Dual Anti-platelet therapy and Neurosurgery

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Case

- 67 year old lady
- Left shoulder and arm pain
- Elective anterior cervical discectomy and fusion of C5-6
- PMH: Ischemic heart disease, underwent Coronary angioplasty twice
- Drug eluting stents – RCA and Marginal branch of left circumflex
- Second stent - 7 months before the proposed surgery
- Medication: Aspirin, Clopidogrel, GTN spray
- No further angina
- Good exercise tolerance
- No signs and symptoms of heart failure
- Feeling lot better after 2\textsuperscript{nd} stent
- Investigations: Normal
- ECHO: Good LV function
Anaesthetic opinion:
Requested the surgeons to discuss the case with cardiologist regarding stoppage of anti-platelet therapy

Cardiologist opinion:
- Better to undergo procedure after 1 year
- Risk of ACS – 1-2% if dual platelet therapy stopped before 1 year
- Clopidogrel to be stopped 1 week before the procedure
- Restart Clopidogrel 1 week after the procedure
- ?? aspirin
Pre assessment

- Advised to stop both Clopidogrel and Aspirin 7 days before the surgery

- Anaesthetic plan:
  - Admit the patient to the hospital before the surgery
  - Start Heparin – to stop 12 hours before the surgery
  - ? Post-op management
Day of Surgery

- Different Anaesthetic consultant

- Not happy to anaesthetise

- Concerned about stent occlusion/thrombosis as both Clopidogrel and Aspirin are stopped

- Neurosurgical registrar happy to operate as the patient has given the consent for the surgery and aware of increased risk of post-op MI
Cardiology registrar:
Patient should be given Aspirin 300 mg and proceed with surgery only if necessary after 4 hours

Neurosurgery consultant:
Decided not to operate until patient completes 12 months of dual anti-platelet therapy
Problems

- Bare metal Vs Drug eluting stent
- Stent thrombosis
- Perioperative period increases the risk of thrombus formation
- Rebound increase of thrombosis if dual anti-platelet therapy is stopped abruptly
Abrupt discontinuation of clopidogrel + Abrupt discontinuation of aspirin

Rebound effect:
- Significantly increased inflammatory prothrombotic state
- Significantly increased platelet adhesion and aggregation
  - Excessive thromboxane A₂ activity

+ Surgical intervention
  Increased prothrombotic and inflammatory state
  - increased cytokines, neuroendocrine, inflammatory mediator release
  - increased platelet adhesiveness and persistently high platelet counts
  - increased release of procoagulant factors
  - decreased/impaired fibrinolysis

Prothrombotic/thrombotic state with incompletely endothelialized stent(s)

Stent thrombosis

Myocardial infarction
Table 4. Duration of Antiplatelet Therapy and Timing of Noncardiac Surgery

<table>
<thead>
<tr>
<th>Duration/Condition</th>
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<tbody>
<tr>
<td>Dilatation without stenting: 2–4 wk of dual-antiplatelet therapy</td>
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<tr>
<td>Surgery postponed for 2–4 wk (vital surgery only)</td>
</tr>
<tr>
<td>PCI and BMS: 4–6 wk minimum of dual-antiplatelet therapy</td>
</tr>
<tr>
<td>Elective surgery postponed ≥6 wk, but not for more than 12 wk, when restenosis may begin to occur</td>
</tr>
<tr>
<td>PCI and DES: 12 mo of dual-antiplatelet therapy</td>
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<tr>
<td>Elective surgery postponed for ≥12 mo</td>
</tr>
<tr>
<td>In patients in whom coronary revascularization with PCI is appropriate for mitigation of cardiac symptoms and who need elective noncardiac surgery in the subsequent 12 mo, a strategy of balloon angioplasty or BMS placement followed by 4 to 6 wk of dual-antiplatelet therapy is probably indicated</td>
</tr>
<tr>
<td>Aspirin: lifelong therapy, whichever is the revascularization technique</td>
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PCI = percutaneous coronary intervention; BMS = bare-metal stent; DES = drug-eluting stent.
Figure 4. Proposed algorithm for perioperative management of patients with bare-metal stents based on current literature. The 2007 ACC/AHA perioperative guidelines state, “it appears reasonable to delay elective noncardiac surgery for 4–6 wk to allow for at least partial endothelialization of the stent, but not for more than 12 wk, when restenosis may occur.”
Figure 5. Proposed algorithm for perioperative management of patients with drug-eluting stents based on current literature.
<table>
<thead>
<tr>
<th>Surgical haemorrhagic risk</th>
<th>Cerebro- and cardiovascular risk</th>
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</thead>
<tbody>
<tr>
<td><strong>Low</strong></td>
<td><strong>Intermediate</strong></td>
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<tr>
<td>&gt;6 months after MI, PCI, BMS, CABG, stroke &gt;12 months if complications</td>
<td>6–24 weeks after MI, PCI+BMS, CABG, or stroke (Ø complication); &gt;12 months after DES; high-risk stents (long, proximal, multiple, overlapping, small vessels, bifurcation); low EF, diabetes</td>
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<tr>
<td><strong>Low risk</strong></td>
<td>Elective surgery: OK; maintain aspirin</td>
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<tr>
<td>Transfusion normally not required; peripheral, plastic, and general surgery, biopsies; minor orthopaedic, ENT, and general surgery; endoscopy; eye anterior chamber; dental extraction and surgery</td>
<td></td>
</tr>
<tr>
<td><strong>Intermediate risk</strong></td>
<td>Elective surgery: OK; maintain aspirin</td>
</tr>
<tr>
<td>Transfusions frequently required; visceral surgery; cardiovascular surgery; major orthopaedic, ENT, reconstructive surgery; endoscopic urology</td>
<td></td>
</tr>
<tr>
<td><strong>High risk</strong></td>
<td>Elective surgery: OK; maintain statin; withdraw aspirin (maximum 7 days)</td>
</tr>
<tr>
<td>Possible bleeding in a closed space; intracranial neurosurgery; spinal canal surgery; eye posterior chamber surgery</td>
<td></td>
</tr>
</tbody>
</table>
Fig 3 Algorithm for preoperative management of patients under antiplatelet therapy. MI, myocardial infarction; ACS, acute coronary syndrome; PAD, peripheral arterial disease; PCI, percutaneous coronary intervention; BMS, bare metal stent; DES, drug eluting stent. *High-risk stents: long (>36 mm), proximal, overlapping, or multiple stents implantation, stents in chronic total occlusions, stents in small vessels or bifurcated lesions. **Examples of low-risk situations: >3 months after BMS, stroke, uncomplicated MI, PCI without stenting. ***Risk of bleeding in closed space: intracranial neurosurgery, intra-medullary canal surgery, posterior eye chamber ophthalmic surgery. In these situations, the risk/benefit ratio of upholding vs withdrawing aspirin must be evaluated for each case individually; in case of aspirin upholding, early postoperative re-institution is important.
Bridging therapy

- Glycoprotein 2b/3a receptor antagonist Eg: Tirofiban, Eptifibatide

- Infusion commenced with in 24 hours of stopping Clopidogrel

- Stopped 4 hours before the surgery

- Restarted as early as 2 hours after the surgery and continued until Clopidogrel is restarted
Conclusion

- Increased risk of peri-operative cardiac event if dual anti-platelet therapy is withdrawn abruptly

- Bridging therapy

- Develop guidelines in managing these patients peri-operatively
References

- Urgent surgery in patients with a recently implanted coronary drug-eluting stent: a phase II study of ‘bridging’ antiplatelet therapy with tirofiban during temporary withdrawal of clopidogrel – BJA March 2010

- Perioperative antiplatelet therapy: the case for continuing therapy in patients at risk of myocardial infarction- BJA July 2007


- Coronary Artery Stents: II. Perioperative Considerations and Management - Anaesthesia and Analgesia Aug 2008

- American Heart Association – Perioperative guidelines -2007