CASE REPORT

Successful thrombolysis in patients with subacute and late stent thrombosis

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Stent thrombosis is a severe complication associated with percutaneous coronary interventions (PCIs). The optimal treatment strategy of this complication is not well known, although emergency PCI in hospitals with 24 h facilities for urgent coronary angiography is still considered the best solution. The present report describes four cases of subacute and late stent thrombosis treated with systemic thrombolysis due to the unavailability of the catheterization laboratory. All patients had a very short symptom-to-treatment time (median of 50 min) and were successfully treated with tenecteplase. The subsequent coronary angiography confirmed complete resolution of the thrombosis and the patients were discharged without further PCIs performed.

Key Words: Stent; Thrombolysis; Thrombosis

Coronary stent thrombosis is a severe complication of percutaneous coronary intervention (PCI). Based on the time of occurrence, the following types of stent thrombosis have been described: acute (24 h or less), subacute (more than 24 h and 30 days or less), late (more than 30 days and 12 months or less) and very late (more than 12 months) stent thrombosis. Because the number of stents implanted per year is increasing and the introduction of drug-eluting stents seems to be associated with a slight increase in the incidence of thrombosis (1), the absolute number of patients suffering from this complication is not negligible.

Repeat PCI is commonly considered the preferred strategy to manage patients with stent thrombosis, whereas thrombolytic therapy is considered only partially effective. However, 24 h catheterization laboratories are not present in all hospitals and patient transport to hospitals with these facilities may be time consuming.

We describe the cases of four patients with a previous stent PCI who were admitted to the hospital for an acute myocardial infarction with ST elevation due to a probable stent thrombosis successfully treated with systemic thrombolysis with tenecteplase.

CASE PRESENTATION

From May 2005, to December 2006, four patients (all men) with a single-vessel disease that was previously treated (within 60 days of

Une thrombolyse concluante chez des patients ayant une thrombose subaiguë et tardive de l'endoprothèse

La thrombose de l'endoprothèse est une grave complication associée à des interventions coronaires percutanées (ICP). On connaît mal la stratégie de traitement optimale de cette complication, mais une ICP d'urgence en milieu hospitalier dans un établissement offrant la coronarographie d'urgence en tout temps est toujours considérée comme la meilleure solution. Le présent rapport décrit quatre cas de thrombose d'endoprothèse subaiguë et tardive traités par thrombolyse systémique en raison de la non-disponibilité du laboratoire de cathétérisme. Tous les patients ont profité d'un très court délai entre l'apparition des symptômes et le traitement (médiane de 50 minutes) et ont reçu un traitement concluant par ténecteplase. La coronarographie qui a suivi a confirmé la résolution complète de la thrombose, et les patients ont obtenu leur congé sans qu'il soit nécessaire de procéder à une ICP.

PCI) with a successful stent PCI were admitted to the emergency department for acute myocardial infarction with ST segment elevation in the same territory of the previously treated vessel. Two patients were previously implanted with drug-eluting stents and two patients with bare metal stents (Table 1). In two cases, the electrocardiogram (ECG) on admission showed an inferior myocardial infarction (the culprit vessel was the right coronary artery) and in two cases, the ECG showed an anterior myocardial infarction (the culprit vessel was the left anterior descending artery). Two patients had discontinued all antithrombotic therapy (acetylsalicylic acid [ASA] and clopidogrel) against medical advice, one patient was taking ASA only (because of intolerance to clopidogrel) and one patient was taking both ASA and clopidogrel (Table 1). The four patients were admitted to the emergency department in the middle of the night when a 24 h catheterization laboratory was not yet available in the hospital. The symptom-to-treatment time was very short (ranging from 40 min to 75 min) and all patients were treated with systemic thrombolysis using tenecteplase, unfractionated heparin and ASA. Sixty minutes after the thrombolysis, a significant reduction of the ECG ST elevation and complete regression of the chest pain were observed. The following day, coronary angiography performed in all patients showed the patency of the infarct-related artery (Thrombolysis In Myocardial Infarction [TIMI] grade 3 flow) without evidence of any angiographic

TABLE 1
Clinical characteristics of patients

Patient	Age, years	Sex	Preimplanted stent	Stent dimension, mm	Vessel culprit	Antithrombotic therapy	Days from the implantation	Symptom to lysis time, min
1	52	Male	Cypher Select*	3.0x23	RCA	Clopidogrel and ASA	25	40
2	55	Male	Taxus†	3.0x24	LAD	ASA	42	60
3	78	Male	Pro-Kinetic‡	3.0x15	RCA	None	12	75
4	45	Male	R stent§	3.0x18	LAD	None	62	40

*Cordis Corporation, USA; †Boston Scientific Corporation, USA; ‡Biotronic, Germany; §OrbusNeich, Hong Kong. ASA Acetylsalicylic acid; LAD Left anterior descending artery; RCA Right coronary artery

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alteration either in the implanted stent or in the rest of the coronary tree. Creatine kinase-MB and troponin T increased in all patients with a very early peak (within 6 h) and rapid normalization. There were no in-hospital complications and the patients were discharged within five days.

DISCUSSION

Stent thrombosis is a severe complication arising after the implantation of a stent and, with appropriate antiplatelet therapy, is very rare (less than 1%) in bare metal stent procedures. However, due to the increasing number of stents implanted, the total number of patients who experience stent thrombosis is not negligible. Moreover, a slight increase in stent thrombosis has been observed (1) after the introduction of drug-eluting stents, despite a reduction in the restenosis rate.

Presently, no clear definition exists for the best management strategy of stent thrombosis. Some reports have shown the efficacy of repeated interventional procedures, and a multicentre study is being performed for the ongoing evaluation of the outcome of patients treated with a repeat PCI (2). However, many hospitals do not have 24 h catheterization laboratory facilities and patient transport to another hospital may be time consuming. Before a 24 h catheterization facility for urgent coronary revascularization was established in January 2007, patients who were admitted to our emergency department during the night for an acute myocardial infarction with ST segment elevation were treated with systemic thrombolysis.

The present report describes four cases of patients with subacute (two cases) and late (two cases) stent thrombosis that were successfully treated with systemic thrombolysis without the need to perform a new percutaneous intervention. In our case collection, the good results obtained with systemic thrombolysis may be explained by the very short symptom-to-treatment time. Indeed, many studies showed that the efficacy of thrombolysis is inversely correlated with the time to treatment from symptom onset. Moreover, a previous study showed a similar degree of efficacy of thrombolysis compared with percutaneous angioplasty in the treatment of ST elevation myocardial infarction when the time from symptom onset to reperfusion was less than 2 h (3).

Our results may also be explained through the thrombolytic agent employed. Previous studies (4) showed the reduced efficacy of urokinase (a nonfibrin-specific thrombolytic agent) in the treatment of

acute stent thrombosis but a subsequent case report (5) described the good results obtained with the use of tenecteplase. Tenecteplase differs significantly from urokinase because it is a highly fibrin-specific single-bolus thrombolytic agent with a simplified route of administration that facilitates rapid time to treatment.

The mechanisms underlying the stent thrombosis in the four patients described in the present case report remain unknown. However, in three of the patients, a premature discontinuation of the antiplatelet therapy was documented and this may play a significant role in the pathogenesis of stent thrombosis, as shown in previous studies (1).

A limitation of the present case collection is that our patients were referred to the catheterization laboratory the day after thrombolysis and the angiographic documentation of stent thrombosis was lacking. However, according to the definitions of the 2006 Academic Research Consortium, stent thrombosis is classified as probable when a myocardial infarction, occurring at any time after the index procedure, is documented in the target vessel territory without angiographic confirmation.

CONCLUSION

Our case collection demonstrates that, in patients with probable stent thrombosis and a short time to reperfusion, systemic thrombolysis may be associated with good immediate results.

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