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ASSESSMENT OF COAGULATION STATUS AFTER TOOTH EXTRACTION IN PATIENTS WITH ATRIAL FIBRILLATION RECEIVING ANTICOAGULANT THERAPY: MODERN APPROACHES

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Abstract. This article analyzes current approaches to assessing coagulation status after tooth extraction in patients receiving long-term anticoagulant therapy due to atrial fibrillation (AF). Balancing the risk of bleeding and thromboembolic complications during dental procedures in patients treated with warfarin and direct oral anticoagulants (DOACs), including apixaban, rivaroxaban, dabigatran, and others, remains a significant clinical challenge. The article reviews the bleeding risk associated with tooth extraction, key coagulation parameters such as international normalized ratio (INR), anti-factor Xa activity, and thrombin time, in the context of European and American cardiology and dental clinical guidelines. In addition, local hemostatic measures (hemostatic sponges, tranexamic acid mouthwashes, sutures) and clinical decision-making algorithms regarding continuation or temporary interruption of anticoagulant therapy are discussed. Recent studies suggest that for most low-risk dental procedures, complete discontinuation of DOACs is not required, and an individualized approach based on thromboembolic and bleeding risk assessment (CHA_2DS_2-VASc, HAS-BLED) and coagulation monitoring is preferred.
Keywords. atrial fibrillation, anticoagulant therapy, tooth extraction, coagulation status, warfarin, direct oral anticoagulants, bleeding risk, local hemostasis.

INTRODUCTION. Atrial fibrillation (AF) is the most common cardiac arrhythmia in adults and is associated with a significantly increased risk of stroke and systemic thromboembolic events. The majority of patients with AF receive long-term oral anticoagulant therapy (OAT), including vitamin K antagonists such as warfarin or direct oral anticoagulants (DOACs) such as apixaban, rivaroxaban, dabigatran, and edoxaban. At the same time, these patients frequently require dental procedures during their lifetime, particularly tooth extraction.

Tooth extraction in patients receiving anticoagulant therapy represents a dual clinical challenge. On the one hand, insufficient suppression of the coagulation system increases the risk of thromboembolic complications, including stroke and systemic embolism. On the other hand, excessive anticoagulation may significantly increase the risk of postoperative local and, in some cases, severe bleeding. Therefore, the primary task for both dentists and cardiologists is to accurately assess the patient's coagulation status before and after tooth extraction, optimally manage anticoagulant therapy, and ensure effective local hemostasis.

The aim of this article is to analyze current approaches to the assessment of coagulation status after tooth extraction in patients receiving anticoagulant therapy due to atrial fibrillation, based on international guidelines, laboratory and clinical parameters, and modern local hemostatic strategies.

LITERATURE REVIEW

Atrial fibrillation and the fundamentals of anticoagulant therapy

The main objective of managing patients with atrial fibrillation is the prevention of thromboembolic complications. The CHA_2DS_2-VASc score is used to assess the risk of stroke, while the HAS-BLED score estimates the risk of bleeding. Anticoagulant therapy typically includes the following agents:

- Warfarin (vitamin K antagonist, VKA): the international normalized ratio (INR) is maintained within the therapeutic range of 2.0–3.0.
- Direct oral anticoagulants (DOACs):
- Dabigatran (direct thrombin inhibitor),
- Rivaroxaban, apixaban, edoxaban (factor Xa inhibitors).

The pharmacokinetic properties of these agents, their half-lives, and the need for laboratory monitoring directly influence the assessment of coagulation status during dental extractions.

Risk stratification of tooth extraction

Dental procedures are generally categorized according to bleeding risk as follows:

- Low-risk procedures: single tooth extraction, superficial periodontal procedures, minor biopsies;
- Moderate-risk procedures: multiple tooth extractions performed simultaneously, deep periodontal interventions;
- High-risk procedures: extensive reconstructive surgery and prolonged surgical interventions.

Recent studies indicate that, for most low-risk dental procedures, complete discontinuation of anticoagulant therapy is unnecessary; instead, reinforcement of local hemostatic measures is usually sufficient.

Assessment of coagulation status in patients receiving warfarin

In patients treated with warfarin, the primary laboratory parameter used to assess coagulation status is the international normalized ratio (INR).

- INR 2.0–3.0 represents the therapeutic range for most patients with atrial fibrillation.
- Several studies have demonstrated that low-risk tooth extractions can be safely performed without interruption of warfarin therapy when the INR is ≤ 3.0–3.5.
- When INR exceeds 3.5, dose reduction or postponement of the procedure should be considered.

Complete discontinuation of warfarin may significantly increase the risk of thromboembolic events, particularly in patients with high CHA_2DS_2-VASc scores. Therefore, current approaches support a strategy of minimal modification, consisting of continuing warfarin therapy or omitting only a single dose, combined with effective local hemostatic control.

Assessment of coagulation status in patients receiving DOACs

Routine laboratory monitoring is not required for patients treated with DOACs (dabigatran, apixaban, rivaroxaban, edoxaban); however, when tooth extraction is planned, several factors should be considered:

- Drug half-life (approximately 8–15 hours);
- Renal function, particularly for dabigatran and partially for rivaroxaban and edoxaban;
- Dosing regimen (once-daily vs twice-daily administration).

For low-risk tooth extractions, most current guidelines recommend:

- Avoiding complete discontinuation of the anticoagulant;

- Scheduling the procedure during the deep trough period, i.e., shortly before the next scheduled dose;
- In selected cases, omitting a single dose may be sufficient.

In cases of more extensive surgical procedures, DOAC interruption for 24–48 hours may be considered depending on renal function. Specialized laboratory tests (e.g., anti–factor Xa activity, activated partial thromboplastin time [aPTT], thrombin time) are reserved for high-risk situations or when clinically significant bleeding occurs.

Laboratory and clinical parameters for assessing coagulation status

The assessment of coagulation status before and after tooth extraction should include the following:

1. INR (for patients receiving warfarin)
2. Renal function (creatinine clearance) to determine DOAC dosing and interruption timing
3. History of bleeding, including epistaxis, gingival bleeding, bruising, and chronic hematomas
4. Blood pressure, liver function, and concomitant medications (combined anticoagulant or antiplatelet therapy)
5. Risk assessment scales:

- CHA_2DS_2-VASc — thromboembolic risk
- HAS-BLED — bleeding risk

In the post-extraction period, attention should be given to:

- Duration of local bleeding;
- Frequency of dressing replacement;
- Need for tranexamic acid mouth rinses;
- Requirement for reintervention (sutures or additional hemostatic materials).

Local hemostatic measures

While maintaining optimal systemic anticoagulation, the primary emphasis should be placed on local hemostatic control:

- Mechanical hemostasis:
- Placement of a firm pressure pack in the extraction socket;
- Wound edge approximation using sutures (including cross-suturing techniques);
- Patient instructions to limit excessive tongue and cheek movements.
- Pharmacological hemostasis:
- Tranexamic acid mouth rinses (0.05–0.1 g/mL) administered several times daily for 2–5 days;
- Epinephrine-impregnated gauze or sponges in appropriate oral doses;
- Fibrin-based or collagen hemostatic sponges.
- Behavioral recommendations:
- Avoidance of hot food and beverages during the first 24 hours after extraction;
- Refraining from vigorous mouth rinsing or frequent spitting;
- Avoidance of physical exertion and activities that markedly increase arterial blood pressure.

MODERN PREVENTIVE AND MANAGEMENT APPROACHES

Principle of continuing anticoagulant therapy

- For low-risk tooth extractions, continuation of warfarin or DOAC therapy, or omission of only a single dose, is recommended rather than complete discontinuation of the anticoagulant.
- Bridging therapy with low-molecular-weight heparin should be considered only in patients at very high thromboembolic risk (e.g., those with recently implanted mechanical heart valves or recent thromboembolic events).

Individual risk assessment

- Calculation of CHA_2DS_2-VASc and HAS-BLED scores allows determination of whether thromboembolic or bleeding risk predominates.
- If thromboembolic risk is very high, anticoagulation should be maintained with minimal modification; if bleeding risk is predominant, local hemostatic measures should be reinforced, with adjustment of DOAC dosing or timing as appropriate.

Collaboration between dentist and cardiologist

- When tooth extraction is planned—particularly for multiple extractions or complex procedures—clinical decisions should be made in collaboration with the treating cardiologist.
- A comprehensive review of all medications taken by the patient, including aspirin, clopidogrel, and nonsteroidal anti-inflammatory drugs (NSAIDs), is essential.

Patient education

- Patients should receive clear instructions on pre- and post-extraction care and be informed about situations that require prompt medical attention.
- It should be emphasized that if bleeding persists or worsens, patients should seek immediate medical care without independently altering their anticoagulant therapy.

DISCUSSION

The literature review indicates that tooth extraction in patients receiving anticoagulant therapy for atrial fibrillation can usually be performed safely, provided that:

- Coagulation status (INR, clinical history, renal and hepatic function) is assessed in advance;
- Anticoagulant therapy is not abruptly discontinued, but instead minimally modified based on individual risk assessment;
- Local hemostatic measures are applied appropriately and effectively.

In patients receiving warfarin, low-risk tooth extractions are generally performed without significant bleeding complications when the INR is ≤ 3.0 and adequate local hemostasis is ensured. In patients treated with DOACs, temporary omission of a dose or scheduling the procedure during the drug's trough period, while taking into account half-life and renal function, is usually sufficient.

However, numerous studies have demonstrated that complete discontinuation of anticoagulant therapy is associated with a significantly increased risk of thromboembolic events. This risk is particularly pronounced in patients with atrial fibrillation and CHA_2DS_2-VASc scores ≥ 4, where even short-term interruption of anticoagulation may markedly increase the risk of stroke. Consequently, contemporary guidelines support a "continue or minimally modify" strategy for anticoagulant management.

CONCLUSION

1. Tooth extraction in patients with atrial fibrillation receiving anticoagulant therapy is a common clinical situation that requires careful assessment of coagulation status.
2. In patients receiving warfarin, low-risk tooth extraction can be safely performed without discontinuing anticoagulant therapy when the INR is within the therapeutic range of 2.0–3.0 (and in selected cases up to 3.5), provided that effective local hemostasis is applied.
3. In patients receiving DOACs, tooth extraction is typically performed without complete interruption of therapy by scheduling the procedure during the pre-dose trough period and, if necessary, omitting a single dose.
4. Assessment of coagulation status should not be limited to laboratory parameters (INR, creatinine) alone, but should also include CHA_2DS_2-VASc and HAS-BLED scores, bleeding history, and the patient's overall clinical condition.
5. Local hemostatic measures—such as suturing, hemostatic sponges, and tranexamic acid mouth rinses—allow effective hemostasis to be achieved even with minimal modification of anticoagulant therapy.

6. Effective collaboration among the dentist, cardiologist, and patient is essential for minimizing the risks of post-extraction bleeding and thromboembolic complications.

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