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Original Article

Intracoronary abciximab in STEMI using local drug delivery catheter – Single center experience

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ABSTRACT

Background: Despite restoration of epicardial flow during primary PCI in STEMI, microvascular obstruction may persist as a result of both atheromatous and thrombotic embolization and vasospasm. Compared with the systemic administration of IV pharmacotherapies, highly localized administration of intracoronary pharmacotherapy may be associated with a several-hundred-fold increase in the local concentration of an agent in the epicardial artery and microcirculation. Despite restoration of epicardial flow during primary PCI in STEMI, microvascular obstruction may persist as a result of both atheromatous and thrombotic embolization and vasospasm. We are presenting our experience with use of intracoronary abciximab using local drug delivery catheter in STEMI patients.
Methods: We retrospectively evaluated 15 patients presented to us with STEMI undergoing primary PCI between March 2011 and September 2012 who had super selective intracoronary abciximab using local drug delivery catheter. With standard antiplatelet therapy, both Pre and Post TIMI flow, TMP grading were assessed.
Results: Mean age was 55 years. The TIMI flow increased by 3 grades in thirteen patients, TMP grading increased by 2 grades in five patients and by 3 grades in nine patients. Thus TIMI flow and TMP grading improved after super selective intracoronary abciximab.
Conclusion: Super selective intracoronary abciximab using local drug delivery catheter during primary PCI in STEMI patients significantly improves TMP grading without increased risk of bleeding. This benefit is achieved even in patients without thrombus aspiration. We need to assess the long-term outcomes in the form of reduction in infarct size using this strategy in large group of patients.

1. Introduction

Primary percutaneous coronary intervention (PCI) is now the preferred method of treating patients with ST elevation myocardial infarction (STEMI). The results of primary PCI have improved continuously since the technique was introduced. Despite restoration of epicardial flow, microvascular obstruction may persist after primary PCI as a result of both atheromatous and thrombotic embolization, neutrophil plugging, edema, and vasospasm.[1]

There have been efforts to identify mechanical and pharmacological strategies to improve myocardial perfusion after

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primary PCI. Advances in the procedures and materials have been accompanied by a notable development in associated drug treatments. Compared with the systemic administration of intravenous pharmacotherapies, highly localized administration of intracoronary pharmacotherapy may be associated with a several-hundred-fold increase in the local concentration of an agent in the epicardial artery and microcirculation.

We are presenting herewith our center experience with intracoronary abciximab in STEMI using clearway catheter and assessed the outcomes using TIMI flow and TMP grading.

2. Methods

We assessed 15 consecutive patients who presented to us with STEMI undergoing emergency primary PCI between March 2011 and September 2012. All patients received loading dose of aspirin and 600 mg clopidogrel. Thrombus aspiration was done whenever the thrombus burden was huge. All patients were given bolus only dose of intracoronary abciximab (0.25 mg/kg) using the clearway catheter.

The clearway therapeutic perfusion catheter (Maquet cardiovascular, Sweden) acts as a low-pressure irrigating system for localized perfusion of therapeutic agents into the coronary vasculature. It is a semi compliant micro porous PTFE balloon mounted on 2.7 F Rx catheter and will not burst or tear during use. Fluid gently weeps through the pores with no high pressure jetting. It inflates and infuses fluid at low pressure (1–4 atm) and does not damage the internal elastic lamina of vessel during inflation and infusion. Pressure at balloon surface during infusion is nearly zero relative to blood pressure. Balloon inflation causes occlusion of the vessel providing a better drug contact with thrombus without dilution by blood flow increasing concentration and residence time, which leads to a greater reduction in TIMI thrombus burden score, a hallmark of this therapy. This local drug delivery catheter system is described as OCI (Occlusion, Containment, Infusion) therapeutics allowing site specific, localized drug delivery across any coronary lesion. The potential disadvantage of traditional method (passing through guide catheter) is >50% of the drug will be washed away in systemic circulation and other 20–25% drugs will be delivered to unwanted branches. Less than 20% of the drug will reach the target lesion.

Pre TIMI flow and TMP grading were assessed. The improvement of TIMI flow and TMP grade after intracoronary abciximab using clearway catheter were assessed. After aspiration and abciximab treatment using local drug delivery, stent was deployed using standard protocol.

3. Results

The study population (Mean age of 55 ± 11 years) had 15 patients with STEMI.

Bivalirudin anticoagulation was used in 33% (5/15) during the procedure. Majority of study patients had AWMI 60%. Mean window period of presentation is 7.5 h. One patient had no requirement for stent as angiographically it was a stent like result. 93% (14/15) of them had TIMI 0 flow pre PCI while the rest 7% (1/15) had TIMI 1 flow (Table 1). The TIMI flow increased by 2 grade in 2 patients and by 3 grades in 13 patients. The TMP grading increased by 1 grade in 1 patient, by 2 grade in 5 patients and by 3 grade in 9 patients. TIMI flow remained the same or worsened in none of the patients. 93% (14/15) patients had TIMI 3 flow post procedure with no in-hospital mortality. Clinical/telephonic follow up was done for all patients and there was zero MACE at 30 days.

4. Discussion

Potent inhibition of platelet aggregation can be achieved by the use of intravenous glycoprotein IIb/IIIa inhibitors, which inhibit the final common pathway of platelet aggregation, the cross-bridging of platelets secondary to fibrinogen binding to the activated GP IIb/IIIa receptor.

A 2002 meta-analysis examined 31,400 non-ST elevation ACS patients treated with aspirin and heparin who did not undergo early revascularization. GP IIb/IIIa inhibitor use was associated with a significant reduction in the combined endpoint (death or MI) at five days and at 30 days with benefit appeared to be limited to the highest risk patients.[2]

An interesting observation from the PRISM, CAPTURE, and PARAGON B trials and a meta-analysis is that the benefit from GP IIb/IIIa inhibition primarily occurred in the subset of patients who had elevations in troponin.[3–5] The same pattern of benefit limited to patients with elevated troponins was also noted in the ISAR-REACT 2 trial of patients also treated with clopidogrel.[6] In ISAR-REACT 2, all patients received pretreatment with aspirin and 600 mg of clopidogrel. While there is evidence to recommend GP IIb/IIIa inhibitor therapy in high-risk patients treated with a conservative approach, the evidence comes from studies performed before the routine use of P2Y12 receptor blockers. The role of GP IIb/IIIa inhibitor for these high-risk patients on dual oral antiplatelet therapy is questionable in elective PCI.

However intravenous GP IIb/IIIa receptor antagonists in conjunction with unfractionated heparin or bivalirudin has been established to have a beneficial role in STEMI patients undergoing primary PCI[7] in whom there is no adequate time interval for elective loading dose.

Meta-analysis have showed that IC administration of abciximab is associated with significant benefits in myocardial perfusion and mortality at short-term follow-up compared to IV abciximab administration, without any excess of major bleeding in STEMI patients undergoing primary PCI.[8,9]

Table 1 – Patient and procedure characteristics.

Study population	Total no. of patients $n = 15$
Diabetes mellitus	8
Systemic hypertension	8
AWMI	9
IWMI	6
Cardiogenic shock	1
TIMI flow 0	14
Pre PCI	
Thrombus aspiration	6