension. His vitals as well as the systemic examination were normal. ECG done at the time of the consultation was normal (Fig. 1). Two days later patient was subjected to the exercise protocol. The total exercise duration was 12 minutes upto last minutes of stage IV of Bruce protocol. Patient attained a peak heart rate of 148 beats per minute (bpm) and a peak blood pressure (BP) of 180/90mmHg with a maximum target heart rate (THR) of 169bpm (85% of the THR was achieved). There was 1.5mm ST segment de-



**Figure 1.**  
Normal electrocardio-  
gram at the time of the  
consultation

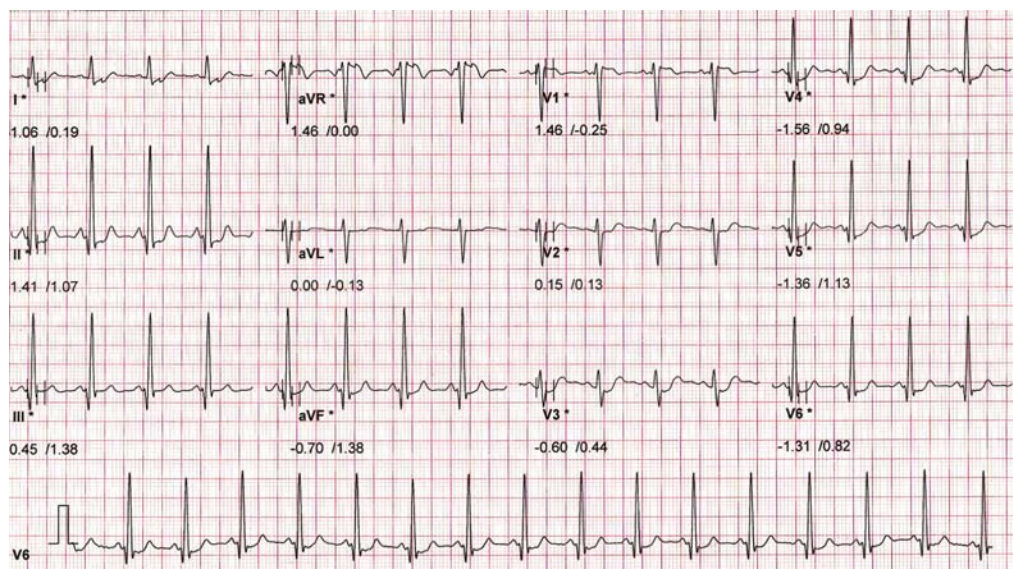


**Figure 2.**  
Electrocardiogram taken  
just before the start of the  
exercise test



**Figure 3.**  
Electrocardiogram taken  
at peak exercise





**Figure 4.**  
Electrocardiogram taken at recovery

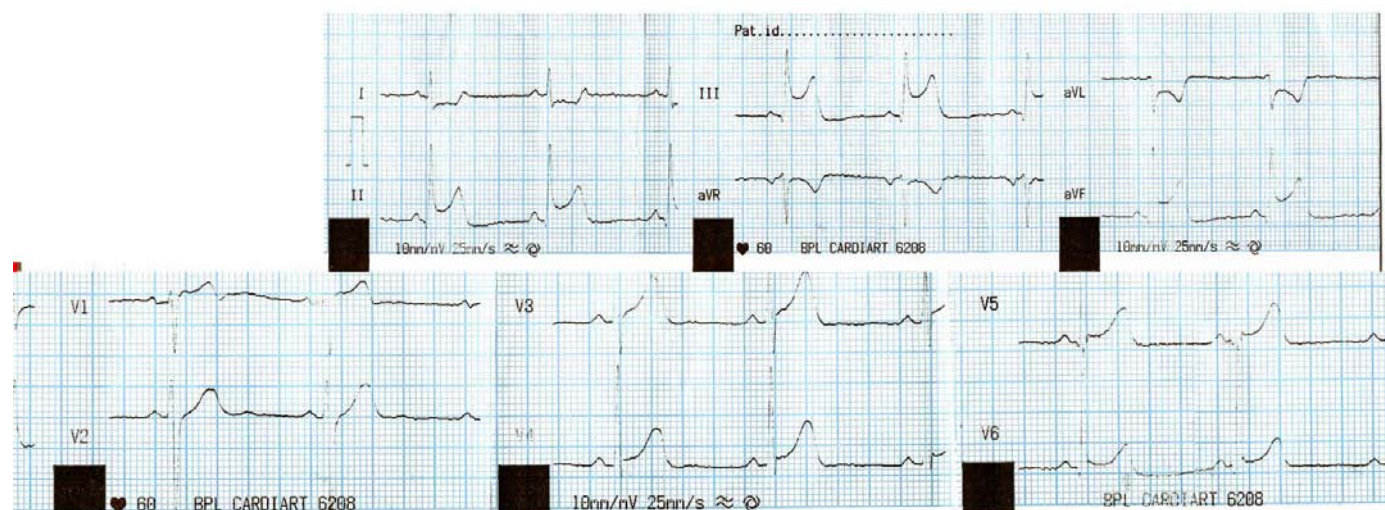
pression (upsloping) at 9 minutes in II, III, aVF as well as V5-V6 with quick recovery in stage III. Patient did not complain of angina, did not develop any arrhythmias and his functional capacity was good. Inference was a low risk positive for inducible ischaemia with a Duke's Treadmill Score of +5.0 (Fig. 2, 3, 4). Recovery period of 5 minutes was uneventful. As the patient was leaving the recovery room, he felt sudden retrosternal chest pain with sweating. On examination patient was found to have pallor, was sweating profusely with a pulse of 76 bpm and a BP of 80 mmHg systolic. An ECG was taken immediately which revealed ST segment elevation in the inferior leads (II, III aVF) as well as in the V5 and V6 (Fig. 5). Patient was immediately taken up for thrombolysis. Streptokinase was infused and serial ECGs were followed. ST segment returned to the baseline 90 minutes after completion of the thrombolysis with resolution of the retrosternal chest pain and normalization of the blood pressure (Fig. 6, 7). Patient was managed in the Mobile Intensive Cardiological Care Unit (MICCU) and made an uneventful recovery.

Coronary angiography done after few weeks revealed 60-70% mid right coronary artery (RCA) lesion which was dilated and stented with a drug eluting stent. Patient is on regular follow-up.

## DISCUSSION

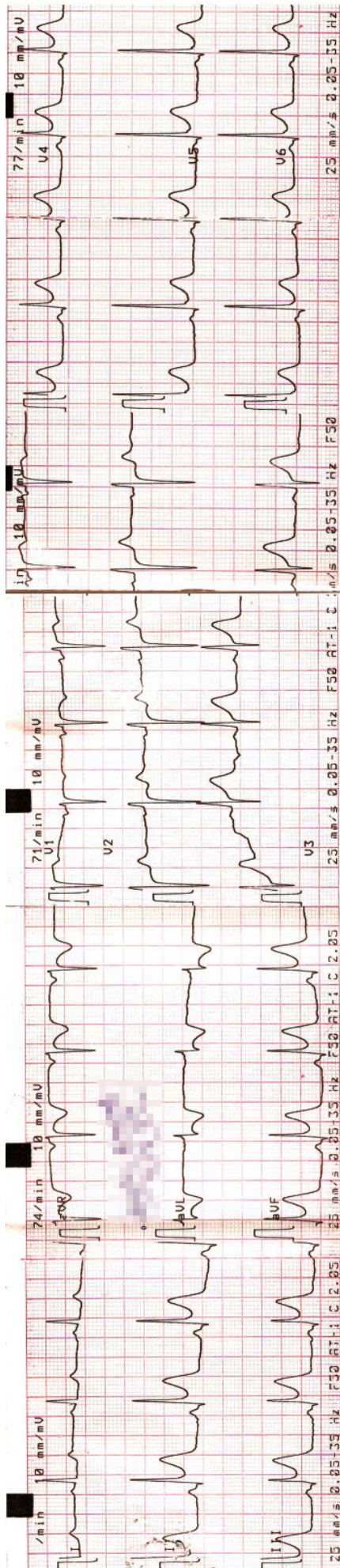
The development of an acute myocardial infarction shortly after a negative exercise stress test is extremely uncommon and only a few cases have been reported in the literature. Physical exertion has been evaluated and found to be trigger for acute myocardial infarction showing a cause effect relationship between the two.<sup>9,10</sup> Around 4.4% of patients had reported heavy exertion within 1 hour before onset of acute myocardial infarction in Mittleman's paper<sup>9</sup> whereas 7.3% of the patients in Willoch's study had engaged in strenuous exercise at the onset of acute myocardial infarction.<sup>10</sup>

The pathogenesis of acute myocardial infarction following physical exertion as such is not known but is hypothesized to be multifactorial. Strenuous exercise

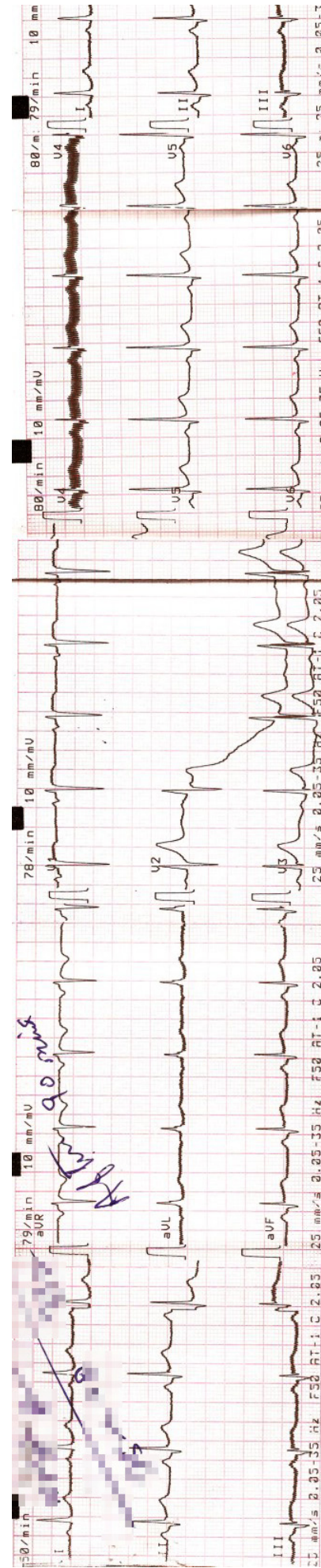


**Figure 5.** Electrocardiogram taken 5 minutes after recovery





**Figure 6.** Electrocardiogram taken at the time of the thrombolysis



**Figure 7.** Electrocardiogram taken 90 minutes after thrombolysis

may disproportionately raise the intracapillary pressure and enhance the capillary reflex within an atherosclerotic plaque with the development of a haematoma and subsequent coronary occlusion.<sup>11</sup> Exercise may induce coronary vasospasm leading to endothelial damage and subsequent platelet aggregation and thrombosis.<sup>12</sup> It has also been observed that in sedentary people strenuous exercise leads to platelet activation and hyperactivity.<sup>13</sup>

There have been few case reports literature of acute myocardial infarction after an exercise testing. Bruce et al<sup>3</sup> described an asymptomatic individual who had an anterior acute myocardial infarction shortly after a normal performance of a maximal exercise testing. Coronary arteriography six months later revealed only minimal plaque in the left anterior descending (LAD) artery other than significant stenosis of the circumflex artery. Brown et al<sup>4</sup> in 1978 reported a patient who sustained an acute inferoapical myocardial infarction within 15 minutes of a negative treadmill exercise test with coronary arteriography revealing only an insignificant stenosis of the circumflex and right coronary arteries 4 months later. Tuzen et al<sup>5</sup> described a patient with acute inferolateral myocardial infarction after 10 minutes of a normal exercise test and in whom emergency coronary angiography was done within 60 minutes of chest pain with dilatation of the occluded circumflex artery. Lintgen<sup>14</sup> reported a case in whom fatal acute myocardial infarction occurred about 30 minutes after an exercise test with a normal result. Autopsy findings suggested that haemorrhage had occurred into the intimal atherosclerotic plaque with superimposed intraluminal clot formation. Nygaard et al<sup>15</sup> reported a case in which acute coronary occlusion developed 20 minutes after a normal exercise test done 5 days after a successful percutaneous transluminal coronary angioplasty.

## REFERENCES

1. Kaltenbach M, Scherer D, Dowinsky S. Complications of exercise testing. A survey in three German-speaking countries. *Eur Heart J* 1982; 3: 199-202.
2. Hamm LF, Crow RS, Stull GA et al. Safety and characteristics of exercise stress testing early after acute myocardial infarction. *Am J Cardiol* 1989; 63: 1193-6.
3. Bruce RA, Hornsten TR, Blackman JR. Myocardial infarction after normal responses to maximal exercise. *Circulation* 1968; 38: 552-8.
4. Brown J, Head GB, Johnson LL. Myocardial infarction immediately following cardiovascular stress testing. *Am J Med* 1978; 65: 521-6.
5. Tuzcu EM, Lever HM, Hollman J, et al. Acute myocardial infarction after normal maximal exercise test and reperfusion by emergency coronary angiography. *Am Heart J* 1988; 115: 1124-7.
6. Barold SS, Hanss RJ, Org LS, et al. Exercise induced myocardial infarction due to coronary thrombosis. *Am Heart J* 1985; 109: 590-3.
7. Ciampricotti R, El-Gamai M. Exercise induced plaque rupture producing myocardial infarction. *Int J Cardiol* 1986; 12: 102-8.
8. Jenkins M, Tate D, Jain A. Myocardial infarction complicating cardio-vascular stress testing with normal coronary arteriography. *Chest* 1989; 96: 431-2.
9. Mittelman MA, Maclure M, Toftar GH et al, for the Determinants of Myocardial Infarction Onset Study Investigators: Triggering of acute myocardial infarction by heavy physical exertion. Protection against triggering by regular exertion. *N Engl J Med* 1993; 329: 1677-83.
10. Willich SN, Lewis M, Lowerl H, et al for the Triggers and Mechanisms of Myocardial Infarction Study Group. Physical exertion as a trigger of acute myocardial infarction. *N Engl J Med* 1993; 32: 1684-90.
11. Paterson JC. Stress, intimal haemorrhage and coronary occlusion. *J Occup Med* 1961; 3: 59-63.
12. Grollier G, Commeau P, Hurpe JM, et al. Le spasme coronariens d'effort. Interpretation Electrocardiographique et physiopathologique a propos de six cas. *Sem Hop Paris* 1985; 61: 195-9.
13. Kestin As, Ellis PA, Bernard MR, et al. Effects of strenuous exercise on platelet activation state and reactivity. *Circulation* 1993; 88: 1502-11.
14. Lintgen AB. Death from myocardial infarction after exercise test with normal result. *JAMA* 1976; 235: 837-9.
15. Nygaard TW, Beller GA, Mentzer RM, Gibson RS, Meller CM, Burnell LR. Acute coronary occlusion with exercise testing after initiating successful coronary angiography for acute myocardial infarction. *Am J Cardiol* 1986; 57: 687.