

# Antiplatelet therapy in patients with coronary artery stents for noncardiac surgery: Role of thromboelastography

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## Abstract

The perioperative course of the patients who have undergone coronary stent placement was studied. These patients were on dual antiplatelet therapy and were posted for noncardiac surgery. Clopidogrel had been discontinued for a variable duration before noncardiac surgery. Thromboelastography (TEG) was performed preoperatively to assess their fitness for surgery. The surgery and the postoperative period were uneventful in all the patients. There was no incidence of increased bleeding in any of the patients. Blood transfusion was not required in any patient. We concluded that standard TEG can be used when in dilemma about the fitness of the patient for surgery. Although there are clear guidelines about the patients who are on dual antiplatelet therapy, in clinical practice, it is important to weigh the risk–benefit to the advantage of the patient. If we stop the dual antiplatelet therapy in a patient with drug eluting stent within 1 year of implantation, the risk of major adverse cardiac event increases many fold. If we continue clopidogrel and aspirin during surgery, the risk of bleeding increases but is not life-threatening, except when surgery is performed in closed spaces. Thus, to continue dual antiplatelet medication intraoperatively is better than to stop it. If the medicine has to be withheld, it should be withheld for the minimal possible duration and a TEG should be performed.

**Key words:** Coronary artery stent, noncardiac surgery, thromboelastography

## Introduction

Coronary artery stenting has become the preferred technique for revascularization in a patient with coronary artery disease. Patients with coronary stents are strictly advised to continue dual antiplatelet therapy, clopidogrel and aspirin, for a duration of at least 1 year to allow re-endothelialization and prevent any thrombotic events.<sup>[1,2]</sup> Continued use of antiplatelet therapy results in a higher chance of surgical bleeding. Stopping the medication increases the incidence of major adverse cardiac events (MACEs).

The American Society of Regional Anesthesia and Pain Medicine (ASRA) in the 3<sup>rd</sup> Consensus Conference

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recommended *practice guidelines* on regional anesthesia and anticoagulation. The guidelines state that clopidogrel should be discontinued for at least 7 days before a neuraxial blockade. If neuraxial block is attempted between 5 and 7 days of discontinuation of clopidogrel, then normalization of platelet function should be documented.<sup>[3]</sup> Management is based on labeling precautions and surgical, interventional cardiology/radiology experience.<sup>[4]</sup>

We present a series of patients with coronary artery stents who presented to us for noncardiac surgery. Coagulation profile assessment was carried out by prothrombin time (PT) and activated partial thromboplastin time (APTT), and platelet function by platelet count (quantitative). Thromboelastography (TEG<sup>®</sup> Analyzer Haemoscope Corp., Skokie, IL, USA) is a *point of care* technology. It was performed on the day of surgery for all patients to detect platelet inhibition.<sup>[5]</sup> Patients with abnormal TEG were not given fitness for surgery.

## Case Report

Approval from the local ethics committee was taken for this prospective observational study and informed written consent was taken from the patients. Twenty-six patients who had undergone a noncardiac surgery after coronary stent (DES)

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placement and were on dual antiplatelet therapy (clopidogrel and aspirin) were included in the study. The patients were studied prospectively for 3 days for the perioperative occurrence of any adverse cardiac event, surgical bleeding or spinal hematoma in case a neuraxial block had been given for the surgery.

Patients with a history of easy bruisability or excessive bleeding were excluded. Patients with known coagulopathy, and those with abnormal platelet count, prothrombin time (PT), activated partial thromboplastin time (APTT) and blood urea nitrogen were also excluded from the study. The patients were followed-up for 3 days to record any complications. The time at which noncardiac surgery was planned after coronary stenting was not influenced by the anesthesiologists.

Twenty-six patients were studied. Patient's characteristics and the surgical procedures are presented in Table 1. Among the patients selected, none had an abnormal TEG. Of the 26 patients, four patients had received subarachnoid block, three patients had combined spinal epidural (CSE) and one patient received a thoracic epidural block along with GA (for Whipple's procedure).

There was no neurological complication in any patient due to central neuraxial block and there were no major adverse cardiac events.

## Discussion

A large number of patients with coronary artery stents on dual antiplatelet therapy are presenting for noncardiac surgery. Besides an increased risk of surgical bleeding, there is a risk of spinal/epidural hematoma if central neuraxial block is performed in a patient on antiplatelet therapy. On the other hand, stent thrombosis can occur if antiplatelet therapy is stopped prematurely, causing acute coronary syndrome.<sup>[6]</sup> The evidence base of various guidelines is weak, relying on case reports, small studies and pharmacokinetics of the drugs. It is important to assess each case along with the associated risk factors to improve patient outcome.

TEG is a method of testing the efficacy of coagulation in blood. Four values represent clot formation:

1. "R" value represents the speed of clot formation
2. "K" value is the time from the end of R until the clot reaches 20 mm

**Table 1: Patient details**

Age (years)	Sex	Type of surgery	Duration of stopping antiplatelet medicine	Duration of stent at noncardiac surgery	Anesthesia	Type of stent
69	F	Dynamic hip screw	3 days	6 months	GA	DES
59	M	Lap. appendectomy	2 months	3 years	GA	BMS
70	M	B/L total extraperitoneal repair for hernia	5 days	4 years	GA	DES
54	M	Lap. cholecystectomy	4 days	1 year	GA	BMS
65	M	Spinal fixation	1 day	5 months	GA	DES
59	M	Hernioplasty	5 days	4 years	GA	DES
71	M	Lap. cholecystectomy	4 days	3 years	GA	DES
67	M	Double J stenting	5 days	4 years	SAB	DES
65	M	Spine fixation	1 day	2 years	GA	DES
76	M	Transurethral resection of prostate	5 days	3 months	CSE	BMS
72	M	Dynamic hip screw	0 day	5 years	CSE	DES
50	M	Renal allograft recipient	5 days	1.5 years	GA	DES
58	M	Transurethral resection of prostate	5 days	4 years	SAB	DES
67	F	Dynamic hip screw	4 days	NA	CSE	NA
48	M	Rt. hemicolectomy	Not stopped	9 months	GA	DES
68	M	Photosensitive vaporization of prostate	1 day	5 months	SAB	DES
71	M	Transurethral resection of prostate	5 days	1 year 5 months	SAB	DES
60	M	Transurethral resection of prostate	Not stopped	25 days	GA	DES
65	M	Kyphoplasty	3 days	11 years	GA	DES
63	M	Whipple's procedure	5 days	2 years	GA + thoracic epidural block	DES
63	F	Phacoemulsification with intraocular lens	Not stopped	3 months	LA	DES
55	M	Ureteric reimplantation B/L	2 days	4 years	GA	DES
68	M	Rt. radical nephrectomy	On day of surgery	2 years	GA	DES
53	F	Chemoport insertion	5 days	3 years	LA	DES
60	M	Transurethral resection of prostate	Not stopped	2 months	GA	DES
65	M	Kyphoplasty	3 days	10 years	GA	DES

GA = General anesthesia; LA = Local anesthesia; SAB = Subarachnoid block; DES = Drug eluting stent; BMS = Bare metal stent; CSE = Combined spinal epidural

3. The angle is the tangent of the curve made as the “K” is reached, and offers similar information to K
4. “MA” reflects clot strength

The speed and strength of clot formation are affected by illness, environment and medications, and depend on the activity of the plasmatic coagulation system, platelet function and fibrinolysis.<sup>[7]</sup> TEG assesses the quality of platelet function, which may be normal even when the total platelet count (quantity) is less. This explains the reason why the patients who had stopped antiplatelet therapy for less than 1 day or had not stopped it, also had normal TEG.

One patient had fracture neck of femur and was admitted for dynamic hip screw (DHS) placement. A general anesthetic is preferred because of the risk of spinal hematoma. This patient had chronic obstructive pulmonary disease with acute exacerbation due to which general anesthesia was contraindicated. The patient was taking clopidogrel and aspirin. TEG of this patient was within the reference range. After consultation with the cardiologist and explaining the risk to the patient, a CSE block was given. The procedure was completed and the patient recovery was uneventful.

The Nordic guidelines for neuraxial blocks in patients taking clopidogrel state that even in an emergency case, central neuraxial block is contraindicated except when a reduced mortality is expected with reasonable certainty from a single-shot spinal anesthesia instead of general anesthesia.<sup>[8]</sup> In our series, because only a small number of patients were followed-up postoperatively, it is difficult to say with certainty that regional block can be given to patients actively taking clopidogrel, if TEG is normal. There is also a difference in opinion between the published guidelines. In a study performed by Osto *et al.*, no clinically significant complication was reported after the use of neuraxial block in patients taking clopidogrel.<sup>[9]</sup> However, this study has been strongly debated by Hodgson and Miller.<sup>[10]</sup>

Ours is a tertiary care center; the facilities available allow us to take difficult decisions. Patients with DES *in situ*, as per guidelines, should continue antiplatelet medication for 1 year because of the risk of stent occlusion.<sup>[1]</sup> In patients scheduled for surgery on the spine (closed spaces), clopidogrel had been stopped 5 days before surgery, while aspirin was continued. Savonitto *et al.* stated that for patients with recently implanted DES needing urgent surgery, a “bridging therapy” with intravenous tirofiban allows temporary withdrawal of oral clopidogrel without increasing the risk of bleeding.<sup>[11]</sup> Tirofiban was not available to us and hence it was not used. However, the TEG was normal. The surgical procedure and patient recovery was

uneventful. Postoperatively, the patients were kept in the high-dependency unit to detect any major adverse cardiac events (MACEs) at the earliest. In all the cases, nature of the risk was explained to the patients and their attendants and their consent was taken.

The observations in this study indicate that TEG can be used to identify platelet inhibition among the surgical patients. Patients with normal TEG and coagulation profile may undergo surgery irrespective of the duration for which antiplatelet therapy has been stopped. Because these patients are prone to develop stent thrombosis, antiplatelet therapy should be stopped for as short a duration as possible. Antiplatelet therapy was restarted postoperatively and TEG was not repeated.

## Conclusion

Recovery of platelet function in acute surgical patients who have stopped taking clopidogrel and aspirin therapy can be identified by TEG. This point of care testing is helpful in increasing the margin of safety for surgical patients on antiplatelet therapy, and assists in the decision making process. TEG platelet mapping is a new point of care technology that is more specific. It will help in the decision making in surgical patients coming for noncardiac surgery.<sup>[12,13]</sup> More work needs to be done on this line to reach a definite conclusion.

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