Platelet Inhibition in Percutaneous Coronary Interventions

Christophe A. Wyss, Marco Roffi[1]

Abstract
Mechanical disruption of atherosclerotic plaques at the time of percutaneous coronary intervention (PCI) is a potent stimulus for arterial thrombosis. Since platelets play a crucial role in the cascade of clot formation, platelet inhibition is an essential step for successful PCI. Aspirin remains the cornerstone of any antithrombotic regimen in the interventional setting. The addition of a thienopyridine is mandatory following stenting to prevent thrombosis of the device. Whenever possible, patients undergoing PCI should be pretreated with clopidogrel and the drug should be continued for up to 1 year. Glycoprotein IIb/IIIa antagonists should be administered in high-risk patients, such as those with acute coronary syndromes, diabetes, or complex coronary anatomy.

Key Words: Aspirin · Clopidogrel · Platelet inhibitors · Glycoprotein IIb/IIIa antagonists · Acute coronary syndromes · Diabetes · Percutaneous coronary intervention

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Plättchenhemmung bei perkutanen Koronarinterventionen

Zusammenfassung
Das mechanische Trauma der Gefäßwand durch Ballonangioplastie oder Stenteinlage ist ein starker Stimulus für eine Koronarthrombose. Da die Plättchen eine entscheidende Rolle in der Gerinnselbildung spielen, ist die Plättchenhemmung ein essentieller Bestandteil der erfolgreichen perkutanen Koronarintervention. Aspirin bleibt der Eckpfeiler jeder antithrombotischen Therapie während perkutaner koronarer Interventionen. Die Zugabe von Thienopyridinen ist nach Stenteinlage unabdingbar, um Stentthrombosen zu vermeiden. Wenn immer möglich, sollte vor einer geplanten Intervention Clopidogrel verabreicht und die Therapie bis zu 1 Jahr nach dem Eingriff weitergeführt werden. Plättchen-Glykoprotein-IIb/IIIa-Rezeptor-Antagonisten sollten bei Hochrisikopatienten verabreicht werden, wie Patienten mit akutem Koronarsyndrom, Diabetes oder komplexer Koronaranatomie.

Schlüsselwörter: Aspirin · Clopidogrel · Plättchenhemmer · Glykoprotein-IIb/IIIa-Antagonisten · Akutes Koronarsyndrom · Diabetes · Perkutane Koronarintervention

Introduction

Spontaneous rupture of a coronary plaque as well as balloon catheter-based mechanical disruption may lead to exposure to the blood circulation of subendothelial thrombogenic material, triggering a well-orchestrated cascade of molecular events characterized by the interactions between platelets, leukocytes, and the subendothelium with subsequent activation of the coagulation system. This chain reaction may result in arterial thrombus formation and subsequent abrupt vessel closure or distal embolization. While the pathophysiological aspects of platelet activation and aggregation as well as the pharmacological basis of antiplatelet therapy have been discussed in detail in other contributions, the focus of the present report is to address platelet inhibition in percutaneous coronary intervention (PCI). The goal of antiplatelet therapy in this setting is to achieve a clinically meaningful reduction of ischemic cardiac events while maintaining an acceptable rate of bleeding complications. Three main classes of antiplatelet agents constitute the armamentarium of the interventionalist, including aspirin, the thienopyridines and the platelet

[1] Department of Cardiology, University Hospital Zurich, Switzerland.

glycoprotein (GP) IIb/IIIa receptor inhibitors. The use of these drugs, alone or in combination, will be presented with special attention to the three clinical settings of PCI application, namely stable coronary disease, non-ST segment elevation acute coronary syndromes (ACS), and acute myocardial infarction (MI).

Aspirin

Aspirin (acetylsalicylic acid) is the most widely used and cheap inhibitor of platelet function and remains the cornerstone of any antithrombotic therapy during PCI. Aspirin potently inhibits platelet aggregation induced by arachidonic acid but is a relatively weak antiplatelet agent following stimulation by a variety of other agonists, including adenosine diphosphate (ADP) and thrombin [1]. This observation sets the basis for combination strategies to target different platelet activation pathways. In the presence of serious aspirin intolerance, the risks and benefits of PCI should be carefully weighed against alternative strategies (i.e., medical management, bypass surgery), since the safety of the procedure among patients not taking aspirin is unknown. Interestingly, initial investigations of aspirin for PCI were designed not to address its antiplatelet properties but its efficacy in restenosis prevention. Although aspirin, like any other antiplatelet agents subsequently tested, had no impact on restenosis, a reduction in ischemic events associated with the drug was documented. In an early study, 376 patients undergoing coronary balloon angioplasty (PTCA) were randomized to either aspirin (990 mg daily) and dipyridamole (225 mg daily) or placebo starting 24 h prior to the procedure and continuing for 4–7 months thereafter [2]. Among patients allocated to the antiplatelet combination the incidence of periprocedural Q-wave MI was reduced compared with controls (1.6% vs. 6.9%; $p = 0.011$). The M-HEART II trial has been the only placebo-controlled study testing the efficacy of aspirin monotherapy following angioplasty [3]. All patients ($n = 752$) received aspirin 325 mg the day prior to PTCA. The aspirin group received 325 mg daily for 6 months following PTCA, while the other group received placebo. At 6 months, the allocation to antiplatelet therapy was associated with a significant reduction in MI compared with controls (1.2% vs. 5.7%; $p = 0.03$). Since then, aspirin has invariably been used in all percutaneous revascularization procedures.

In the absence of randomized clinical trials, the optimal aspirin dose in the interventional setting remains unknown. The 2005 ESC-PCI guidelines support the use of aspirin in all patients (grade I C recommendation; Table 1) [4]. A loading dose of 500 mg orally > 3 h prior to or at least 300 mg intravenously at the time of PCI in all patients not on chronic treatment is recommended. With respect to long-term use, doses > 100 mg daily are not recommended, since they do not appear to convey additional benefit and are associated with increased bleeding risk.

Thienopyridines

Coronary stenting is considered the gold standard in PCI, since it decreases both acute (i.e., abrupt vessel closure) and long-term (i.e., restenosis) complications associated with balloon angioplasty [5]. Due to the intrinsic thrombogenicity of stainless-steel stents, the early coronary stent experience was burdened by an approximately 10% rate of acute or subacute stent thrombosis [6]. At that time, patients were treated with the combination aspirin and oral anticoagulants. The explosive success of intracoronary stenting was only possible because of subsequent antiplatelet combination therapy with aspirin and thienopyridines, which led to a dramatic reduction of subacute stent thrombosis (in the range of 1%) [7]. Ticlopidine and clopidogrel are the two thienopyridines currently available for clinical use. Both agents are administered orally, have similar molecular structures and bind irreversibly to the $P2Y_{12}$ purinoceptor on platelets inducing inhibition of ADP-mediated platelet aggregation [8]. Additionally, since this recep-

Table 1. Recommendation grading according to the European Society of Cardiology.

Tabelle 1. Einteilung der Empfehlungen gemäß den Richtlinien der Europäischen Gesellschaft für Kardiologie.

Level of recommendation	
I	Evidence and/or general agreement that a given treatment is beneficial, useful, and effective
II	Conflicting evidence and/or divergence of opinion about the usefulness/efficacy of the treatment
IIa	Weight of evidence/opinion is in favor of usefulness/efficacy
IIb	Usefulness/efficacy is less well established by evidence/opinion
Level of evidence	
A	Data derived from multiple randomized clinical trials or meta-analysis
B	Data derived from a single randomized clinical trial or large nonrandomized studies
C	Consensus of opinion of the experts and/or small studies, retrospective studies, registries

tor is involved in the amplification of platelet aggregation induced by other agonists such as thrombin, epinephrine, or thromboxane A_2, thienopyridines indirectly inhibit platelet aggregation induced by these agonists [9]. A meta-analysis of registries and randomized trials comparing ticlopidine with clopidogrel in patients undergoing coronary stenting suggested that clopidogrel was just as efficacious as ticlopidine and associated with fewer adverse drug effects [10]. Since ticlopidine may cause severe neutropenia in approximately 1% of patients and requires twice-daily administration, clopidogrel virtually replaced it for all indications in most European countries and in the USA.

Both thienopyridines are prodrugs requiring first-pass metabolism in the liver to become biologically active and have therefore a slow onset of action. Following oral maintenance dose (2 × 250 mg/d for ticlopidine, 75 mg/d for clopidogrel) the platelet inhibition's plateau is achieved after 3–5 days with ticlopidine and after 4–7 days with clopidogrel. Until recently, the main indication for thienopyridine use was the prevention of subacute stent thrombosis and the drugs were administered following the procedure. The CREDO trial investigated whether clopidogrel administration before and prolonged after PCI was associated with a reduction in ischemic events [11]. The study enrolled a total of 2,116 patients that were randomized to 300 mg clopidogrel or placebo 3–24 h prior to PCI. Thereafter, all patients received clopidogrel in the oral maintenance dose (75 mg/d) through day 28. From day 29 through 12 months, patients in the loading-dose group received clopidogrel, while those in the control group received placebo. Overall, clopidogrel pretreatment did not significantly reduce the composite endpoint of MI, death, or target-vessel revascularization (TVR) at 28 days (p = 0.23). However, in the prespecified subgroup of patients who received the drug ≥ 6 h prior to PCI a trend toward a benefit was observed (relative risk reduction 39%; p = 0.05).

In the PCI-CURE study, the investigators addressed the impact of the combination strategy among 2,658 patients with ACS undergoing PCI during index hospitalization according to the discretion of the treating physician [12]. Patients received the study drug for an average of 10 days prior to PCI. After intervention, both groups received open-label thienopyridines for 2–4 weeks, followed by clopidogrel or placebo for a mean of 8 months. The primary endpoint was MI, urgent revascularization, or cardiovascular mortality. At 30 days, the clopidogrel-pretreated group had a 30% relative risk reduction in events (p = 0.03). Recent investigations suggest that 600 mg clopidogrel loading dose confers more potent platelet inhibition and shortens the time interval necessary for effective pretreatment (Figure 1) [13, 14]. Besides, administration of an additional loading dose (300–600 mg) appears to provide further platelet inhibition in patients on clopidogrel maintenance dose (Figure 2) [15].

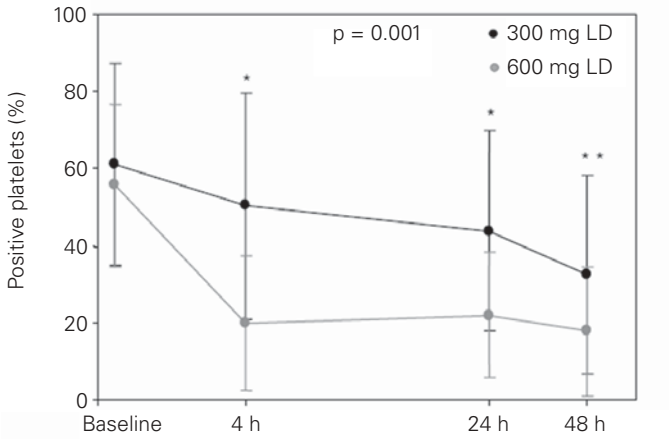

Figure 1. Effect on platelet inhibition following oral loading doses (LD) of clopidogrel. Demonstrated is the platelet glycoprotein IIb/IIIa receptor activation following 2 µmol adenosine diphosphate (ADP) stimulus. *p < 0.001 and **p < 0.05 [13].

Abbildung 1. Plättchenhemmung nach Gabe von Clopidogrel per os. Dargestellt ist die Aktivierung des Glykoprotein-IIb/IIIa-Rezeptors nach Gabe von 2 µmol Adenosindiphosphat (ADP). *p < 0,001 und **p < 0,05 [13].

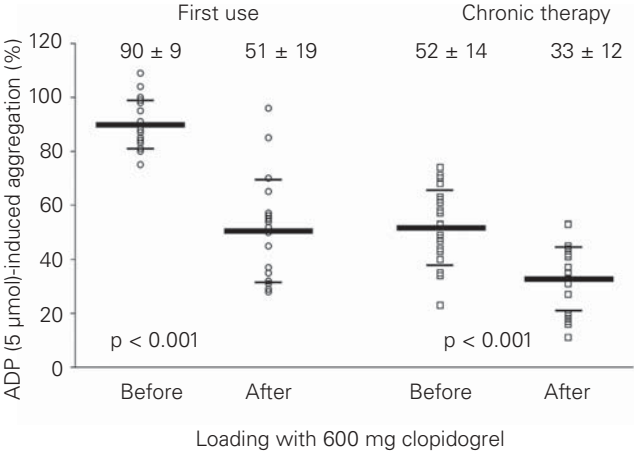

Figure 2. Maximal aggregation induced by 5 µmol/l adenosine diphosphate (ADP) before and 6 h after 600 mg clopidogrel loading in patients not pretreated and in those on chronic clopidogrel therapy. Individual data are shown, along with mean (thick lines) and standard deviation (thin lines) [15].

Abbildung 2. Maximale Plättchenhemmung nach 5 µmol/l Adenosindiphosphat (ADP) vor und 6 h nach 600 mg Clopidogrel per os bei nicht vorbehandelten Patienten und bei Patienten unter chronischer Clopidogreltherapie [15].

However, it is unknown whether to administer an additional bolus dose prior to PCI might translate into a reduction of ischemic events. Since no randomized comparison has addressed different clopidogrel regimens, the optimal clopidogrel loading dose and/or timing of treatment cannot conclusively be defined.

The efficacy of prolonged dual antiplatelet therapy following PCI has been investigated in the CREDO [11] and the PCI-CURE trials [12]. In CREDO, the occurrence of MI, stroke, or death occurring between 30 days and 1 year was reduced by 37% ($p = 0.04$) with prolonged double antiplatelet therapy. A trend toward major bleeding in the combination therapy was observed, while minor bleedings were similar. In the PCI-CURE study a benefit in terms of cardiovascular death, MI, or rehospitalization from clopidogrel from day 30 to 1 year was observed (risk ratio 0.86; $p = 0.05$). Clopidogrel did not increase major but only minor bleedings. Safety and efficacy of long-term dual antiplatelet therapy in high-risk patients are currently being tested in the CHARISMA trial.

The 2005 ESC-PCI guidelines recommend the use of clopidogrel pretreatment with a loading dose of 300 mg at least 6 h before (ideally the day before) planned PCI in stable coronary disease (grade I C) [4]. In primary PCI for ST segment elevation MI (STEMI) or immediate PCI in non-STEMI or ad hoc PCI in stable disease a loading dose of 600 mg should be considered (grade I C). After bare-metal-stent implantation, clopidogrel should be administered for at least 3–4 weeks (grade I A), and after implantation of drug-eluting stents for 6–12 months (grade I C). After non-ST elevation ACS, a prolonged therapy for 9–12 months is recommended (grade I B).

Glycoprotein (GP) IIb/IIIa Receptor Antagonists

Unlike antiplatelet agents that target only one of many individual pathways involved in platelet aggregation, inhibitors of the platelet GP IIb/IIIa receptor potently inhibit the final common pathway involved in platelet adhesion, activation, and aggregation, by blocking platelet binding of fibrinogen [16]. Three GP IIb/IIIa inhibitors are currently used as adjunctive treatment in the setting of PCI, including the murine-human chimeric antibody abciximab, the synthetic nonpeptide tirofiban, and the synthetic peptide eptifibatide. Safety and efficacy of abciximab have initially been tested in randomized placebo-controlled trials of balloon angioplasty (EPIC, EPILOG), coronary artery stenting (EPISTENT), and in refractory unstable angina (CAPTURE) [17–20]. While the individual studies demonstrated a significant reduction of ischemic events (i.e., death, MI, urgent revascularization) associated with the drug, a pooled analysis of the trials demonstrated even a long-term survival benefit (Figure 3) [21]. Side effects include bleeding events, with a major bleeding rate ranging from 0.7% to 14% according to heparin dose [22], and in up to 1% profound thrombocytopenia (< 20,000/µl) [17]. Because of the low plasma levels of unbound abciximab, the drug's inhibitory effect can rapidly be reversed by platelet transfusions.

Tirofiban was studied in angioplasty (RESTORE) and in unstable angina patients initially treated medically (PRISM, PRISM-PLUS) [23–25]. Eptifibatide underwent large-scale clinical trial testing in the setting of medical management of unstable angina (PURSUIT) and PCI (IMPACT-II, ESPRIT) [26–28]. Since the eptifibatide dose used in the initial trials was believed to be insufficient to provide adequate GP IIb/IIIa inhibition during PCI, the ESPRIT trial evaluated a double-bolus regimen (two 180-µg/kg boluses administered 10 min apart, followed by an infusion of 2.0 µg/kg/min for 18–24 h) and demonstrated a benefit in the composite primary endpoint of death, MI, urgent TVR within 48 h (10.5% vs. 6.6%; $p = 0.0015$). Based on these results, this eptifibatide regimen has become standard. Since for both tirofiban and eptifibatide the number of unbound drug molecules in the circulation is very high, platelet transfusions are not effective in reversing the antiplatelet properties of these drugs. The mean plasma half-life of

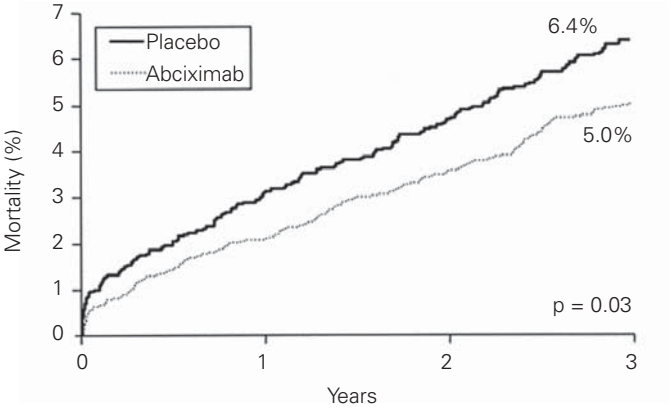

Figure 3. Cumulative mortality curves at 3 years in the EPIC, EPILOG, and EPISTENT trials showing a statistically significant benefit in favor of abciximab (odds ratio 0.78; $p = 0.03$) [21].

Abbildung 3. Kumulative Mortalitätskurven nach 3 Jahren der EPIC-, EPILOG- und EPISTENT-Studien. Die zu Abciximab randomisierten Patienten hatten eine signifikante Mortalitätsreduktion (Odds-Ratio 0,78; $p = 0{,}03$) [21].

tirofiban is approximately 2 h, which is slightly shorter than that of eptifibatide. The clinical antiplatelet effect of these agents is abolished after approximately 4 h of drug discontinuation.

Elective Percutaneous Coronary Intervention

GP IIb/IIIa antagonists have been proven to be effective in reducing ischemic events in patients undergoing PCI across a wide variety of coronary lesions and risk profiles [29]. The only subgroup of patients not deriving benefit from these agents were those undergoing venous bypass grafting [30]. The likely explanation for the lack of efficacy is that the amount and/or the composition of the material embolized during PCI of bypass graft lesions may overwhelm the capacity of these agents to protect the distal vasculature. With respect to whether one agent may be superior to another, the only head-to-head comparison (TARGET) demonstrated that among 4,809 patients abciximab significantly reduced 30-day ischemic events (death, nonfatal MI, or urgent TVR) compared with tirofiban (6.0% vs. 7.6%; p = 0.038) [31]. Subsequent studies have suggested that the level of platelet inhibition at the time of PCI conveyed by tirofiban as dosed in TARGET (10-µg/kg bolus followed by a 0.15-µg/kg/min infusion) was insufficient [32]. A higher tirofiban dose (bolus of 25 µg/kg followed by infusion of 0.15 µg/kg/min), proven to be efficacious in a pilot study of high-risk patients [33], is currently being tested against abciximab in > 8,000 patients in the US-based TENACITY trial.

In patients pretreated with dual antiplatelet therapy (i.e., aspirin and clopidogrel) undergoing PCI, the benefit of additional application of GP IIb/IIIa antagonists has recently been questioned. The ISAR-REACT trial enrolled 2,159 low-risk patients undergoing elective PCI [34]. The patients received a loading dose of 600 mg of clopidogrel on top of aspirin at least 2 h prior to PCI, and then were randomized to abciximab or placebo. The primary endpoint (death, MI, or urgent revascularization) did not differ between the two groups at 30 days, while the abciximab-treated patients had more bleeding complications. Importantly, the trial excluded patients at higher risk such as those recovering from MI, with ACS, insulin-dependent diabetics, and patients with impaired left ventricular function. In addition, randomization occurred after coronary angiography, likely excluding patients with high-risk coronary anatomy. This resulted in an unusually low event rate (4% death, MI, or urgent revascularization at 30 days). In addition, since the ISAR-REACT trial was powered to test superiority and not noninferiority, it cannot be concluded that the two strategies were equivalent. Despite the limitations, the trial demonstrates that, in a properly selected low-risk population pretreated with high-dose clopidogrel, PCI can be safely performed without GP IIb/IIIa blockers.

Non-ST Elevation Acute Coronary Syndromes

In patients with non-ST elevation ACS treated mainly medically, the overall benefit of GP IIb/IIIa inhibitors has been modest, as demonstrated by a relative risk reduction of 9% documented in a meta-analysis involving > 29,000 patients [35]. Nevertheless, in the same study, a statistically significant 26% reduction in 30-day death or MI was identified among patients who underwent PCI, supporting previous findings of the CAPTURE trial that demonstrated high efficacy in ischemic event reduction associated with these agents among patients with ACS undergoing PCI [36]. Additional subsets of ACS patients who derive the greatest benefit from GP IIb/IIIa blockade include those presenting with positive troponin [36] and those with diabetes, as described below.

Acute Myocardial Infarction

The CADILLAC trial assigned 2,082 patients with STEMI to balloon angioplasty alone, balloon angioplasty plus abciximab, stenting alone, or stenting plus abcix-

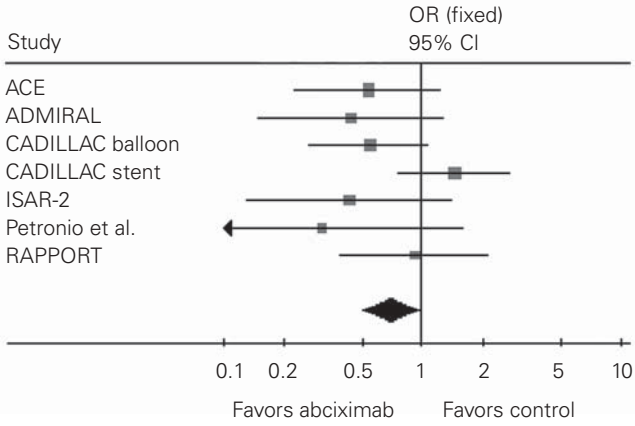

Figure 4. Meta-analysis of all six placebo-controlled abciximab trials in percutaneous coronary intervention for ST elevation myocardial infarction (n = 3,755). The use of abciximab was associated with a significant reduction of death (odds ratio [OR] 0.70, 95% confidence interval [CI] 0.50–0.97) [40].

Abbildung 4. Metaanalyse von allen sechs plazebokontrollierten Abciximabstudien während perkutaner Koronarintervention bei akutem Herzinfarkt (n = 3 755). Zu Abciximab randomisierte Patienten hatten eine signifikante Mortalitätsreduktion (Odds-Ratio [OR] 0,70, 95%-Konfidenzintervall [CI] 0,50–0,97) [40].

imab [37]. The use of abciximab had little effect on the 6-month primary endpoint (composite of death, MI, disabling stroke, and TVR). The event rate was 20.0% among patients after balloon angioplasty, 16.5% after balloon angioplasty plus abciximab, 11.5% after stenting, and 10.2% after stenting plus abciximab (p = 0.001). The ADMIRAL trial randomly assigned 300 STEMI patients to abciximab or placebo and the study drug was administered in the ambulance prior to hospital admission [38]. At 30 days, the primary endpoint (composite of death, MI, or urgent TVR) occurred in 6.0% of the patients in the abciximab group compared with 14.6% of those in the placebo group (p = 0.01). At 6 months, the event rate was 7.4% and 15.9%, respectively (p = 0.02). The diverging outcomes of the two studies are most likely the result of different population enrollment. Accordingly, the 30-day mortality in the CADILLAC trial was 1.1–2.7%, while in the ADMIRAL trial it was 5–10%. Importantly, in the CADILLAC trial patients were randomized following coronary angiography, thereby likely excluding patients with high-risk coronary anatomy, while in ADMIRAL allocation occurred prior to angiography. Another study, the ACE trial, compared stenting versus stenting plus abciximab in 400 patients with STEMI. At 1 year, the survival rate was 95.2% in the abciximab group and 88.2% in the stent-alone group (p = 0.017) [39]. A recent meta-analysis summarizing the results of all six placebo-controlled abciximab trials in primary PCI (n = 3,755) demonstrated that the use of this potent platelet inhibitor was associated with a statistically significant mortality reduction at 6 months (odds ratio 0.70, 95% confidence interval 0.50–0.97; Figure 4) [40]. From a safety perspective, abciximab was associated with an overall 39% increased risk of major bleedings. The risk was driven by patients allocated to high heparin doses (100-U/kg bolus followed by a maintenance infusion), while those receiving 70-U/kg bolus and no infusion had no statistically increased bleeding risk. No large-scale randomized study has addressed the use of small molecules in the setting of acute MI.

Glycoprotein IIb/IIIa Receptor Inhibitors in Diabetics

The currently available bulk of data concordantly suggests that diabetic patients derive a preferential benefit from GP IIb/IIIa inhibitors compared with nondiabet-

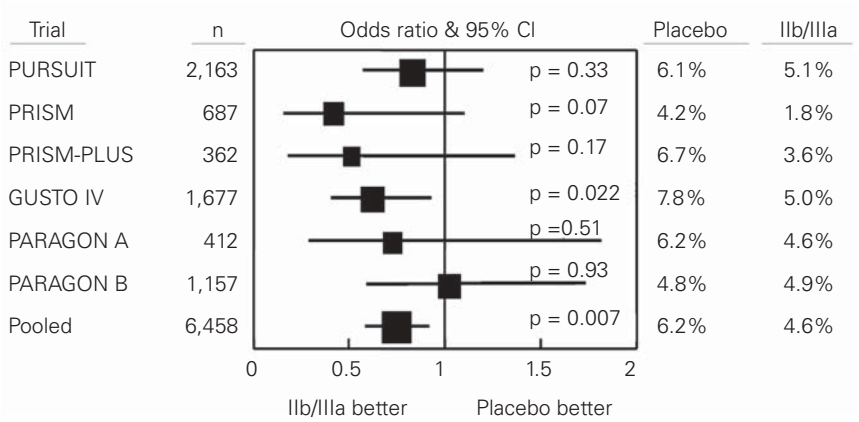

Figure 5. Meta-analysis of the placebo-controlled trials of glycoprotein IIb/IIIa receptor inhibitors in the medical management of non-ST elevation acute coronary syndromes. Odds ratio with 95% confidence intervals (CI) and corresponding p-values for treatment effect on 30-day mortality among diabetic patients [44].

Abbildung 5. Metaanalyse der plazebokontrollierten Studien mit Glykoprotein-IIb/IIIa-Rezeptor-Antagonisten in der medikamentösen Behandlung des akuten Koronarsyndroms ohne ST-Hebung. Dargestellt ist die 30-Tage-Mortalität bei Diabetikern [44].

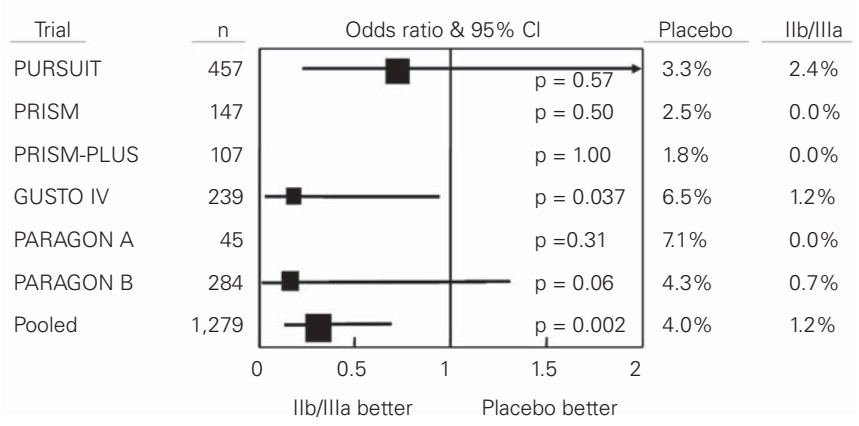

Figure 6. Odds ratio with 95% confidence intervals (CI) for treatment effect on 30-day mortality among diabetic patients with acute coronary syndromes undergoing percutaneous coronary intervention. Values to the left of 1.0 indicate a survival benefit of platelet glycoprotein IIb/IIIa inhibition [44].

Abbildung 6. 30-Tage-Mortalitätsreduktion durch Glykoprotein-IIb/IIIa-Antagonisten bei diabetischen Patienten mit akutem Koronarsyndrom, die einer perkutanen Koronarintervention unterzogen wurden [44].

ics [41]. A pooled analysis of the early abciximab experience (EPIC, EPILOG, and EPISTENT) demonstrated that diabetic patients undergoing PCI derived a mortality benefit from these agents, lowering their risk to the one of nondiabetics randomized to placebo [42]. With respect to whether one agent may be superior to another among diabetics undergoing PCI, the only data available are derived from the TARGET trial. Among 1,117 diabetic patients, no difference in outcomes was observed up to 1 year, suggesting comparable efficacies between tirofiban and abciximab in the diabetic population [43]. Also in the setting of ACS, diabetic patients derived a greater benefit from GP IIb/IIIa blockade than nondiabetics. In a meta-analysis of all large-scale clinical trials addressing the use of GP IIb/IIIa antagonists among patients with ACS primarily medically managed, a statistically significant 26% mortality reduction at 30 days ($p = 0.007$) was demonstrated among diabetic patients (n = 6,458; Figure 5) [44]. Even more striking was the 70% mortality reduction observed among the diabetic patients who underwent PCI in these trials ($p = 0.002$; Figure 6). The value of GP IIb/IIIa receptor inhibitors in diabetic patients pretreated with clopidogrel 600 mg has recently been challenged by the ISAR-SWEET study [45]. Among 701 diabetic patients undergoing elective PCI pretreated with 600 mg of clopidogrel > 2 h prior to the procedure, abciximab was not more efficacious than placebo in reducing ischemic events. Importantly, ACS patients were excluded from the trial. In addition, the trial was underpowered to address clinical endpoints. Nevertheless, the study suggests that there is a subset of diabetic patients that, if adequately pretreated with clopidogrel, may safely undergo elective PCI even in the absence of GP IIb/IIIa receptor inhibitors.

Recommendations According to the 2005 ESC-PCI Guidelines

For PCI in stable patients, GP IIb/IIIa antagonists are helpful in unstable or complex lesions, as bailout medication in case of threatening/actual vessel closure, visible thrombus or no/slow-reflow phenomenon (grade IIa C) [4]. In high-risk non-STEMI patients, if cardiac catheterization is likely to be performed within 2.5 h, GP IIb/IIIa antagonists can be postponed and abciximab or eptifibatide initiated in the catheterization laboratory. If cardiac catheterization is unlikely to be performed within 2.5 h, tirofiban or eptifibatide should be initiated (grade I C). In STEMI, abciximab is beneficial (grade IIa A).

Conclusion

Aspirin remains the cornerstone of any antithrombotic regimen in the interventional setting. The addition of a thienopyridine is mandatory following stenting to prevent thrombosis of the device. Whenever possible, patients undergoing PCI should be pretreated with clopidogrel and the drug should be continued for up to 1 year. GP IIb/IIIa antagonists should be administered in high-risk patients, such as those with acute coronary syndromes, diabetes, or complex coronary anatomy.

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Address for Correspondence
Marco Roffi, MD, FACC
Andreas Grüntzig Cardiovascular
Catheterization Laboratories
Cardiology
University Hospital
Rämistraße 100
8091 Zürich
Switzerland
Phone (+41/44) 255-8573, Fax -4401
e-mail: marco.roffi@usz.ch