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REVIEW ARTICLES

Antiplatelet Therapy During Surgery: A Review

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Antiplatelet agents are one of the cornerstones of primary and secondary prevention of coronary artery disease (CAD). They are especially important after coronary stent implantation and acute coronary syndromes. (ACS).[1] Stent thrombosis is rare but potentially fatal complications after coronary stent implantation and the most important risk factor is premature cessation of dual antiplatelet therapy with aspirin and a thienopyridine.[2] Recent studies suggest that 5% of patients who underwent percutaneuos coronary intervention (PCI) will also have to undergo non-cardiac or cardiac surgery within the first year after coronary stenting.[3] This subset of patients presents to cardiologists, surgeons, and anaesthesiologist with the problem of having to decide between the risk of increased blood loss when continuing the antiplatelet agents in the perioperative period, and the risk of stent thrombosis if the drugs are stopped abruptly and prematurely. There is only very limited evidence from controlled trials to be used for guidelines .This review concentrates on the balance of the individual risks of these patients and to offer a practical approach for daily clinical practice.

Bleeding vs. thrombotic events - The consequences:

Increased bleeding rates in the case of maintaining antiplatelet drugs in the perioperative period and the risk of cardiac events in the case of interrupting the medication have to be carefully balanced. Maintaining antiplatelet therapy during perioperative period leads to an average increase in haemorrhagic risk of 2.5% - 20% with aspirin alone & 30%-50% in case of dual antiplatelet therapy. However, no study has yet demonstrated an increase in surgical morbidity or mortality linked to the increased blood loss (with the exception of intracranial neurosurgery), although the rate of blood transfusions is increased by one third.[4] In a meta-analysis of 50 articles that included more than 10 000 patients undergoing cardiac surgery, found that postoperative blood loss increased by only 300 ml on average for patients taking aspirin, which certainly does not outbalance the beneficial effects of aspirin in this subset of patients.[5]

In a study with around 400 matched pairs, dual antiplatelet therapy during the last 4 days before CABG was an independent predictor of transfusion requirement [6] and need for redo surgery.[7]Another large prospective observational study on 1628 consecutive patients failed to reveal any association between the perioperative use of clopidogrel and significantly increased bleeding, transfusion requirements, need for surgical re-exploration or intensive care unit stay.[8] A subgroup analysis of the CURE trial examining patients who underwent CABG with or without clopidogrel and aspirin found a minor, but not significant, difference in the incidence of major or life threatening bleeding events.[9]

During the re-endothelialization phase of coronary stents, the average postoperative myocardial infarction (MI) rate due to stent thrombosis is 35%; the average mortality of stent thrombosis is 20–40%;[10,11] up to 85% in one postoperative study.[12] Patients who stopped the drug within the first month after drug eluting stent implantation, had a 10 times higher risk of death.[13] A large meta-analysis including 50,000 patients treated with aspirin for secondary prevention of CAD showed that the cardiac complication rate was increased threefold after aspirin withdrawal.This risk was even considerably higher after coronary stent implantation.[14]

Possible approaches: Two distinct scenarios can be distinguished.

Planned surgery:

In this scenario, the patient is deemed a candidate for percutaneous revascularization, but has to undergo surgery in the near future. Preoperative revascularisation may not be mandatory unless the patients present with unstable coronary syndromes or other high risk characteristics. This is further supported by CARP trial.[15] Although contemporary practice during PCIs includes placement of stents, a sole balloon angioplasty may be safely performed in this subgroup of patients. If stenting cannot be avoided during PCI and if surgery has to be performed within 1 year after stent placement, then bare metal stents are preferable to drug eluting stents.This is of particular relevance if dual antiplatelet therapy cannot

be continued during the perioperative period. If surgery is elective and can safely be postponed for more than 1 year, nothing argues against implantation of drug eluting stents, when indicated.

Unplanned surgery:

In this scenario, patients already have had an ACS and/or have been treated with PCI and in need of antiplatelet drug therapy:

Patients on aspirin:

Aspirin is a lifelong therapy and should never be stopped before surgery when prescribed as a secondary prevention after stroke, angina, MI, or any type of revascularization. Surgery with an extensively high risk of bleeding in a closed space such as intracranial neurosurgery or spinal canal surgery is an exception (Fig.-1).

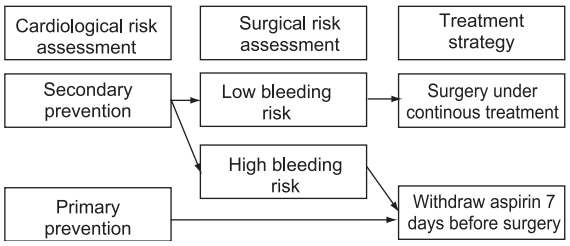

Fig.-1: *Perioperative management of patients receiving antiplatelet therapy with aspirin.*[4]

However, Aspirin as primary prevention may safely be withdrawn but not more than 7 days before surgery (Fig.-1).

Table-I

Characteristics of patients being at high or low risk for suffering stent thromboses after withdrawal of antiplatelet drugs.[4]

High risk	Low risk
Less than 6 months after drug eluting stent implantation.	Antiplatelet drugs prescribed solely for primary prevention
Less than 6 weeks after acute coronary syndrome	More than 6 weeks after after bare metal stent Implantation.
Additional risk factors diabetes mellitus,renal failure, bifurcation stenosis etc.	More than 6 weeks after: uncomplicated acute coronary syndrome or stroke

Patients on clopidogrel and aspirin:

In low-risk situations(table-1), it is possible to discontinue clopidogrel but not aspirin, 5-7 days before surgery, and restarted as soon as possible with a de novo loading dose of 600 mg.[4]

In high risk situations (table-1), surgery should be postponed for a certain period (table-2) unless it is vital, where it may be performed on full antiplatelet therapy. In closed spaces, such as intracranial surgery or spinal surgery in the medullary canal, clopidogrel should be stopped before surgery and restarted with a loading dose as soon as perioperative bleeding can be excluded (Fig.-2). However, in these cases, in which it is deemed mandatory to pause

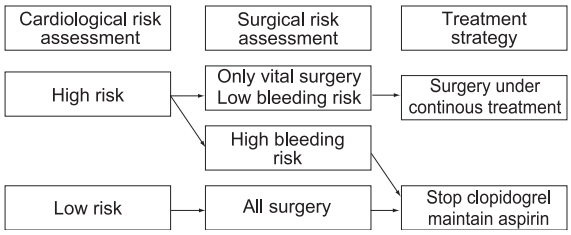

Fig.-2: *Perioperative management of patients receiving antiplatelet therapy with aspirin and clopidogrel.*[4]

aspirin and clopidogrel treatment, surgery should only be performed in centres with the facility of immediate PCI.

Table-2 Duration of antiplatelet therapy and recommended delays for non-cardiac surgery after PCI.[16]

1. Dilatation without stenting: 2-4 weeks.
   Surgery postponed for 2-4 weeks
   (vital surgery only)
2. PCI and BMS: 4-6 weeks(at least)
   Vital surgery postponed for >6 weeks.
   Elective surgery postponed for >3 months
3. PCI and DES: 12 months
   Elective surgery postponed for >12 months

Comment:

There is a delicate balance between ischemic risks from stopping use of antiplatelet drugs and bleeding risk from continuing during perioperative period. Ideally, Elective surgery after coronary stenting should be deferred until use of antiplatelet agents can be safely stopped. The best approach is to ensure an interdisciplinary attention involving surgeon, cardiologist, and anesthesiologist,

together with the patient to ensure that care is individualized and all relevant considerations are accounted for.

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