



Short Perspective

When to stop anticoagulation, anti-platelet aggregates, and non-steroidal anti-inflammatories (NSAIDs) prior to spine surgery

Nancy E. Epstein, M.D.

Professor of Clinical Neurosurgery, School of Medicine, State University of New York at Stony Brook, New York, and Chief of Neurosurgical Spine and Education, NYU Winthrop Hospital, NYU Winthrop NeuroScience/Neurosurgery, Mineola, New York 11501, USA.

E-mail: *Nancy E. Epstein, M.D. - nancy.epsteinmd@gmail.com



*Corresponding author:

Nancy E. Epstein, M.D.,
NYU Winthrop Hospital,
NYU Winthrop NeuroScience/
Neurosurgery, 200 Old Country
Rd. Suite 485, Mineola,
NY 11501, USA.

nancy.epsteinmd@gmail.com

Received : 28 January 19

Accepted : 29 January 19

Published : 26 March 19

DOI

10.25259/SNI-54-2019

Quick Response Code:



ABSTRACT

Background: Based upon a select review of the literature, in my opinion, spine surgeons, not just our medical/cardiological colleagues, need to know when to stop anticoagulant, anti-platelet aggregates, and non-steroidal anti-inflammatory (NSAIDs) medications prior to spine surgery to avoid perioperative bleeding complications.

Methods: Typically, medical/cardiological consultants, who “clear our patients” are not as aware as we are of the increased risks of perioperative bleeding if anticoagulant, anti-platelet, and NSAIDs are not stopped in a timely fashion prior to spine surgery (e.g. excessive intraoperative hemorrhage, and postoperative seromas, hematomas, and wound dehiscence).

Results: Different medications need to be discontinued at varying intervals prior to spinal operations. The anticoagulants include; Warfarin (stop at least 5 preoperative days), and Xa inhibitors (Eliquis (Apixaban: stop for 2 days) and Xarelto (Rivaroxaban: stop for 3 days)); note presently data vary. The anti-platelet aggregates include: Aspirin/Clopidogrel (stop >7-10 days preoperatively). The multiple NSAIDs should be stopped for varying intervals ranging from 1-10 days prior to spine surgery, and increase bleeding risks when combined with any of the anticoagulants or anti-platelet aggregates. NSAIDs (generic name/commercial names should be stopped preoperatively for at least; 1 day- Diclofenac (Voltaran), Ibuprofen (Advil, Motrin), Ketorolac (Toradol); 2 days- Etodolac (Lodine), Indomethacin (Indocin); 4-days-Meloxicam (Mobic) and Naproxen (Aleve, Naprosyn, Anaprox); 4 days- Nabumetone (Relafen); 6 days - Oxaprozin (Daypro); and 10 days- Piroxicam (Feldene).

Conclusions: Spine surgeons need to know when anti-platelet, anticoagulant, and NSAIDs therapies should be stopped prior to spine surgery to avoid perioperative bleeding complications.

Keywords: Multiple Cardiac Stents; Valve Replacement; Cardiac Myomectomy; Hypertrophic Cardiomyopathy; Plavix; Aspirin Therapy; Anticoagulation

INTRODUCTION

In my opinion, we as spine surgeons, not just our medical/cardiological colleagues, need to know when anti-platelet, anticoagulant, and non-steroidal anti-inflammatory (NSAIDs) therapies should be

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stopped prior to spine surgery to avoid perioperative bleeding complications. This perspective summarizes the ideal timing for cessation of Aspirin/Clopidogrel (>7-10 days), Warfarin (at least 5 days), Xa inhibitors (Eliquis (Apixaban) and Xarelto (Rivaroxaban): for several days), and NSAIDs (varying from 1-10 days) prior to spine surgery to avoid postoperative seromas, hematomas, and wound dehiscence.

Guidelines for Cessation of Anticoagulation Prior to Spine Surgery

For those with cardiovascular disease on anticoagulation, when should therapy be stopped prior to spine surgery? Narouze *et al.* recommended that intravenous heparin be stopped 4 hours preoperatively.^[3] Subcutaneous heparin (i.e., bid or tid) should be stopped 8-10 hours preoperatively, low molecular weight heparin, 24 hours prior to surgery, while other fibrinolytic medications should be discontinued at least 48 hours preoperatively.^[3] Coumadin, on the other hand, should be withheld for a minimum of 5 preoperative days. The time duration for stopping Xa inhibitors ranged from 48-72 hours respectively (e.g., Apixaban (Eliquis: at least 48 hours before high risk procedures) and Rivaroxaban (Xarelto: 72 hours before high risk procedures). A major concern, however, is whether these patients will develop thrombotic/embolic complications once these medications are stopped perioperatively.

Guidelines for Cessation of Anti-Platelet Aspirin (ASA) Therapy Prior to Spine Surgery

Platelet Turnover Time

The hematologists tell us the typical platelet turnover time is 10 days for patients with normal bone marrow (i.e., data typically for younger patients). Nevertheless, many older patients may take longer to replace platelets as their bone marrow may become infiltrated with adipose tissue, prolonging platelet turnover time.

Physiology of Aspirin (ASA) Therapy

ASA irreversibly inactivates COX-1, blocks thromboxane production, platelet aggregation, and thus thrombosis. Narouze *et al.* confirmed an average 7-10 day duration of platelet function, which meant that approximately 50% of platelet function returned within 5 days of stopping ASA.^[3] Park *et al.* also confirmed the normal time for platelets to regenerate was 7-10 days.^[4]

Dosing and Levels of Oral Aspirin (ASA) Therapy

Narouze *et al.* defined different time parameters for cessation and restarting ASA.^[3] They observed that taking one dose of uncoated ASA orally was absorbed within 30 minutes; it reached full effectiveness within 1 hour (> 90% reduced thromboxane levels). Alternatively, coated ASA attained full effectiveness within 3-4 hours.

When to Stop Aspirin (ASA) Therapy Prior to Spine Surgery

Aspirin, the major leading anti-platelet aggregate, should typically be stopped at least 7-10 days prior to spine surgery. Park *et al.* (2013) evaluated 86 of 182 patients undergoing 1-2 level lumbar fusions; the control group of 96 patients (Group 0) were on no ASA, Group 1 patients stopped ASA 3 to 7 days preoperatively, while Group 2 patients discontinued ASA > 7 to 10 days preoperatively.^[4] Group 1 patients (i.e., who stopped ASA 3-7 days preoperatively) exhibited more/longer postoperative drainage vs. those in the control group (Group 0 on no ASA), or in Group 2 (7-10 days cessation of ASA). Kang *et al.* (2011) also documented that low-dose ASA resulted in greater perioperative blood loss for patients (mean age 68.5) undergoing 2-level spinal surgery for degenerative disease.^[2] They recommended stopping low dose ASA 7 days preoperatively. Their Group I (38 patients) patients stopped 100 mg aspirin at least 7 days preoperatively (mean, 9.0 days) vs. the control group (38 patients) not on any aspirin. Although the intraoperative estimated blood loss (EBL) was comparable for both groups (e.g., 855.2 cc for the ASA group; vs. 840.8 cc for the control group), those previously on ASA had significantly more postoperative drainage (averaging 864.4 cc vs. 458.4 cc (p<0.001). Furthermore, those in the ASA group had higher transfusion requirements, and bleeding complications.

Risk of ASA Withdrawal Syndrome

Acutely stopping anti-platelet therapies may, however, result in a transient hypercoagulation “withdrawal” syndrome, thereby increasing the preoperative/perioperative risks of cardiac stent thrombosis and/or embolism. Gerstein *et al.* (2012) observed that acutely stopping ASA perioperatively risked the “ASA withdrawal syndrome”, defined as platelet rebound, and an acute prothrombotic/hypercoagulable state increasing the risks of acute cardiovascular complications.^[1] However, they acknowledged that it was “standard practice” to stop ASA before elective high-risk surgery to avoid perioperative hemorrhagic complications. These procedures included; craniotomies, middle ear surgery, posterior eye surgery, intramedullary spine operations, and transurethral prostatectomy. I think that all spinal surgical procedures should be added to this list.

Guidelines for Cessation of Anti-Platelet Clopidogrel Therapy Prior to Spine Surgery

Clopidogrel (75 mg po bid) blocks the ADP receptor P2Y12, and is typically used in conjunction with ASA (i.e., dual therapy) for prophylaxis in patients with cardiovascular/peripheral vascular disease, and/or cerebrovascular pathology.^[3]

Clopidogrel requires approximately 24 hours to become effective, results in 50-60% platelet inhibition, and is reversed within 5-7 days following cessation of administration (controversial stopping points varies among specialists and types of procedures being performed).^[3]

When to Stop NSAIDs Prior to Spine Surgery

There are different guidelines for when to stop the various NSAIDs prior to surgery. The timing depends largely on the alternative half-lives of the various medications.^[3] NSAIDs to stop at least 1 day preoperatively included (generic name/commercial name); Diclofenac (Voltaran), Ibuprofen (Advil, Motrin), Ketorolac (Toradol). Cessation of NSAIDs 2 days preoperatively included; Etodolac (Lodine), and Indomethacin (Indocin). Four-day cessation was recommended for Meloxicam (Mobic) and Naproxen (Aleve, Naprosyn, Anaprox). Six-days preoperatively, Nabumetone (Relafan) had to be stopped, while Oxaprozsin (Daypro), and Piroxicam (Feldene) had to be stopped at least 10 days preoperatively.

NSAIDs Increased Bleeding Risks in Spine Surgery

NSAIDs increased bleeding risks for spine surgery, and should be discontinued for at least 5 half-lives preoperatively.^[3] Park *et al.* compared estimated blood loss (EBL) when using ASA and/or NSAIDs in lumbar fusion patients.^[5] For 106 patients having 2 or more lumbar levels fused, there were 3 preoperative groups: Group 1 was on no ASA, but on NSAIDs, Groups 2 discontinued ASA/NSAIDs for 1 week, and Group 3 continued ASA/NSAIDs for 1 week. NSAIDs used for Group 2 (stopped ASA/NSAIDs) and Group 3 patients (continued ASA/NSAIDs) resulted in significantly greater EBL vs. Group 1 patients (on no ASA, but on NSAIDs alone). Platelet dysfunction was also greater for Group 2 vs. Group 1 patients, and Group 3 vs. Group 1 patients. They concluded ASA significantly increased bleeding risks, even if stopped 1 week preoperatively. Furthermore, NSAIDs increased surgical blood loss in all 3 Groups, and should be stopped preoperatively (i.e., at different time intervals according to the medication used) to reduce the risk of perioperative hemorrhage.

CONCLUSION

In my opinion, spine surgeons, not just our medical/cardiological colleagues, need to know when anti-platelet, anticoagulant, and non-steroidal anti-inflammatory (NSAIDs) therapies should be stopped prior to spine surgery to avoid perioperative bleeding complications. Here we summarized the ideal timing for cessation

of; Warfarin (at least 5 days), Xa inhibitors (Eliquis (Apixaban: 2 days) and Xarelto (Rivaroxaban; 3 days): Aspirin/Clopidogrel (>7-10 days), and NSAIDs (varying from 1-10 days) prior to spine surgery to avoid postoperative seromas, hematomas, and wound dehiscence.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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How to cite this article: Epstein NE. When to stop anticoagulation, anti-platelet, and non-steroidal anti-inflammatories (NSAIDs) prior to spine surgery. *Surg Neurol Int* 2019;10:45.