I. Introduction

Written by Admin
Tuesday, 05 January 2010 01:52

A recent study found that 7.1% of cardioembolic strokes in one institution occurred in individuals withdrawn from warfarin for a medical procedure. As a cardioembolic mechanism is thought to be responsible for approximately one-fourth of acute ischemic strokes, such cases likely account for 1.5- 2% of all acute ischemic strokes. These patients often have a large vessel occlusion and poor outcome.

Although provision of parenteral anticoagulant “bridge” treatment to patients withdrawn from an anticoagulant reduces the risk of a cardioembolic stroke, such treatment increases the risk of major postoperative bleeding. Similarly, withdrawal of antiplatelet medication reduces the risk of excessive perioperative bleeding but increases the risk of cerebral or coronary thrombosis.

Medical decision-making in this area must balance the risk of thromboembolism or vascular thrombosis with that of excessive bleeding. Questions that should be considered when determining the best strategy in each individual case include the following:

Which medical and dental procedures require withdrawal of antithrombotic medication?

What is the optimal timing for withdrawal and subsequent resumption of treatment with antithrombotic medication?

To which patients should parenteral anticoagulant “bridge” treatment be provided and for how long should it be continued?

Which parenteral anticoagulant should be used for “bridging,” and how should it be dosed?

What individual patient characteristics are significant in these determinations?

A task group in north Spokane developed these guidelines based on current best evidence to ensure the following:

1. Withdrawal of patients from chronic anticoagulant or antiplatelet medication only when the anticipated medical or dental procedure cannot be performed safely otherwise.
2. Use of parenteral anticoagulant “bridge” treatment only when the risk of perioperative thromboembolism justifies the risk of excessive bleeding.
3. Consistent timing of anticoagulant withdrawal, verification of restoration of coagulation preoperatively, and timing of resumption of warfarin postoperatively.

4. Consistent timing of antiplatelet medication withdrawal and resumption, considering the particular drug being used and individual patient characteristics.
5. Consistent timing and dosing of parenteral anticoagulant “bridge” treatment using low molecular weight heparin or intravenous unfractionated heparin pre- and postoperatively, considering individual patient characteristics.
6. Identification of those patients for whom preoperative insertion of a vena cava filter should be considered.
7. A consistent approach to rapid correction of anticoagulant or antiplatelet treatment for patients who will undergo or have just had urgent surgery.

It should be noted that while these guidelines reflect current best practices, they are empiric and not evidence-based. They address the most common clinical scenarios that confront physicians. For individual patient characteristics/antithrombotic medication/surgical procedure scenarios not clearly addressed in these guidelines, refer to this publication:

Antithrombotic and Thrombolytic Therapy: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th edition). CHEST 2008: 133:71-968s. http://www.chestjournal.org/content/133/6_suppl

Task Group Members

C. William Britt, Jr., M.D. - Chair; Medical Director, Stroke Program, Providence Holy Family Hospital

Jennifer Taylor, Pharm.D., CACP - Manager, Providence Anticoagulation Clinic

John Ames, D.D.S. - Cascade Oral Surgery

James Valentine, D.D.S. - Oral Surgery Plus

Philip Coff, M.D. - Gastroenterology

Peter Weitzman, M.D. - Medical Director, Providence Anticoagulation Clinic; Chief Medical Officer, Hospital Specialists, PLLC

John Peterson, M.D. - Spokane Cardiology

With this work the group honors **Dr. Leroy Byrd**, an outstanding person, physician and benefactor of Providence Holy Family Hospital and many other organizations.

The group acknowledges with much gratitude the contribution of Amy Wilcox, who volunteered many hours of assistance because she shared the passion for improving the care of patients receiving antithrombotic medications in Spokane.

II. Procedural Bleeding Risk Assessment for Anticoagulant Reversal

Written by Admin
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The anticoagulant medications to which this section applies are warfarin (Coumadin, Jantoven), dabigtran (Pradaxa), and rivaroxaban (Xarelto)

MEDICAL PROCEDURES:

LOW bleeding risk – anticoagulant reversal NOT RECOMMENDED

1. Cataract or other ophthalmic surgery, except for major lid or orbital surgery.
2. Skin biopsy or other minor dermatologic procedure.
3. Joint or soft tissue injection.
4. Endoscopy when biopsy is not anticipated or the risk of interventionally-induced bleeding is low.

HIGH bleeding risk – anticoagulant reversal RECOMMENDED:

1. Abdominal surgery.
2. Intracranial or spinal surgery.
3. Thoracic surgery.
4. Closed surgical procedure (i.e., endoscopic surgery).
5. Cardiac catheterization.
6. Cardiac pacemaker or defibrillator implantation.
7. Coronary artery bypass or heart valve replacement.
8. Aortic aneurysm repair.
9. Peripheral artery bypass or other vascular surgery.
10. Major orthopedic surgery, at the discretion of the surgeon.
11. Reconstructive plastic surgery.
12. Major cancer surgery.
13. Prostate or bladder surgery.

14. Endoscopy when intervention is anticipated and the risk of interventionally-induced bleeding is high.
15. Epidural injections or lumbar puncture.
16. Transforaminal injections or facet joint interventions, at the discretion of the interventionalist.

DENTAL PROCEDURES:

LOW bleeding risk – anticoagulant reversal NOT RECOMMENDED:

1. Supragingival scaling.
2. Simple restorations.
3. Injections of local anesthetic for direct rather than regional anesthesia (see below).
4. Endodontics (INR < 3.1).

MODERATE bleeding risk – anticoagulant reversal NOT RECOMMENDED, BUT topical measures to control bleeding should be used*

1. Subgingival scaling.
2. Restorations with subgingival preparations.
3. Single or multiple extractions.
4. Injections of local anesthetic for regional anesthesia (ie, superior alveolar or mandibular nerve block).
5. Gingivoplasty.
6. Curettage.
7. Removal of a single bony impaction with minimal bone removal.

HIGH bleeding risk: anticoagulant reversal RECOMMENDED:

1. Full mouth or full arch extractions.
2. Apicoectomy (root removal).
3. Alveoloplasty (bone removal).
4. Minor or extensive periodontal flap surgery.
5. Single or multiple implants.

6. Multiple bony impactions.
7. Open fracture reduction.
8. Orthognathic surgery.
9. Gingivectomy.

*** Suggestions for topical treatment to control bleeding include the following:**

1. Warm water rinse.
2. Topical pressure with gauze or tea bags.
3. Site packing with gel sponges (Gelfoam), absorbing oxycellulose (Surgicel), or microcrystalline collagen (Avitene).
4. Additional sutures.
5. Electrocautery.
6. Aminocaproic acid (Amicar) rinse 5% (a - see below).
7. Aminocaproic acid (Amicar) –impregnated Gelfoam (b - see below).
8. Have the patient avoid hot liquids, mouthwashes, hard foods, and nonsteroidal anti- inflammatory drugs.
    a. Available from The Medicine Shoppe Pharmacy, 1327 Northwest Blvd., Spokane, WA 99205 (509) 327-1504 or Riverpoint Pharmacy, 528 E. Spokane Falls Blvd., Ste 110, Spokane, WA 99202 (509) 343-6252 on prescription as follows:
    Dispense: one 4oz bottle
    Instructions for use: ½ hr before the dental procedure hold 10 mL (2 tsp) in mouth for 2 minutes, then spit out. After the procedure repeat immediately, then every 2 hours for 6-10 doses until bleeding stops. May continue as needed.
    The approximate cost of one 4oz bottle is $25.00.

Aminocaproic acid (Amicar) –impregnated Gelfoam is not a commercial product. These gel sponges are prepared by saturating Gelfoam in aminocaproic acid (Amicar) rinse 5% just prior to use.

III. Procedural Bleeding Risk Assessment for Withdrawal of Antiplatelet Medication

Written by Admin
Tuesday, 05 January 2010 03:38

The antiplatelet medications addressed in this section are aspirin, dipyridamole ER/aspirin (Aggrenox), clopidogrel (Plavix), and prasugrel (Effient).

(Note: As dipyridamole does not increase the bleeding time, the medical decision-making process is the same for dipyridamole ER/aspirin (Aggrenox) as for aspirin alone.)

For patients undergoing skin biopsy or other minor dermatologic procedures, ophthalmic surgery excluding major lid or orbital surgery, endoscopy when biopsy is not anticipated or the risk of interventionally-induced bleeding is low, or dental procedures associated with a LOW or MODERATE bleeding risk (see Section II, Procedural Bleeding Risk Assessment for Anticoagulant Reversal), continuing the antiplatelet medication through the perioperative period is RECOMMENDED.

For patients undergoing medical or dental procedures associated with a HIGH bleeding risk (see Section II, Procedural Bleeding Risk Assessment for Anticoagulant Reversal) who are at LOW risk for cardiac events (except patients who have had recent placement of coronary stent(s); see below), discontinuing the antiplatelet medication preoperatively is RECOMMENDED.

For patients undergoing medical or dental procedures associated with a HIGH bleeding risk (see Section II, Procedural Bleeding Risk Assessment for Anticoagulant Reversal), including coronary artery bypass grafting, who are at HIGH risk of cardiac events (except patients who have had recent placement of coronary stent(s); see below), continuing aspirin-containing medication through the perioperative period but discontinuing clopidogrel (Plavix) at least 5 and, preferably, 10 days and prasugrel (Effient) at least 7 days prior to the procedure is RECOMMENDED.

For patients who have had placement of a bare metal coronary stent in the 4 weeks or a drug-eluting coronary stent in the 12 months preceding the anticipated procedure, continuing aspirin and clopidogrel (Plavix) through the perioperative period is RECOMMENDED independent of the bleeding risk of the procedure.

For patients with a coronary stent whose antiplatelet medication has been discontinued prior to the anticipated procedure, therapeutic bridging with unfractionated heparin, low molecular weight heparin, direct thrombin inhibitors, or glycoprotein IIb/IIIa inhibitors is NOT RECOMMENDED.

IV. Preoperative Screening for Assessment of Risk of Thromboembolism from Anticoagulant Reversal in Patients with Atrial Fibrillation, and “Bridging” Determination

Written by Admin
Tuesday, 05 January 2010 03:48

The $CHADS_2$ score is the recommended screening tool for this risk assessment.

C = Congestive heart failure exacerbation within 100 days of the anticipated procedure – one point.

H = History of hypertension, defined as systolic BP greater than 160 mmHg (even if blood pressure has normalized) – one point.

A = Age of 75 or more years – one point.

D = Diabetes mellitus – one point.

S = Any prior TIA or ischemic stroke – two points.

(Note: Multiple risk factors for thromboembolism often coexist. The decision concerning anticoagulant “bridge” treatment in a patient with atrial fibrillation should take into account ALL risk factors.)

Medical decision-making in this area is the same for patients with intermittent or paroxysmal atrial fibrillation as for those with chronic atrial fibrillation.

The short-term thromboembolic risk is LOW in patients with atrial fibrillation who have a $CHADS_2$ score of 0-2 and no TIA, ischemic stroke, or systemic thromboembolic event in the previous 3 months. Therefore, parenteral anticoagulant “bridge” treatment with low- or “prophylactic-dose” low molecular weight heparin (see below) or no “bridge” treatment is RECOMMENDED for these patients, including those with dilated cardiomyopathy.

The short-term risk of thromboembolism is HIGH in patients with atrial fibrillation who have a $CHADS_2$ score of 5-6 OR concurrent rheumatic valvular heart disease, a mechanical heart valve, active cancer (treatment within 6 months or palliative care), severe thrombophilia such as the lupus anticoagulant, cardiolipin antibodies, antithrombin III deficiency, deficiency of protein C or S, homozygous Factor V Leiden, or multiple thrombophilias, or a history of TIA, ischemic stroke, or systemic thromboembolism in the previous 3 months. Parenteral anticoagulant “bridge” treatment with therapeutic- or “treatment-dose” low molecular weight heparin (see below) is RECOMMENDED for these patients.

The short-term risk of thromboembolism is MODERATE in patients with atrial fibrillation who have a $CHADS_2$ score of 3-4 and no history of stroke or TIA. In patients with a moderate risk for thromboembolism, there is no single perioperative antithrombotic strategy, and management depends on the individual patient's risk assessment and the procedural bleeding risk. There should be a preference for "bridge" treatment in patients who also have mild thrombophilia such as heterozygous Factor V Leiden or factor II (PT20210) mutation, a history of systemic thromboembolism in the previous 3-12 months, OR a history of recurrent venous thromboembolism.

The intensity of low molecular weight heparin anticoagulant "bridge" treatment is defined as follows:

1. Theraputic- or "treatment-dose" low molecular weight heparin consists of either enoxaparin (Lovenox) 1 mg/kg subcutaneously every 12 hours or dalteparin (Fragmin) 200 Iu/kg subcutaneously every 24 hours.
2. Low- or "prophylactic-dose" low molecular weight heparin consists of either enoxaparin (Lovenox) 40 mg subcutaneously every 24 hours, enoxaparin (Lovenox) 30 mg subcutaneously every 12 hours, or dalteparin (Fragmin) 5,000 Iu subcutaneously every 24 hours. (Note: This dose is not adjusted for weight and is suitable primarily for prevention of venous thromboembolism. If there is high risk of arterial thrombosis and embolism, therapeutic- or "treatment-dose" low molecular weight heparin is advised.)

(NOTE: Individual Pharmacy and Theraputics Committees may adopt slightly different dosing protocols, preserving the treatment- and prophylactic-dose distinction.)

For guidance in the timing of parenteral anticoagulant "bridge" treatment and in the treatment of patients with renal disease, see Section VIII, Drug Selection, Timing, and Dosing of Anticoagulant "Bridge" Treatment.

V. “Bridging” Determination for Patients with a Mechanical Heart Valve Undergoing Periprocedural Anticoagulant Reversal

Written by Admin
Tuesday, 05 January 2010 04:20

For patients with a mechanical heart value who are undergoing anticoagulant reversal for a procedure, provision of parenteral anticoagulant “bridge” treatment is determined as follows:

The short-term thromboembolic risk is LOW in patients with a bileaflet aortic mechanical valve who are less than 75 years old, normotensive, and in sinus rhythm, have no atrial enlargement or history of ischemic stroke, TIA, diabetes, or congestive heart failure, and have normal ventricular function. Therefore, parenteral anticoagulant “bridge” treatment with low- or “prophylactic-dose” low molecular weight heparin (see below) or no “bridge” treatment is RECOMMENDED for these patients.

The short-term thromboembolic risk is HIGH in patients who have a mitral valve prosthesis or an older (caged-ball or tilting disc) aortic valve prosthesis, a history of ischemic stroke or TIA in the previous 6 months, persistent valvular regurgitation (ie, mitral regurgitation in a patient with a prosthetic aortic valve), or a left atrial thrombus. Therefore, provision of therapeutic- or “treatment-dose” parenteral anticoagulant “bridge” treatment with low molecular weight heparin (see below) is RECOMMENDED for these patients.

Patients with bileaflet aortic valve prosthesis and one of the following conditions: atrial fibrillation, prior ischemic stroke or TIA, hypertension, diabetes, congestive heart failure, or age 75 or more years, are considered to have a MODERATE risk of thromboembolism. Therefore, parenteral anticoagulant “bridge” treatment with either therapeutic or “treatment-dose” or low- or “prophylactic-dose” low molecular weight heparin is RECOMMENDED for these patients.

The intensity of low molecular weight heparin anticoagulant “bridge” treatment is defined as follows:

1. Therapeutic- or “treatment-dose” low molecular weight heparin consists of either enoxaparin (Lovenox) 1 mg/kg subcutaneously every 12 hours or dalteparin (Fragmin) 200 Iu/kg subcutaneously every 24 hours.
2. Low- or “prophylactic-dose” low molecular weight heparin consists of either enoxaparin (Lovenox) 40 mg subcutaneously every 24 hours, enoxaparin (Lovenox) 30 mg subcutaneously every 12 hours, or dalteparin (Fragmin) 5,000

Iu subcutaneously every 24 hours. (Note: This dose is not adjusted for weight and is suitable primarily for prevention of venous thromboembolism. If there is high risk of arterial thrombosis and embolism, therapeutic- or “treatment-dose” low molecular weight heparin is advised.)

(NOTE: Individual Pharmacy and Theraputics Committees may adopt slightly different dosing protocols, preserving the treatment- and prophylactic-dose distinction.)

For guidance in the timing of parenteral anticoagulant “bridge” treatment and in the treatment of patients with renal disease, see Section VIII, Drug Selection, Timing, and Dosing of Anticoagulant “Bridge” Therapy.

VI. “Bridging” Determination for Patients with Venous Thromboembolism Undergoing Periprocedural Anticoagulant Reversal

Written by Admin
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Patients with acute venous thromboembolism in the three months prior to the procedure requiring anticoagulant reversal have a HIGH risk for venous thromboembolism. Parenteral anticoagulant “bridge” treatment with therapeutic- or “treatment-dose” low molecular weight heparin (see below) is RECOMMENDED for these patients.

Patients with a single venous thromboembolic event more than twelve months prior to the procedure requiring anticoagulant reversal and no other risk factors for thromboembolism have a LOW risk of thromboembolism. Therefore, parenteral anticoagulant “bridge” treatment with low- or “prophylactic-dose” low molecular weight heparin (see below) or no “bridge” treatment is RECOMMENDED for these patients.

Patients with venous thromboembolism in the prior 3-12 months, a mild thrombophilia such as heterozygous Factor V Leiden or Factor II (PT20210) mutation, a history of recurrent venous thromboembolism, or active cancer (treatment within 6 months or palliative care) have a MODERATE risk of thromboembolism. Provision of parenteral anticoagulant “bridge” treatment with either therapeutic- or “treatment-dose” or low- or “prophylactic-dose” low molecular weight heparin is RECOMMENDED for these patients.

Additional medical risk factors for venous thromboembolism include severe thrombophilia such as the lupus anticoagulant, cardiolipin antibodies, antithrombin III

deficiency, protein C or S deficiency, homozygous Factor V Leiden, or multiple thrombophilias.

Additional risk factors for venous thromboembolism for surgical and hospitalized patients include the following:

Prolonged immobility.

Orthopedic, abdominal, spinal, bariatric, thoracic, neurological, major trauma, coronary artery bypass graft, major vascular, and major urological surgery.

Acute medical illness, especially congestive heart failure and severe respiratory disease.

Spinal cord injury.

Sepsis.

Acute neurological disorder.

Inflammatory bowel disorder.

Pregnancy or post-partum period.

Morbid obesity.

Age 75 or more years.

The intensity of low molecular weight heparin anticoagulant “bridge” treatment is defined as follows:

1. Therapeutic- or “treatment-dose” low molecular weight heparin consists of either enoxaparin (Lovenox) 1 mg/kg subcutaneously every 12 hours or dalteparin (Fragmin) 200 Iu/kg subcutaneously every 24 hours.
2. Low- or “prophylactic-dose” low molecular weight heparin consists of either enoxaparin (Lovenox) 40 mg subcutaneously every 24 hours, enoxaparin (Lovenox) 30 mg subcutaneously every 12 hours, or dalteparin (Fragmin) 5,000 Iu subcutaneously every 24 hours. (Note: This dose is not adjusted for weight and is suitable primarily for prevention of venous thromboembolism. If there is high risk of arterial thrombosis and embolism, therapeutic or “treatment-dose” low molecular weight heparin is advised.)

(NOTE: Individual Pharmacy and Theraputics Committees may adopt slightly different dosing protocols, preserving the treatment- and prophylactic-dose distinction.)

For patients anticoagulated subsequent to deep venous thrombosis or venous thromboembolism occurring in the four weeks prior to a procedure with a high risk of postoperative bleeding such that resumption of anticoagulant “bridge” treatment postoperatively will not occur or is expected to be delayed, elective placement of a vena cava filter preoperatively is RECOMMENDED. (Note: Placement of a vena cava filter does not obviate the need for resumption of anticoagulant therapy once the risk of postoperative bleeding resolves.)

For guidance in the timing of parenteral anticoagulant “bridge” treatment and in the treatment of patients with renal disease, see Section VIII, Drug Selection, Timing, and Dosing of Anticoagulant “Bridge” Treatment.

VII. Periprocedural Anticoagulant Dosing in Patients Undergoing Anticoagulant Reversal

Written by Admin
Tuesday, 05 January 2010 06:16

For patients undergoing warfarin reversal for a procedure, the following is RECOMMENDED:

1. Discontinuation of warfarin five days prior to the scheduled procedure. For example, if the procedure is scheduled for the 22nd day of the month, the last day of maintenance warfarin dosing would be the 16th, meaning that warfarin is discontinued on the 17th day of the month.
2. Measurement of the INR on the day prior to the scheduled procedure. If that INR is 1.5 or greater, the patient should be given 1-2 mg of vitamin K orally, depending on the extent of elevation. In such cases the INR should be repeated on the morning of the procedure to verify correction to less than 1.5. (It should be noted that administration of more than 2 mg of vitamin K may induce warfarin resistance for up to one week, delaying the return of effective anticoagulation in the absence of parenteral anticoagulant “bridge” treatment; see Section VIII, A.2).
3. Resumption of the preoperative maintenance dose of warfarin on the evening of the procedure, assuming hemostasis is secured. If hemostasis is not secured on that day, resumption of maintenance dose warfarin should be delayed until hemostasis is secured.

4. Measurement of the INR three to five days after resumption of the preoperative maintenance dose of warfarin. The result of that INR should be managed as usual to achieve a therapeutic INR. (Note: An INR of 2.0 or greater on the third day after resumption of warfarin does not obviate the need to continue low molecular weight heparin “bridge” treatment for five days after warfarin is resumed; see Section VIII, 5.)

For patients undergoing dabigatran (Pradaxa) reversal for a procedure, because the restoration of coagulation is dependent on the individual patient's renal function, use of the following table to guide the discontinuation of dabigatran is RECOMMENDED:

Renal Function	Timing of last dose of dabigatran before surgery	
(CrCl ml/min)	Low-Moderate bleeding risk	High bleeding risk
> 80	24 hrs	2-4 days
>50 to ≤ 80	24 hrs	2-4 days
>30 to ≤ 50	2 days	4 days
≤ 30	2-5 days	> 5 days

1. Measurement of the Thrombin clotting time (TT) or partial thromboplastin time (PTT) will detect persisting dabigatran effect. Measurement of either 6-12 hours prior to surgery with a high bleeding can risk verify restoration of coagulation.
2. Resumption of the preoperative maintenance dose of dabigatran on the morning following the procedure, assuming hemostasis is secured, is RECOMMENDED. If hemostasis is not secured on that day, resumption of maintenance dose dabigatran should be delayed until hemostasis is secured.

For patients undergoing rivaroxaban (Xarelto) reversal for a procedure of low, moderate, or high bleeding risk, the procedure should be delayed for at least 24 hours after the last dose of rivaroxaban.

As rivaroxaban is usually taken once daily with the evening meal, it should be taken as usual until the day prior to the planned procedure, when the dose is omitted.

PT and aPTT results return to pre-dosing levels 12 hours after administration. Measurement of the PT and aPTT can verify that the patient has not received a dose of rivaroxaban in the previous 12 hours.

No labratory test is routinely available that verifies complete restoration of coagulation after withdrawal from rivaroxaban.

VIII. Drug Selection, Timing, and Dosing of Anticoagulant "Bridge" Treatment

Written by Admin
Tuesday, 05 January 2010 06:20

For patients undergoing warfarin reversal for a procedure who need parenteral anticoagulant "bridge" treatment perioperatively, the following are RECOMMENDED:

1. The use of subcutaneous low molecular weight heparin (LMWH), either enoxaparin (Lovenox) or dalteparin (Fragmin), rather than subcutaneous or intravenous unfractionated heparin or fondaparinux (Arixtra), with certain exceptions (see A below).
2. The intensity of low molecular weight heparin anticoagulant "bridge" treatment is defined as follows:
    a. Theraputic- or "treatment-dose" low molecular weight heparin consists of either enoxaparin (Lovenox) 1 mg/kg subcutaneously every 12 hours or dalteparin (Fragmin) 200 Iu/kg subcutaneously every 24 hours.
    b. Low- or "prophylactic-dose" low molecular weight heparin consists of either enoxaparin (Lovenox) 40 mg subcutaneously every 24 hours, enoxaparin (Lovenox) 30 mg subcutaneously every 12 hours, or dalteparin 5,000 Iu subcutaneously every 24 hours. (Note: This dose is not adjusted for weight and is suitable primarily for prevention of venous thromboembolism. If there is high risk of arterial thrombosis and embolism, therapeutic- or "treatment-dose" low molecular weight heparin is advised. Note also: Individual Pharmacy and Theraputics Committees may adopt slightly different dosing protocols, preserving the treatment- and prophylactic-dose distinction.)
3. The administration of subcutaneous enoxaparin (Lovenox) or dalteparin (Fragmin) beginning 24 to 48 hours after discontinuation of warfarin and three days prior to the procedure. For example, if the procedure is scheduled for the 22nd day of the month, warfarin is discontinued on the 17th, and LMWH is started on the evening of the 18th or the morning of the 19th . The last preoperative dose is given on the morning of the 21st, the day prior to the scheduled procedure. LMWH SHOULD NOT be administered within 24 hours of the start of the procedure.
4. For patients in whom the postoperative bleeding risk is low or moderate and hemostasis is secured, either therapeutic- or "treatment-dose" or low- or

"prophylactic-dose" LMWH SHOULD be resumed 24 hours after the procedure on the first post-operative day.

5. For patients in whom the postoperative bleeding risk is judged to be high and hemostasis is secured, depending on the feasibility and complexity of treatment and the risk to the individual patient of major postoperative bleeding, either of the following is RECOMMENDED:
    a. Do not resume LMWH postoperatively (see B below).
    b. Delay resuming therapeutic- or "treatment-dose" LMWH for 48 to 72 hours postoperatively(see B below).
    c. Resumption of low- or "prophylactic-dose" LMWH 24 hours after the procedure on the first postoperative day.
6. Continuation of the LMWH "bridge" treatment for a minimum of five days AND until the INR is greater than or equal to 2.0 for 24 hours.

    A. As LMWH has renal clearance, patients with a glomerular filtration rate (or Creatinine Clearance) of less than 30 ml/min, usually due to chronic renal disease or advanced age, have an abnormal response to enoxaparin (Lovenox), and less than 20 ml/min, to dalteparin (Fragmin). Therefore, patients undergoing warfarin reversal for a procedure who have a GFR of less than 30 ml/min should not receive enoxaparin (Lovenox), patients who have a GFR of less than 20 ml/min should not receive dalteparin (Fragmin), and either of the following is RECOMMENDED:
        1. Discontinuation of warfarin five days prior to the scheduled procedure AND admission to the hospital on the third day prior to the procedure for treatment with intravenous unfractionated heparin, which is discontinued four hours prior to the procedure, or
        2. Discontinuation of warfarin two days prior to the procedure and the administration of oral vitamin K 1-2 mg, determined by the INR, on the day prior to the procedure. If this option is selected, the INR should be measured on the morning of the procedure to verify correction to less than 1.5. If the INR is found to be greater than 1.5, additional oral vitamin K 1-2 mg should be administered and the procedure postponed for one day. The INR should be measured again the following morning to verify correction to less than 1.5.

            With either option, assuming a low to moderate risk of postoperative bleeding and hemostasis is secured, intravenous unfractionated heparin should be resumed 24 hours after the

procedure on the first postoperative day and continued for a minimum of five days AND until the INR has been greater than or equal to 2.0 for 24 hours.

For patients with a high risk of postoperative bleeding, resumption of intravenous unfractionated heparin postoperatively is NOT RECOMMENDED (see B below).

(Note: The administration of more than 2 mg of supplemental vitamin K may induce warfarin resistance for up to one week. Therefore, while option “2” avoids preoperative hospitalization, additional inpatient days postoperatively may be required for continued administration of unfractionated heparin intravenously for patients treated with more than 2 mg of supplemental vitamin K.)

B. For patients anticoagulated subsequent to deep venous thrombosis or venous thromboembolism occurring in the four weeks prior to a procedure with a high risk of postoperative bleeding such that resumption of anticoagulant “bridge” treatment postoperatively will not occur or is expected to be delayed, elective placement of a vena cava filter preoperatively is RECOMMENDED. (Note: Placement of a vena cava filter does not obviate the need for resumption of anticoagulant therapy once the risk of postoperative bleeding resolves.)

For patients undergoing dabigratran (Pradaxa) or rivaroxaban (Xarelto) reversal for a procedure, as the anticoagulant effect of both drugs peaks 2-3 hours after the first dose and full efficacy is restored, the following are RECOMMENDED:

1. When hemostasis is secured in patients whose postoperative bleeding risk is low or moderate, and medications can be taken by mouth the preoperative maintenance dose of dabigatran should be resumed on the morning following the procedure. The preoperative maintenance dose of rivaroxaban should be resumed with the evening meal on the day of the procedure.
2. For patients in whom the postoperative bleeding risk is high and hemostasis is secured, delay resuming the preoperative maintenance dose of dabigatran or rivaroxaban for 48-72 hours postoperatively in patiients who can take medications by mouth.
3. For patients who cannot take medications by mouth in the immediate postoperative period, administer LMWH bridge treatment as described above.

For patients anticoagulated with dabigatran or rivaroxaban preoperatively who receive LMWH postoperatively, when the patient can take medications by mouth, the preoperative maintenance dose of dabigatran or rivaroxaban should be resumed 12

hours after the last injection of therapeutic or "treatment -dose" LMWH and 24 hours after the last injection of low or "prophylactic - dose" LMWH.

IX. Timing of Withdrawal and Resumption of Antiplatelet Medication

Written by Admin
Tuesday, 05 January 2010 06:31

For patients who require interruption of aspirin, dipyridamole ER/aspirin (Aggrenox), clopidogrel (Plavix), or prasugrel (Effient) treatment, the medication should be discontinued 7 to 10 days before the procedure.

For patients who require interruption of aspirin- or clopidogrel-containing medications for surgery or a procedure and hemostasis is secured, resumption of the medication on the morning of the first postoperative or postprocedural day is RECOMMENDED. If hemostasis is not secured, delaying resumption of the medication until hemostasis is secured is RECOMMENDED.

For patients scheduled for percutaneous coronary intervention (PCI), continuing aspirin through the periprocedural period is RECOMMENDED. If clopidogrel (Plavix) has been discontinued, it is recommended that clopidogrel (Plavix) be resumed with a loading dose of 300-600 mg administered after PCI.

For patients taking prasugral (Effient) for acute coronary syndrome, discontinuing prasugrel 7 days prior to coronary artery bypass graft surgery and other procedures associated with a high bleeding risk is RECOMMENDED.

For assessment for withdrawal of antiplatelet medication, see Section III, Procedural Bleeding Risk Assessment for Withdrawal of Antiplatelet Medication.

X. Rapid Correction of Anticoagulant or Antiplatelet Treatment for Urgent Surgery

Written by Admin
Tuesday, 05 January 2010 06:35

For patients requiring rapid correction of anticoagulation from warfarin due to planned or just completed urgent surgery

1. The administration of low-dose (2.5 to 5 mg) vitamin K either intravenously or orally.
2. The administration of fresh-frozen plasma in addition to low-dose vitamin K intravenously or orally if more urgent correction of anticoagulation is required.

For patients receiving aspirin, dipyridamole ER/aspirin (Aggrenox), clopidogrel (Plavix), or prasugrel (Effient) who have excessive perioperative bleeding, transfusion of platelets is RECOMMENDED.

Consultation with a hematologist for guidance in determination of the fresh–frozen plasma or platelet transfusion requirement is suggested.

For patients requiring rapid correction of anticoagulation from dabigatran (Pradaxa) or rivaroxaban (Xarelto) due to planned or just completed urgent surgery, the use of recombinant activated factor VII or Prothrombin Complex Concentrate may be considered if the procedural bleeding risk is high or if there is excessive postoperative bleeding in a location that is difficult to control with routine measures or poses a severe risk to the patient.