Pulmonary Hemorrhage after Percutaneous Coronary Intervention

Yuan-Horng Yan,1 Cheng-Yun Chen,2 Cheng-Ren Chen3 and Chen-Tung Hsu2

According to the recent On-TIME 2 and MULTISTRATEGY studies, tirofiban may be considered useful in the management of patients with ST-elevation myocardial infarction (STEMI). However, although rare, massive pulmonary hemorrhage is a severe complication associated with tirofiban after percutaneous coronary intervention (PCI). Little related research has been reported in Taiwan. We report a 70-year-old man who was suffering from acute STEMI with proximal left anterior descending artery total occlusion. Tirofiban-related pulmonary hemorrhage after PCI was highly suspected. The symptoms improved after stopping tirofiban. Physicians need to be aware of tirofiban-related pulmonary hemorrhage after PCI.

Key Words: Anti-platelet agents • Percutaneous coronary intervention • Pulmonary hemorrhage

INTRODUCTION

Recent studies have shown that anti-platelet medications such as tirofiban and abciximab are associated with a reduction in mortality and morbidity and are considered useful in the management of patients with acute ST-elevation myocardial infarction (STEMI). These studies showed tirofiban to be a well tolerated and effective glycoprotein IIb/IIIa inhibitor. On the basis of the demonstrated benefits of the high-dose bolus regimen, tirofiban may be considered useful in the management of patients with STEMI.1,2 However, although rare in Taiwanese population, massive pulmonary hemorrhage is a severe and potentially fatal complication of tirofiban.3-5 Physicians need to be aware of this complication because early treatment increases the chances of patient survival.

CASE REPORT

A 70-year-old man presented to the hospital with acute onset of chest pain. The pain was located in the left sub-sternal region and radiated to both forearms and jaw. It lasted for more than 30 minutes. Cold sweating was also noted during the attack. His body weight was 65.4 kg and body length was 158 cm. The body mass index (BMI) was 26.2 kg/m². On physical examination, the lungs were clear. Grade 2/6 systolic murmur was heard over the left sternal border and apex. An electrocardiogram showed ST-segment elevation in leads V2-V6 with a Q-wave. A cardiac enzyme panel showed creatine phosphokinase (CPK) of 676 IU/L, CPK-muscle/brain of 97.9 ng/mL and Troponin-I of 3.112 ng/mL. C-reactive protein was 22.87 mg/dl. Prothrombin time and activated partial thromboplastin time were 10.0s (control 9.6s) and 22.8s (control 29.0s). In our intensive care unit, intravenous nitroglycerin with rate of 1.5 mg/hr and a loading dose of heparin followed by continuous infusion were prescribed for acute coronary syndrome (ACS). Primary percutaneous coronary intervention (PCI) was performed to restore patency of the left anterior descending artery successfully (Figures 1A and 1B). Clopidogrel 300 mg was administered. The
Echocardiography before PCI showed that the left ventricle ejection fraction (LVEF) was 46.0%. Abciximab was not available in our hospital. According to the On-TIME 2 and MULTISTRATEGY studies, due to benefits of the high-dose bolus regimen, tirofiban may be considered useful in the management of patients with STEMI. Although tirofiban is not currently approved for use in STEMI patients or as adjunctive therapy in patients undergoing PCI, we used tirofiban in this case. Tirofiban hydrochloride infusion (25 μg/kg bolus followed by a maintenance infusion of 0.15 μg/kg/min for 24 hours) was administered to clear thrombus formation in the proximal left anterior descending artery (LAD-P). While the LAD-P total occlusion was dilated with a 4.0 balloon, spiral dissection developed later. Percutaneous transluminal coronary angioplasty with a bare-metal stent (4.0 × 28 mm) was deployed successfully. The LAD-P 100% stenosis was reduced to 10%. LVEDP data of cardiac catheterization was 20 mmHg. Swan-Ganz catheterization was not performed. The echocardiography after PCI showed that the LVEF was 50.2%. However, the patient developed hemoptysis just after catheterization. An estimated 500 mL blood was expectorated in 24 hours and change of Hb in this patient was 5.2 g/dl. Major pulmonary bleeding was classified based on criteria. Chest radiography showed confluent opaque consolidation in both lungs (Day 1, Figure 2A). Hemoptysis improved after tirofiban was discontinued. Clopidogrel was also reduced to 37.5 mg daily then discontinued due to remaining mild hemoptysis. Hemoptysis resolved then, and chest radiography showed diffuse confluent acinar consolidation in both lungs (Day 7, Figure 2B). The consolidation and fibrosis in both lungs persisted. Pulmonary edema could be excluded. The patient was transferred to the ordinary ward. Mild dyspnea on exertion was found. Home oxygen therapy was prescribed after discharge (Day 14, Figure 2C). Chest radiography showed progressive resolution of bilateral infiltrations after one month (Day 28, Figure 2D).

**DISCUSSION**

The most effective magnitude and timing of antiplatelet therapy is important in patients with acute ST-elevation myocardial infarction (STEMI). The efficacy of tirofiban in STEMI has been demonstrated when the drug administered in patients being managed with PCI. These trials primarily studied tirofiban utilizing a high-dose bolus regimen (25 μg/kg bolus followed by a maintenance infusion of 0.15 μg/kg/min for 18-24 hours). The On-TIME (Ongoing Tirofiban in Myocardial Infarction Evaluation) 2 trial assessed early administration of high-dose bolus regimen of tirofiban, either at the
referral centre or in the ambulance, in patients being transferred to a primary PCI centre. Early use of tirofiban resulted in both a significant increase in the rate of complete resolution of ST-segment deviation pre- and post-PCI, and improvement in clinical outcomes at 30 days. Moreover, the multi-factorial MULTISTRATEGY (Multicentre Evaluation of Single High-Dose Bolus Tirofiban vs Abciximab With Sirolimus-Eluting Stent or Bare Metal Stent in Acute Myocardial Infarction) trial, which compared the high-dose bolus regimen of tirofiban with standard-dose administration of abciximab administered immediately prior to PCI, revealed similar effects on myocardial perfusion, ST-segment elevation recovery and clinical outcomes between the two agents, and confirmed the safety of tirofiban when used in combination with drug-eluting stents in patients with STEMI undergoing primary PCI.

However, although it not differ significantly between groups, a higher major bleeding rate (19/473, 4.0% vs. 14/477, 2.9%) and minor bleeding rate (29/473, 6.1% vs. 21/477, 4.4%) should be noted in the tirofiban group compared to the control group in the On-TIME 2 trial. In the MULTISTRATEGY trial, the incidence of major and minor bleedings were 7.8% in

---

**Figure 2.** Serial changes of chest films. (A) Day 1, (B) Day 7, (C) Day 14, (D) Day 28.
the abciximab and 7.2% in the tirofiban group. A consider-
sla
ble rate of bleeding events occurred in this high-
risk patient population.²

Massive pulmonary haemorrhage has been reported to be a rare and frequently overlooked complication of glycoprotein IIb/IIIa platelet inhibitors such as tiro-

fibran.⁶-⁸ The finding of our patient showed that this rare complication should also be watched for in Taiwanese population. Current drug dosage recommendation may be too high for Taiwanese and other East Asians. Further studies are needed.

REFERENCES