Anticoagulants and Antiplatelet Drugs in Dentistry: Stop the Interruption

A Peer-Reviewed Publication
Written by Michael Wahl, DDS

Abstract
Antithrombotic medications including anticoagulants like warfarin (Coumadin®) and antiplatelet agents like aspirin are used by millions of dental patients to prevent various thrombotic complications including stroke or heart attack. Dentists must weigh the risks of postoperative bleeding in patients whose antithrombotic medications are continued versus the risk of thromboembolic complications if antithrombotic medications are interrupted for dental procedures. The dental and medical literature shows only minimal risk for bleeding complications in patients whose anticoagulation or antiplatelet medication is continued for dental surgery, and if bleeding complications occur, they can usually be easily controlled with local measures for hemostasis. The literature also shows a small but significant risk of catastrophic or fatal embolic complications in patients whose anticoagulation or antiplatelet medications are interrupted for dental procedures. There is usually no valid reason to interrupt therapeutic levels of continuous anticoagulation or antiplatelet medications for dental surgery with local measures available for hemostasis.

Educational Objectives:
At the end of this self-instructional educational activity, the participant will be able to:
1. Describe the relative risks of bleeding complications in patients on continuous antithrombotic medications such as warfarin and aspirin undergoing dental surgery.
2. Describe the relative risks of thromboembolic complications in patients whose continuous antithrombotic medications are interrupted for dental procedures.
3. Describe the purpose of physician consultation in dentistry.

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3. Describe the purpose of physician consultation in dentistry.

Abstract
Antithrombotic medications including anticoagulants like warfarin (Coumadin®) and antiplatelet agents like aspirin are used by millions of dental patients to prevent various thrombotic complications including stroke or heart attack. Dentists must weigh the risks of postoperative bleeding in patients whose antithrombotic medications are continued versus the risk of thromboembolic complications if antithrombotic medications are interrupted for dental procedures. The dental and medical literature shows only minimal risk for bleeding complications in patients whose anticoagulation or antiplatelet medication is continued for dental surgery, and if bleeding complications occur, they can usually be easily controlled with local measures for hemostasis. The literature also shows a small but significant risk of catastrophic or fatal embolic complications in patients whose anticoagulation or antiplatelet medications are interrupted for dental procedures. There is usually no valid reason to interrupt therapeutic levels of continuous anticoagulation or antiplatelet medications for dental surgery with local measures available for hemostasis.

Antithrombotic medications including anticoagulants and antiplatelet drugs are used by millions of patients to prevent heart attacks and strokes. Anticoagulants include vitamin K antagonists like warfarin (Coumadin®), dabigatran (Pradaxa®), and rivaroxaban (Xarelto®). Antiplatelet medications include aspirin, clopidogrel (Plavix®), ticlopidine (Ticlid®), cilostazol (Pletal®), and dipyridamole (Persantine®). Table 1. These medications slow down the clotting process and are often called “blood thinners.”

Anticoagulants are prescribed for a variety of conditions, including atrial fibrillation, artificial heart valve, valvular heart disease, left ventricular dysfunction or thrombus, history of deep vein thrombosis or embolism, and history of transient ischemic attack or stroke. Antiplatelet drugs are also prescribed as antithrombotic medications for a variety of conditions, including atrial fibrillation, history of angina or myocardial infarction, coronary artery disease prevention, history of coronary bypass surgery, history of transient ischemic attack or stroke, and asymptomatic carotid artery disease.

Dentists must weigh the risks of potential hemorrhage after dental procedures in patients on antithrombotic medications versus embolic complications if such medications are withdrawn or reduced before the procedure. Fortunately, dental surgery including simple or surgical extractions is different than other types of surgery. Major blood vessels are unlikely to be encountered, and perioperative and postoperative bleeding sites are usually accessible without further surgery. Local measures to aid hemostasis including application of pressure by biting on gauze, tea bags, oxidized cellulose, absorbable gelatin, tranexamic acid mouthwash, and suturing are simple to use and usually effective.

In the past, dental treatment for patients on antithrombotic medication was controversial, since such patients can be at higher risk of hemorrhage after dental procedures. As early as 1956, Askey and Cherry reported on 6 anticoagulated patients undergoing 14 extractions without bleeding complications and warned that the risk of embolic complications exceeded the risk of bleeding complications for dental extractions in anticoagulated patients. In contrast, Ziffer et al. recommended interrupting anticoagulation for dental extractions after reporting the first cases of serious bleeding requiring more than local hemostatic measures to control bleeding (injections of vitamin K) after dental extractions in anticoagulated patients.

<table>
<thead>
<tr>
<th>Anticoagulants</th>
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<tr>
<td>warfarin (Coumadin)</td>
<td>aspirin</td>
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<tr>
<td>dabigatran (Pradaxa)</td>
<td>clopidogrel (Plavix)</td>
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<td>rivaroxaban (Xarelto)</td>
<td>ticlopidine (Ticlid)</td>
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<td>cilostazol (Pletal)</td>
<td>dipyridamole (Persantine)</td>
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Warfarin indications (recommended therapeutic range for most conditions: INR 2.0-3.0, for some mechanical mitral heart valves: INR 2.5-3.5):
- atrial fibrillation
- artificial heart valve
- valvular heart disease
- left ventricular dysfunction or thrombus
- history of deep vein thrombosis or embolism
- history of transient ischemic attack or stroke

Aspirin indications:
- atrial fibrillation
- history of angina or myocardial infarction
- coronary artery disease prevention
- history of coronary bypass surgery
- history of transient ischemic attack or stroke
- asymptomatic carotid artery disease
More recent studies have repeatedly shown that bleeding complications (low morbidity) are uncommon in patients on antithrombotic medications undergoing dental surgery with local measures for hemostasis. Concern about potential embolic complications (high morbidity) has outweighed the risk of hemorrhage. Most authorities including the American Dental Association recommend against interrupting therapeutic levels of antithrombotic medications for most dental surgical procedures, including simple single or multiple extractions.3-13

In spite of overwhelming evidence that therapeutic levels of antithrombotic medications should not be interrupted or reduced for dental surgery, surveys on anticoagulant and antiplatelet drugs in dental procedures have repeatedly found that dentists and physicians overestimate the risk of postoperative hemorrhage and underestimate the risk of thrombotic complications in patients on antithrombotic agents14-22 and often prefer interruption to continuation of antithrombotic medications for dental surgery.

**Warfarin**

In the early 1920s, many cattle in Canada and the northern US were hemorrhaging after minor procedures (like dehorning or castration) or spontaneously. The Canadian veterinary pathologist Frank Schofield determined that the cattle had been eating spoiled sweet clover, which acted as an anticoagulant. In 1940, a group of chemists at the University of Wisconsin led by Karl Paul Link (Figure 1) isolated the hemorrhagic ingredient and determined it to be dicoumarol, which became the basis for the first anticoagulant drug.

By 1948, Link developed the more potent anticoagulant warfarin, named after the acronym for the Wisconsin Alumni Research Foundation, which funded Link’s research.23 Over 65 years later, warfarin is still the most prescribed vitamin K antagonist and has saved countless thousands of lives by preventing thromboembolic complications such as strokes and transient ischemic attacks, with indications including atrial fibrillation, pulmonary embolism, venous thromboembolism, and mechanical heart valves.

Figure 1. Professor Karl Paul Link (1901-1978), who discovered warfarin.

Warfarin is used to decrease the risk of thromboembolism, including stroke or transient ischemic attacks, but it can also increase the risk of bleeding. Dental surgery in anticoagulated patients can present a challenge to dentists and physicians. The bleeding risk in continuously anticoagulated patients undergoing dental surgery including extractions must be weighed against the embolic risks in withdrawing or reducing anticoagulation before dental procedures.

Warfarin anticoagulation is now measured by the International Normalized Ratio (INR). Neither dabigatran nor rivaroxaban require INR measurements, and while studies of dental treatment of patients on these two medications is limited, there is no evidence that bleeding complications are greater in dabigatran- or rivaroxaban-anticoagulated patients than with warfarin anticoagulated patients. The recommended therapeutic range for most patients on continuous anticoagulation with warfarin is INR 2.0 to 3.0, but for some patients with mechanical mitral heart valves, the recommended range is INR 2.5 to 3.5.24 INR levels have traditionally been checked by blood drawn in laboratories or hospitals, but there are now also home testing devices allowing patients to self-monitor their INR levels.25 The American College of Chest Physicians recommends that motivated and competent patients be encouraged to self-test and manage their INR levels.26

In 2007, the Haemostasis and Thrombosis Task Force of the British Committee for Standards in Haematology reviewed the literature and then issued a statement for managing anticoagulated patients undergoing dental surgery.27 These guidelines were reviewed by the British Committee for Standard in Haematology, the British Society for Haematology Committee, the British Dental Association, and the National Patient Safety Agency. The authors found the bleeding risk to be low for dental surgery in patients anticoagulated at INR 2.0 to 4.0 (even above therapeutic levels) and recommended that anticoagulation be continued in most of these patients, with hemostasis controlled by local measures. They also recommended that INR levels be checked on stably anticoagulated patients within 72 hours of surgery.

In 1998 and 2000,29 this author researched over 2400 documented cases of dental surgical procedures (extractions, alveolar surgery, and gingival surgery) in more than 950 continuously anticoagulated patients. Many cases involved full-mouth extractions with alveoplasties, and many cases involved patients at anticoagulation levels significantly higher than present therapeutic levels of INR 2.0-3.5. Of these cases, only 12 patients (at most 1.3% of patients) experienced hemorrhage uncontrolled by local measures, but at least 7 of these 12 patients (including the two patients in the aforementioned Ziffer et al.2 cases) were anticoagulated well above current therapeutic levels. In no case was the hemorrhage fatal.
Before 2000, there were over 500 documented cases on patients whose anticoagulation was interrupted for dental procedures. Most cases were uneventful, but four patients (0.9%) experienced fatal embolic complications, and one patient experienced two nonfatal embolic complications soon after such anticoagulation was interrupted. Since 2000, there have been at least 13 studies of 700 ces sations of anticoagulation with vitamin K antagonists for dental procedures in about 634 patients. Although most interruptions for dental procedures were uneventful, 12 (1.7%) suffered embolic complications, including 2 that were fatal.

Since 2000, there have been at least 24 studies of over 2600 continuously anticoagulated patients, some at higher than therapeutic levels, undergoing over 5900 dental surgical procedures including simple and surgical single and multiple extractions. In over 99% of cases, hemostasis was achieved with local measures only. In only 4 cases (0.15% of patient visits) were more than local measures (eg, the administration of vitamin K or fresh frozen plasma) used to aid hemostasis. Each of these 4 cases involved at least 3 extractions, and in at least 2 and possibly all 4 cases, the patients had very high postoperative INR levels, which may have contributed to the bleeding.

Many clinicians are unaware of the risk of serious embolic complications, sometimes fatal, in patients whose anticoagulation is withdrawn for dental procedures. In 2010, to support the idea that anticoagulation should be reduced or withdrawn for some dental extractions, Balevi asserted, “there has been no reported case of a dental extraction causing a cardiovascular accident (CVA) in a patient whose warfarin was temporarily discontinued.” Todd pointed out that bleeding after dental surgery, “while never life threatening, can be quite disconcerting and require repeated local measures…”

Warfarin has a long half-life of about 40 hours so when warfarin therapy is interrupted, it takes about 5 days to reach normal hemostasis. Akopov et al. in 2005 reported that 5 patients who suffered thrombotic events were at INR levels between 1.5 and 2.0 at admission to the hospital after anti-coagulation withdrawal for medical procedures. Moreover, optimal INR levels to prevent stroke with minimal risk of hemorrhage has been the subject of intense study and for most patients has been defined as INR 2.0 to 3.0 (INR 2.5 to 3.5 for some high-risk patients). Reducing the dose below these levels to a suboptimal level will therefore expose these patients to a higher risk of stroke or even death for little or no benefit in prevention of hemorrhage, which, if it occurs at all, can be treated with local measures. It is true that embolic events are infrequent when warfarin anticoagulation is briefly interrupted, but when an embolic event like a stroke occurs, it is usually catastrophic and possibly fatal. It also should be noted that bleeding complications can sometimes occur even in patients not anticoagulated with warfarin.

The therapeutic analgesic effects of aspirin, also known as acetylsalicylic acid (ASA), were first recorded over 2000 years ago by Hippocrates, when he recommended chewing willow leaves (which contain salicylic acid) during childbirth. Charles Frédéric Gerhardt, a chemist at the German company Bayer discovered acetylsalicylic acid in 1853 although in an impure form. Felix Hoffmann [Figures 2 and 3], another chemist at Bayer, was the first to isolate pure acetylsalicylic acid in stable form in 1897, naming it “Aspirin” for commercial manufacture and sale in 1899. Originally a trade name, Bayer eventually lost or sold its rights to the trademark, and aspirin entered the lexicon as a generic name for acetylsalicylic acid. Since then, aspirin’s analgesic, antipyretic, anti-inflammatory, and anti-thrombotic effects have made aspirin a “wonder drug” and one of the most commonly used globally. When aspirin is used for antithrombosis, the typical dosage can vary between 75 and 325mg daily.

Dentists and physicians must weigh the potential bleeding complications in patients on continuous antiplatelet drugs like aspirin versus the potential for heart attacks or strokes in patients whose antiplatelet therapy is interrupted.
for dental procedures. There have been four case reports of severe bleeding including two involving platelet transfusions after dental treatment in patients on aspirin, but these reports each include patients at very high dosages or taking other medications that may have been responsible for the bleeding. 74-77 Three of these reports were in the 1970s, and one was in 1997. These cases have led some to recommend a 7- to 10-day interruption of low-dose antiplatelet therapy before dental extractions. 78

Since then, there have been 18 studies of patients on antiplatelet medications (including patients on dual antiplatelet medications like aspirin and clopidogrel, or other single antiplatelet medications) undergoing dental surgery without bleeding complications requiring more than local measures for hemostasis. 59,64,65,79-95 Overall, including the earlier reports, there have been at least 23 studies on at least 1038 patients undergoing at least 1090 visits for dental surgery while on continuous antiplatelet medications, and there have been only 2 bleeding complications (0.2% of patients and 0.2% of patient visits) requiring more than local measures for hemostasis. Over 99% of all dental surgery in patients on antiplatelet medications required no more than local measures for hemostasis. It can be concluded that the risk of bleeding is extremely low after dental procedures in patients on therapeutic levels of antiplatelet medications. Just as with warfarin anticoagulation, it should be noted that bleeding complications can sometimes occur even in patients not on antiplatelet medications.

Some medical and dental professionals assume there is little or no risk of serious thrombotic complications in patients whose antiplatelet therapy is interrupted for dental procedures, but in large case-control studies of patients on low-dose aspirin, strokes or myocardial infarctions were significantly more likely to occur in those whose antiplatelet therapy was interrupted for any reason (not just dental procedures). 96,97 Although there have been some cases of antiplatelet therapy interruption for dental procedures without complications, there have been thromboembolic complications reported in patients whose antiplatelet therapy was interrupted for dental procedures. There have been at least 325 patients undergoing 375 dental procedures after antiplatelet medication interruption reported in the literature. 79,83,90,91,98-100 At least 15 of these patients suffered thromboembolic complications, including acute coronary syndrome and stent thrombosis and/or myocardial infarction afterward. 101,102 The risk of thrombotic complications is low, but not zero and such complications are potentially serious or even fatal. If aspirin therapy is interrupted for surgery, a 7- to 10-day interruption was thought to be prudent. Sonksen et al. showed that a 2-day interruption is sufficient for normal hemostasis 103 and Brennan et al. recommended no more than a 3-day interruption. 104 If aspirin therapy is interrupted for a dental procedure, it is the physician and not the dentist who should recommend the interruption.

National medical and dental group recommendations for dental surgery in patients on antithrombotic medications.

The American College of Chest Physicians (AACP) recommended continuing anticoagulation for dental extractions in its statements in 2001, 2004, and 2008. The AACP recommended in 2012 105 a choice of either continuing anticoagulation using a prohemostatic mouthwash like tranexamic acid to aid in hemostasis for minor dental procedures including extractions or withdrawing anticoagulation for 2 or 3 days before the procedure.

The American Dental Association states, “It is generally agreed that anticoagulant [including antiplatelet] drug regimens should not be altered prior to dental treatment. If you stop taking, or take less of, the anticoagulant medication, you increase your chance for blood clot development, which could result in thromboembolism, stroke or heart attack. The risks of stopping or reducing this medication routine outweigh the consequences of prolonged bleeding, which can be controlled with local measures.” [emphasis original] 106

The American Dental Association, American Heart Association, American College of Cardiology, Society for Cardiovascular Angiography and Interventions, American College of Surgeons, and American College of Chest Physicians have concluded that antiplatelet therapy should be continued for dental procedures. 103,107

Physician consultation by dentists

C. Edmund Kells was a pioneer in dental radiography and the inventor of surgical suction. As early as 1920, Kells criticized physician consultation. 108 Dental patients would frequently present with physician recommendations for wholesale and wanton extraction of salvageable and healthy teeth to cure varioumaladies such as insanity or arthritis, based on the focal infection theory. Dentists would blindly follow such advice, and Kells decried this practice, calling it “the Crime of the Age…. The time will come, however, -the time must come – when no exodontist of standing will extract a tooth upon the orders of a physician. A dentist, and no one but a dentist, should sign the death certificate of a tooth. The Lord only knows why physicians should want to sign such certificates. Don’t they sign enough such certificates in their own legitimate line?”

In 2012, Gary and Glick discussed the issue of “medical clearance” in dentistry and stated that physician consultation can be a valuable tool, but it should not be a “crutch.” 109 Many dentists are under the impression that physician consultation somehow insulates dentists from legal liability in a patient’s care. But it is the dentist, not the physician, who is responsible for dental treatment decisions. It may be worthwhile to consult with the physician if information is needed about what a patient’s INR level is, but there is no need to determine if therapeutic levels of anticoagulation should be withdrawn for a simple extraction. Anticoagulation at therapeutic levels should be continued for simple extractions. The American Dental As-
A dental license is not a license to defer dental treatment decisions to nondentists, even if the nondentist is a physician. While physician consultation can and should be a valuable tool for dentists, especially for gaining information necessary for safe patient treatment (eg, a patient’s INR level), it is not a substitute for knowledge, experience, and clinical judgment. Physicians have been shown to misunderstand the bleeding risks inherent to dental procedures. For example, in a 1996 survey of physicians, more physicians recommended anticoagulation interruption for conventional endodontic therapy than for professional prophylaxis even though there is usually little or no bleeding associated with endodontic therapy, and certainly less so than bleeding associated with professional cleanings.

There have been at least four separate cases of embolic complications (two fatal) after physician consultation and anticoagulation interruption. In other words, the dentist consulted the physician, who recommended interruption of warfarin before the dental surgery. The patients in each of these cases suffered strokes, and two died. A lawsuit was filed in each case. In these cases, there was no reason to interrupt therapeutic levels of anticoagulation for dental extractions and certainly no reason for the dentist to ask the patient’s physician to consider such an interruption (although there may have been a reason to consult with the physician to determine the patient’s INR levels).

If before a dental extraction appointment, the dentist requests a physician consultation for antithrombotic medication interruption, and the physician recommends interruption for a dental extraction, then the dentist has a duty to advise the patient that dental surgery can be accomplished with minimal hemostatic risk in patients on continuous antithrombotic medications, and that such an interruption carries a risk of serious and possibly fatal embolic complications. The dentist should explain to the patient that if a bleeding complication occurs at all, it would unlikely be catastrophic or fatal. In no case should a dentist recommend interruption of antithrombotic medications. If the patient’s antithrombotic medication is to be interrupted, it is solely the physician and not the dentist who should order the interruption.

Therapeutic levels of continuous antithrombotic medications like warfarin and aspirin should not be interrupted or reduced for dental surgery, as the risk of bleeding complications is very low and if postoperative bleeding complications occur, they are usually simple to treat with local hemostatic measures.Interrupting therapeutic levels of continuous antithrombotic medications carries a low but significant risk of catastrophic or fatal thromboembolic complications. Physician consultation can be a valuable tool for a dentist to gain information about a patient (eg, the patient’s INR levels), but it is not a substitute for the dentist’s good clinical judgment, experience, and education.

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1. Noseda N. The effect of aspirin on bleeding after extraction of teeth. Saud Dent

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Questions

1. If aspirin therapy is interrupted for surgery, what is the maximum interruption recommended for normal hemostasis?
   a. 2-3 days
   b. 4-5 days
   c. 6-7 days
   d. 8-9 days

2. What is the half-life of warfarin?
   a. 4 minutes
   b. 40 minutes
   c. 4 hours
   d. 40 hours

3. How is dental surgery different than other major surgery?
   a. Major blood vessels are unlikely to be encountered
   b. Perioperative and postoperative bleeding sites are accessible without further surgery
   c. Local measures for hemostasis are usually sufficient
   d. All of the above

4. Warfarin was named after:
   a. Albert S. Warfarin
   b. The Wisconsin Alumni Research Foundation
   c. The San Francisco Wharf
   d. None of the above

5. Physician consultation is usually valuable for the treating dentist to determine:
   a. A patient’s INR level before dental surgery
   b. If continuous warfarin therapy should be interrupted before conventional root canal therapy
   c. If continuous warfarin therapy should be interrupted before a simple dental extraction
   d. All of the above

6. Which of the following is not a local hemostatic method?
   a. Biting on gauze
   b. Tranexamic acid mouthwashes
   c. Injection of vitamin K
   d. Suturing

7. Anticoagulants like warfarin are not used for which of the following conditions?
   a. Atrial fibrillation
   b. Artificial heart valve
   c. Menopause
   d. Deep vein thrombosis or embolism

8. Which of the following national medical or dental organizations recommends interruption of antplatelet therapy for simple dental extractions?
   a. American Dental Association
   b. American Heart Association
   c. Both a & b
   d. None of the above

9. Salicylic acid is found in which of the following?
   a. Oak leaves
   b. Maple leaves
   c. Willow leaves
   d. Pine needles

10. Which company coined the term “Aspirin”?
    a. St. Joseph’s
    b. Johnson & Johnson
    c. Bayer
    d. None of the above

11. What are the potential complications of a dental extraction in a patient whose warfarin anticoagulation is interrupted?
    a. Bleeding
    b. Stroke
    c. Death
    d. All of the above

12. What are the potential complications of a dental extraction in a patient whose aspirin therapy is interrupted?
    a. Bleeding
    b. Myocardial infarction
    c. Death
    d. All of the above

13. Since 2000, how many cases of dental surgery in anticoagulated patients required more than local measures for hemostasis?
    a. 5%
    b. 2%
    c. 1%
    d. <1%

14. How many cases of dental surgery in patients on antplatelet medication required more than local measures for hemostasis?
    a. 5%
    b. 2%
    c. 1%
    d. <1%

15. When a simple dental extraction is planned for a patient anticoagulated with warfarin at therapeutic levels, the dentist should:
    a. Advise interruption of anticoagulation
    b. Consult with the physician for possible interruption of anticoagulation
    c. Proceed with the planned extraction
    d. None of the above

16. The most widely-accepted measure of warfarin’s anticoagulant effect is the:
    a. Prothrombin Time Ratio (PTR)
    b. International Normalized Ratio (INR)
    c. Complete Blood Count (CBC)
    d. None of the above

17. The recommended therapeutic range of anticoagulation for most patients except mechanical mitral valve on warfarin anticoagulation is INR:
    a. 1.5-2.5
    b. 2.0-3.0
    c. 2.5-3.5
    d. 3.0-4.0

18. Surveys have shown that for dental procedures in patients on anticoagulant or antiplatelet medications, most dentists and physicians:
    a. Overestimate bleeding risk and underestimate stroke risk
    b. Overestimate stroke risk and underestimate bleeding risk
    c. Overestimate bleeding risk and overestimate stroke risk
    d. Underestimate bleeding risk and underestimate stroke risk

19. If a dentist follows the physician’s advice for a dental treatment decision, who is primarily legally responsible for the dental treatment decision?
    a. The dentist
    b. The physician
    c. The patient
    d. Both a & b

20. Which of the following is an anticoagulant drug?
    a. Warfarin (Coumadin)
    b. Dabigatran (Pradaxa)
    c. Rivaroxaban (Xarelto)
    d. All of the above

21. Which of the following is an antplatelet drug?
    a. Aspirin
    b. Dipyridamole (Persantine)
    c. Clopidogrel (Plavix)
    d. All of the above

22. Aspirin’s indications include all of the following except:
    a. Atrial fibrillation
    b. History of angina or myocardial infarction
    c. Endocarditis prevention
    d. History of transient ischemic attack or stroke

23. Who is noted to have discovered stable acetylsalicylic acid and naming it “Aspirin”?
    a. Gerhardt
    b. Hippocrates
    c. Hoffman
    d. None of the above

24. Who discovered warfarin?
    a. Schofeld
    b. Link
    c. Hippocrates
    d. All of the above

25. What is the most commonly prescribed vitamin K antagonist?
    a. Warfarin
    b. Aspirin
    c. Clopidogrel
    d. Dipyridamole

26. Bleeding complications in patients on continuous antithrombotic medications undergoing dental surgery are:
    a. Common and high morbidity
    b. Uncommon and high morbidity
    c. Common and low morbidity
    d. Uncommon and low morbidity

27. Thromboembolic complications in patients undergoing dental surgery whose antithrombotic medication is interrupted are:
    a. Common and high morbidity
    b. Uncommon and high morbidity
    c. Common and low morbidity
    d. Uncommon and low morbidity

28. INR testing is commonly accomplished by which of the following:
    a. Home test
    b. Lab test
    c. Hospital test
    d. All of the above

29. The recommended therapeutic range of anticoagulation for mechanical mitral valve patients on warfarin anticoagulation is INR:
    a. 1.5-2.5
    b. 2.0-3.0
    c. 2.5-3.5
    d. 3.0-4.0

30. When aspirin is used for antithrombotic therapy, the typical daily dosage is between:
    a. 75-325mg
    b. 75-3250mg
    c. 750-3250mg
    d. None of the above
**Anticoagulants and Antiplatelet Drugs in Dentistry: Stop the Interruption**

**Educational Objectives**
1. Describe the relative risks of bleeding complications in patients on continuous antithrombotic medications such as warfarin and aspirin undergoing dental surgery.
2. Describe the relative risk of thromboembolic complications in patients whose continuous antithrombotic medications are interrupted for dental procedures.
3. Describe the purpose of physician consultation in dentistry.

**Course Evaluation**
1. Were the individual course objectives met? Objective #1: Yes No Objective #3: Yes No Objective #2: Yes No

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating (5 = Excellent, 0 = Poor)</th>
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<tbody>
<tr>
<td>To what extent were the course objectives accomplished overall?</td>
<td>5</td>
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<tr>
<td>Please rate your personal mastery of the course objectives.</td>
<td>5</td>
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<tr>
<td>How would you rate the objectives and educational methods?</td>
<td>5</td>
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<td>How do you rate the author’s grasp of the topic?</td>
<td>5</td>
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<td>Please rate the instructor’s effectiveness.</td>
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<td>Was the overall administration of the course effective?</td>
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<td>Please rate the usefulness and clinical applicability of this course.</td>
<td>5</td>
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<td>Please rate the usefulness of the supplemental weblogiography.</td>
<td>5</td>
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<td>Do you feel that the references were adequate?</td>
<td>Yes No</td>
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<td>Would you participate in a similar program on a different topic?</td>
<td>Yes No</td>
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<td>If any of the continuing education questions were unclear or ambiguous, please list them.</td>
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<td>Was there any subject matter you found confusing? Please describe.</td>
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<td>How long did it take you to complete this course?</td>
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<tr>
<td>What additional continuing dental education topics would you like to see?</td>
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</tbody>
</table>

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