REVIEW ARTICLE

Bleeding risk assessment and management in atrial fibrillation patients

Key messages for clinical practice from the European Heart Rhythm Association position statement

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KEY WORDS

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ABSTRACT

The prevention of thromboembolism is the main therapeutic goal in patients with atrial fibrillation (AF). Vitamin K antagonists have been proved highly effective in preventing thromboembolic events in patients with AF and despite recent advances in oral anticoagulation they remain the most widely used agents. Anticoagulation increases the incidence of bleeding; however, in the field of stroke prevention in AF the clinical benefit of vitamin K antagonists clearly outweighs potential risks. The annual incidence of major bleeding among individuals with AF on oral anticoagulation varies widely, ranging from 1.3% to 7.2%. Several factors affect bleeding risk including the intensity of anticoagulation, the efficacy of monitoring modalities, and patient characteristics. This multifactorial etiology makes prediction of bleeding risk complex, necessitating the derivation and validation of clinical prediction tools for the estimation of total bleeding risk in clinical practice. The present review summarizes data on definition, risk prediction, prevention, and management of oral anticoagulation-associated bleeding as reflected by the recent European Heart Rhythm Association consensus statement.

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Introduction Stroke and thromboembolism (TE) prevention is the main objective in the management of atrial fibrillation (AF).[1,2] Despite recent advances in oral anticoagulation, vitamin K antagonists (VKAs) remain the main agents used in clinical practice. Regardless of their known limitation, VKAs have demonstrated clinical benefit that outweighs the risk of bleeding.[3,4] The absolute benefit is more pronounced among patients with high-risk features for TE (CHA_2DS_2VASc score of ≥1).[4] Nevertheless, major bleeding, especially intracranial bleeding (ICH), is associated with poor prognosis.

The risk of dying is almost 2-fold higher when ICH occurs in patients on warfarin.[5] To improve management of AF, the European Heart Rhythm Association (EHRA), endorsed by the European Society of Cardiology (ESC) Working Group on Thrombosis recently published a consensus document on bleeding risk assessment in AF patients.[6,7] The "best practice" in dealing with bleeding risk in AF patients is recommended based on an extensive review of recent evidence, on the epidemiology of bleeding events in AF, clinical implication, risk factors, risk stratification and bleeding risk schemas, bleeding complications, as well as the prevention and management of bleeds.

Epidemiology of bleeding risk in atrial fibrillation

The annual incidence of major bleeding among individuals with AF on VKAs varies widely ranging from 1.3% to 7.2%. The incidence of ICH and fatal bleeding ranges from 0.3% to 1.8% and from 0.5% to 1.0%, respectively (TABLE 1).[8-13] In their landmark trials, new oral anticoagulants (OACs) demonstrated similar or lower rates of major bleeding, depending on the doses used. In a model projecting clinical trial data in real world population from the Danish National Patient Registry, the relative risks of ICH with the new OACs compared with warfarin were 0.31 for dabigatran

TABLE 1 Annual rates of major bleeding among atrial fibrillation patients taking antithrombotic drugs

Drugs	Randomized trials	Year	Population, n	Major bleeding, %/year	ICH, %/year	Age, y
antiplatelets/vitamin K antagonists						
aspirin	ACTIVE A[52]	2009	7554	1.2	0.2	71
aspirin + clopidogrel	ACTIVEA[52]; ACTIVE W[53]	2009	7554	1.8	0.4	71
warfarin	AFI[54]; SPAF[55]; AFFIRM[56]; SPORTIF[57]; ACTIVE[52,53]; RE-LY[8]; ROCKET-AF[9]; ARISTOTLE[10]	1994–2011	385–18,006	2.2–3.5	0.3–1.8	69–80
warfarin + aspirin	SPAF III[58]	1996	1044	2.5	1.0	72
	AFASAK II[59]	1998	340	0.6	0.3	73
new oral anticoagulants						
dabigatran 110	RE-LY[8]	2009	12,037	2.7	0.2	72
dabigatran 150	RE-LY[8]	2009	12,334	3.1	0.3	72
rivaroxban	ROCKET-AF[9]	2010	14,264	2.9	0.4	73
apixaban	ARISTOTLE[10]	2011	18,423	2.0	0.3	70

Abbreviations: ACTIVE A – Atrial Fibrillation Clopidogrel Trial With Irbesartan for Prevention of Vascular Events A, ACTIVE W – Atrial Fibrillation Clopidogrel Trial With Irbesartan for Prevention of Vascular Events W, AFASAK – Atrial Fibrillation, Aspirin, and, Anticoagulation Study, AFFIRM – Atrial Fibrillation Follow-up Investigation of Rhythm Management study, AFI – Atrial Fibrillation Investigation, ARISTOTLE – Apixaban for the Prevention of Stroke in Subjects With Atrial Fibrillation, ICH – intracranial hemorrhage, RE-LY – Randomized Evaluation of Long Term Anticoagulant Therapy, ROCKET-AF – An Efficacy and Safety Study of Rivaroxaban With Warfarin for the Prevention of Stroke and Non-Central Nervous System Systemic Embolism in Patients With Non-Valvular Atrial Fibrillation, SPAF – Stroke Prevention in Atrial Fibrillation, SPORTIF – Stroke Prevention Using Oral Thrombin Inhibitor in Atrial Fibrillation

110 mg twice daily, 0.40 for dabigatran 150 mg twice daily, 0.67 for rivaroxaban, and 0.42 for apixaban.[14]

The reported incidence of anticoagulant-related hemorrhage is influenced by study design, clinical definitions, patients' characteristics, and quality of monitoring. The rate of bleeding increases markedly with advanced age and is highest during the initiation of anticoagulant treatments among newly-diagnosed patients with AF.[6,15] Major bleeding risk is significantly influenced by concomitant use of antiplatelet agents, especially in the elderly population. Bleeding-related hospitalization rates were significantly enhanced when warfarin was prescribed on the top of low-dose aspirin (adjusted rate ratio [RR], 1.44; 95% confidence interval [CI], 1.00–2.07), clopidogrel (adjusted RR, 2.23; 95% CI, 1.48–3.36), clopidogrel with aspirin (adjusted RR, 3.44; 95% CI, 1.28–9.23).[16,17]

Definition of bleeding and its implication in clinical practice A variety of definitions of major bleeding have been used in published clinical studies. The definition of major bleeding in the setting of OAC-treated patients usually consists of a combination of events including fatal bleedings, bleedings requiring hospitalization, bleedings requiring transfusion of 2 or more units of packed red blood cells, or bleedings in critical site (i.e., intracranial, retroperitoneal, intraspinal, intraocular, pericardial, or atraumatic intra-articular hemorrhage).[18,19]

In an effort to overcome inconsistencies and facilitate comparison of bleeding events across studies, the subcommittee on the control of anticoagulation of the Scientific and Standardization Committee of the International Society of Thrombosis and Haemostasis proposed a definition of bleeding complications in nonsurgical patients that was recently revisited. Most of the contemporary AF studies have been performed according to this standardized definition.[19]

Not all bleeding events are equally detrimental. Extracranial major bleeding leads to death or permanent disability in 3% of the cases. For ICH, the latter risk is 25 times higher.[20] The definition of clinically relevant major bleeds and clinically less relevant major bleeds has been proposed for aiding decision making in clinical practice. The former would include life-threatening events, symptomatic intracerebral bleeds, and other bleeding events resulting in permanent organ damage or events requiring an acute major intervention. Clinically less relevant major bleeds would be less acute events, such as an asymptomatic hemoglobin drop and bleeding events that lead to a temporary cessation of antithrombotic therapy. These differences in severity level have different impact on mortality. Indeed, clinically relevant major bleeds are associated with a greater risk of short- and long-term mortality. A meta-analysis of the ACTIVE-W (Atrial Fibrillation Clopidogrel Trial with Irbesartan for Prevention of Vascular Events) study confirmed that both hemorrhagic stroke and severe bleeding increased the risk of subsequent mortality.[21] Factors that deteriorate short- and mid-term prognosis of AF patients after a bleeding event include critical location of bleeds, impaired tissue perfusion, withdrawal of antithrombotic agents, activation of sympathetic, vasoconstrictive and prothrombotic mechanisms, increased cardiac workload, negative impact of transfusions, and prolonged hospitalization and bed rest leading to increased risk of venous TE.

Bleeding risk factors The established risk factors of OAC-associated bleeding can be classified as patient-related and monitoring- and health system-related.

Monitoring- and health-system-related factors The intensity of the anticoagulation and the quality of anticoagulation monitoring have major impact on the risk of hemorrhage. The incidence of major bleeding for patient with target international normalized ratio (INR) above 3.0 is twice as high as in those with a target INR between 2.0 and 3.0. Moreover, even in the stringent settings of clinical trials, a large proportion of patients on VKAs are outside the therapeutic range and hence they are exposed to a risk of bleeding or thrombosis.[8,9] Both major bleeding and mortality rates have been reported to be significantly higher in patients with time in therapeutic range (TTR) less than 60% (3.85% and 4.20%, respectively) compared with those with TTR above 75% (1.58% and 1.69%, respectively).[22]

Good anticoagulation control may be better obtained by monitoring the treatment at specialized coagulation services. A recent meta-analysis showed that self-monitoring for oral anticoagulation could significantly reduce the occurrence of thromboembolic events (hazard ratio [HR], 0.51; 95% CI, 0.31–0.85), but not the incidence of major hemorrhagic events (HR, 0.88; 95% CI, 0.74–1.06).[23-25] Besides, point-of-care testing also did not improve TTR.

Patient-related factors Age Advanced age is associated with increased risk for major hemorrhage.[26] The cumulative incidence of major hemorrhage in AF patients on warfarin is 13.1 per 100 patient-years when older than 80 years of age compared with 4.7 per 100 patient-years for those younger than 80 years. Accordingly, the risk of ICH in patients at 85 years of age or older has been reported to be significantly higher compared with patients in the 70–74 age group (adjusted odds ratio, 2.5; 95% CI, 1.3–4.7).[26-28] Combined warfarin-antiplatelet therapy and higher INR threshold further increase the bleeding risk in elderly patients on OAC.[29]

Genetic factors Current research on genetic predisposition to OAC-related bleeding mainly focus on P450 2C9 and vitamin K epoxide reductase complex subunit 1 gene (VKORC1). However, it is known that at least 30 genes are involved in the metabolism and action of warfarin. P450 2C9 variants were found to cause delayed stabilization of VKA treatment[13] that resulted in significantly more time above the therapeutic INR range in the initial phase of treatment, and higher risk of INR values above 5.0 as compared with noncarrier patients. VKORC1 is also associated with sensitivity to VKAs. Based on the association between the risk of bleeding and P450 2C9 or VKORC1 genotypes, several dosing algorithms have been proposed, but have not yet been applied in clinical practice.

Comorbidities History of bleeding events, anemia, prior stroke, uncontrolled hypertension, hepatic and renal impairment have been identified as risk factors for OAC-related bleeding. Previous bleeding is the most potent predictor of recurrent hemorrhage. Systolic blood pressure of 140 mmHg or greater increases the risk of both hemorrhagic and ischemic stroke among individuals with AF.[13,29] Hepatic or renal impairment might double the risk of bleeding. Congestive heart failure and diabetes have been also identified as conditions associated with major bleeding.[16]

Concomitant medications Antiplatelet agents are the most important concomitant medications among patients on OACs, which might increase the risk of major bleeding. It was reported that the relative risk of major bleeding in patients with VKA and aspirin was 2.5 (95% CI, 1.7–3.7). In a large cohort study of 82,854 patients with AF, the incidence of bleeding was 6.9 per 100 patient-years among patients on aspirin and warfarin, 13.9 per 100 patient-years among patients on clopidogrel and warfarin, 15.7 per 100 patient-years among patients on triple antithrombotic therapy (aspirin, clopidogrel, and warfarin).[30] Compared with warfarin monotherapy, triple antithrombotic therapy increased more than 3-fold the risk of both nonfatal and fatal bleeding. Additionally, nonsteroidal anti-inflammatory drugs (NSAIDs) are associated with an enhanced risk of gastrointestinal bleeding. Selective inhibitors of cyclooxygenase-2 are not associated with lower risk of bleeding compared with conventional NSAIDs. Alcohol abuse, patient's frailty, and biological age also influence the risk of OAC-related bleeding.

Calculating bleeding risk OAC-related bleeding is a multifactorial condition. Factors that increase bleeding risk often overlap with stroke risk factors. Moreover, many risk factors for bleeding are transient, such as variable INR values, operations, vascular procedures, and drug-drug or food-drug interactions. Consequently, estimation of bleeding risk is much more complex than thromboembolic risk assessment. Several bleeding risk schemas have been developed to assess the bleeding risk in OAC treated patients, including the modified Outpatient Bleeding Risk Index (mOBRI), the HEMORR$_2$HAGES score, the Shireman's schema, the ATRIA score, and the HAS-BLED score. Age and history of bleeds have been included as variables in all of these schemas. Previous stroke (mOBRI, HEMORR$_2$HAGES, HAS-BLED) and anemia (mOBRI, HEMORR$_2$HAGES, Shireman's schema, and ATRIA) are included in most schemas. Annual rates of major bleeding events predicted by the bleeding risk schemas vary from 0.8% to 3% at low risk, 2.0% to 8% at intermediate risk, and 4.9% to 30% at high risk.[31,32]

mOBRI has been validated on prospective data, while other prediction schemas were developed and validated retrospectively. The Shireman's schema has a disadvantage of short follow-up (90 days), complex mathematical calculation, and noninclusion of concomitant medication. Besides, anticoagulant control data are not included in the Shireman's schema or HEMORR$_2$HAGES. The simple HAS-BLED score has been derived and validated in patients with AF and has demonstrated good predictive performance in its validation cohort (c-statistic, 0.72).[33-36] The ATRIA score includes similar components as other scores (such as anemia, renal disease, age, prior bleeding, and hypertension), but assigns weighing (thus, more complex) to various risk factors.[37]

Patient preferences Patient preferences are of great importance in deciding on stroke prevention therapy. Patient values and preferences in the decision-making process are highly valued by most health care systems worldwide. The best therapeutic strategy will have to be individually determined, following discussion of the pros and cons of antithrombotic treatment. A variety of decision-aiding tools has been developed to help patients participate in the decision-making process. In any case, simple individualized information on antithrombotic treatment and the potential compilations has to be provided to every patient prior to the initiation of OAC.

Special situations with additional bleeding risk consideration **Catheter ablation** The bleeding risk associated with catheter ablation is small; however, when it does occur, catheter ablation-related bleeding events are severe.[38] According to a recent worldwide survey, catheter ablation for AF was associated with 1% risk for stroke/transient ischemic attack, 1% risk for cardiac tamponade, and 1%–2% risk for access site bleed.[38] Higher complication rates have been reported for elderly patients (aged >65 years) undergoing an electrophysiological study or radiofrequency ablation.[38,39]

Bleeding events appear to be related to periprocedural mechanical factors rather than pre- or periprocedural antithrombotic therapy. In 2008, the EHRA recommended cessation of warfarin 4 to 5 days before the ablation procedure followed by bridging with heparin. Recently, uninterrupted OAC is advocated to be a relatively safe alternative strategy.[40-42] Following an AF ablation patients should continue anticoagulant therapy at least 2 to 3 months, and the EHRA and ESC guidelines recommend long-term anticoagulation after ablation based on the patients stroke risk profile, with continuation of OACs if the CHA_2DS_2VASc score is 2 or higher.[1]

Peri-devices (implantable cardioverter defibrillators, pacemakers) In high-risk patients (patients with high stroke risk score or mechanical prosthetic heart valves) scheduled for elective implantation or replacement of a pacemaker or an implantable cardioverter defibrillator, it may be appropriate to interrupt anticoagulant and substitute VKAs with unfractionated heparin (UFH) or low-molecular-weight heparin (LMWH) to prevent thrombosis. However, for patients with high risk of bleeding, the consensus of the Task Force for the 2010 ESC guidelines advocates that anticoagulation may be interrupted temporarily for procedures without bridging therapy.[1] There is evidence that in patients with nonvalvular AF, postoperative high-dose heparinization or postoperative LMWH bridging substantially increases the risk for hematomas (10%–20% vs. 2%–8%) without reducing the rate of arterial embolism within the first month after implantation.[43] Thus, balancing the risk of bleeding against the risk of TE is recommended before implantation procedures. Interruption of anticoagulation preoperatively with heparin bridging should be considered only if needed.

Acute coronary syndromes and coronary angiography/intervention Factors affecting the bleeding risk when performing coronary angiography or percutaneous coronary intervention in patients on OAC can be classified into patient-related (older age, female, smoking, chronic kidney), coronary anatomy-related (left main, three-vessel disease), and antithrombotic therapy-related (triple antithrombotic therapy, most often OAC, aspirin, and clopidogrel, additional use of glycoprotein IIb/IIIa inhibitors, and INR >2.6). Radial instead of femoral access may lead to fewer access-site bleedings, while femoral closure devices have not been associated with reduced bleeding events compared with manual compression.[44]

Drug-eluting stents (DES) are associated with a more prolonged antithrombotic combination therapy compared with bare metal stents (BMS). After an elective procedure triple therapy with clopidogrel, aspirin, and warfarin is required for 1 month in patients with BMS, at least 3 months with a "-limus" (sirolimus, everolimus, tacrolimus)-eluting stent, and at least 6 months after a paclitaxel-eluting stent.[45-48]

In respect to periprocedural OAC therapy, an uninterrupted strategy can be followed, for patients at moderate-high or very high risk of TE. Radial access should be also preferred. When UFH or bivalirudin are combined with dual-antiplatelet therapy, for example, in patients with acute ST elevation myocardial infarction referred for percutaneous coronary intervention, INR should be ideally limited to 2 or less. Moreover, prasugrel, ticagrelor may further increase peri-interventional bleeding rates in this setting.

In the absence of clinical trial data, expert opinion suggests: 1) avoid the use of DES for patients who require triple antithrombotic therapy; 2) when OAC is given in combination with clopidogrel and/or low-dose aspirin, the intensity must be carefully regulated, with a target INR of 2.0–2.5; and 3) in the case of combined

TABLE 2 Consensus statements for bleeding risk assessment and management in atrial fibrillation patients. Adapted from the Position Document from the European Heart Rhythm Association, endorsed by the European Society of Cardiology (ESC) Working Group on Thrombosis

general AF populations
1. In most patients, thromboembolic rates without anticoagulation are markedly (5- to 8-fold) higher than bleeding rates. Therefore, most patients with AF, including the majority of patients at high bleeding risk, are in need of anticoagulant therapy.
2. For AF patients requiring permanent effective anticoagulation, it is recommended that the 2010 ESC Guidelines for the management of patients with AF be applied.
3. The bleeding risk with aspirin should be considered as similar to that with VKA, especially in the elderly.
4. Most patients with a high CHA_2DS_2VASc score would benefit from OAC even if their bleeding risk is high. Only in rare patients with a relatively low stroke risk and an extremely increased risk of bleeding may the withholding of OAC be considered.
5. An assessment of the (long-term) risk of bleeding in the general AF population is recommended.
6. In specific AF patient subsets (i.e., postablation, post-LAA closure, postpercutaneous coronary intervention/acute coronary syndrome, etc.), the assessment of bleeding risk is part of overall management, balancing this risk against the risk of thromboembolic complications.
7. The HAS-BLED score should be considered as a calculation to assess bleeding risk, whereby a score of ≥3 indicates "high risk" and some caution and regular review is needed, following the initiation of antithrombotic therapy, whether with OAC or antiplatelet drugs.
periablation
1. Start OAC (e.g., VKA, such as warfarin INR 2.0–3.0) for at least 4 weeks prior to the ablation procedure.
2. In many cases, OAC can be continued throughout the ablation procedure.
3. Where a bridging strategy is planned, stop VKA 2–5 days before the ablation procedure and bridging therapy with heparin (either LMWH or UFH) until the day before the ablation procedure.
4. Periprocedural anticoagulation: after sheath insertion and transseptal puncture, administration of a bolus of intravenous (IV) heparin (bolus dose empirically 5000–10,000 U or 50–100 U/kg) followed by continuous infusion of 1000–1500 U/h to achieve an ACT at least in excess of 300 s that is checked every 30–45 min. On the completion of the procedure, IV heparin is discontinued and sheaths removed when the ACT is subtherapeutic (<160 s) or if high, reversed by protamine. IV heparin to be resumed for 12–24 h at a maintenance dose of 1000 U/h without a bolus that will maintain activated partial thromboplastin time at 60–80 s or at least twice the baseline level. OAC to be resumed on the day of the procedure.
5. Replace IV heparin with subcutaneous LMWH after 12–24 h and reinitiate OAC. Stop LMWH when the target INR 2–3 is reached.
6. Continue therapeutic warfarin for a minimum of 12 weeks after the ablation procedure. Patients who have a CHA_2DS_2VASc score of ≥2 should continue OAC long term.
peri-devices (implantable cardioverter defibrillators, pacemakers)
1. Implant of devices maintaining OAC may be as safe as bridging with heparin infusion and should allow a significant reduction of in-hospital stay.
2. In some circumstances, anticoagulant treatment should be interrupted preoperatively and be replaced by heparin.
3. If implantation must be performed while on anticoagulant (whether maintaining OAC or bridging with heparin infusion) and/or antiplatelet therapy, the procedure should be carried out by an experienced operator who will pay close attention to hemostasis in the area of the generator pocket.
presentation with ACS and/or requiring PCI/stents
1. For antithrombotic therapy management in anticoagulated AF patients presenting with an ACS and/or undergoing PCI/stenting, the recommendations in the 2010 ESC Guidelines for the management of patients with AF or the ESC thrombosis working group consensus document should be applied.
management of bleeding complications
1. Appropriate strategies should be implemented both in the long term and peri-intervention to prevent bleeding.
2. Bleeding risk assessment should be regularly performed, during regular review of the patient. Correctable bleeding risk factors should be managed.

Abbreviations: ACS – acute coronary syndrome, ACT – activated clotting time, AF – atrial fibrillation, ESC – European Society of Cardiology, INR – international normalized ratio, LAA – left atrial appendage, LMWH – low-molecular-weight heparin, OAC – oral anticoagulant, PCI – percutaneous coronary intervention, UFH – unfractionated heparin

antithrombotic strategies, gastric protection is recommended at least for the duration of combination therapy.[7]

Managing bleeding complications Management of major bleeding aims to sustain adequate circulation, achieve local control of the bleeding site (e.g., endoscopic treatment or surgical hemostasis), and proper transfusion procedures. Vitamin K is the most effective intervention to counteract the effect of VKAs.

When correcting major bleeding caused by VKAs, signs of bleeding, INR value, half-lives of different VKAs, and the different routes of administration of vitamin K (oral or parenteral) should be considered. After the administration of intravenous vitamin K, the INR will start to drop within 2 hours and will be completely normalized within 12 to 16 hours[44]; and after oral administration it will take up to 24 hours to normalize the INR.[3] Intramuscular administration of vitamin K should be avoided in patients on OAC. A dose of 2.5 to 5 mg of vitamin K has been proposed when the INR is less than 7, whereas a dose of 5 to 10 mg may be required for patients with higher INRs. Notably, higher doses of vitamin K may lead to VKA resistance for more than 1 week.[3] Considering the large amount of plasma that is required for correcting the INR, it may be more useful to administer prothrombin complex concentrates.

Left atrial appendage closure may be an alternative measure in patients at high risk of embolic stroke and with contraindications for OAC, especially for those after an intracranial hemorrhage. Surgical and percutaneous catheter-based

procedures have been practiced into left atrial appendage (LAA) closure. It is currently recommended that the LAA may be removed to reduce the future stroke risk at the time of mitral valve surgery, as well as exclusion of the LAA during coronary artery bypass graft surgery, although the latter has suboptimal results. The WATCHMAN, AMPLATZER and Coherex WaveCrest are the recent developing devices for embolic protection in patients with AF.[49,50] However, further data are needed to assess the long-term stroke prevention and the risk-benefit ratio of this technique.

New oral anticoagulants Given the inherent limitations of VKAs, new OACs have been developed and evaluated for stroke prevention in patients with AF. Direct thrombin inhibitors (dabigatran) and direct factor Xa inhibitors (rivaroxaban, apixaban, edoxaban) have the advantage of targeting a specific component of the coagulation cascade, little potential for food or drug interactions, and administration in fixed doses without routine coagulation monitoring.[51]

In a recent modeling analysis based on the Danish National Patient Registry, dabigatran, rivaroxaban, and apixaban appeared to have a greater net clinical benefit than warfarin. Even in patients with $CHADS_2$ score of 0 and high bleeding risk, apixaban and dabigatran 110 mg twice daily had a positive net clinical benefit. At the CHA_2DS_2VASc score of 1, apixaban and both doses of dabigatran (110 mg and 150 mg twice daily) had a positive net clinical benefit. In patients with the $CHADS_2$ score of 1 or more or the CHA_2DS_2VASc of 2 or more, the 3 new OACs (dabigatran, rivaroxaban, and apixaban) appeared superior to warfarin for net clinical benefit, regardless of bleeding risk. Hemorrhagic risk was associated with the intensity of anticoagulation. The risk gradually increased from dabigatran 110 mg twice daily, to dabigatran 150 mg twice daily, to rivaroxaban. VKAs were associated with the highest hemorrhagic risk.[14]

Conclusion This document provides a comprehensive overview of bleeding risk factors, risk scoring systems, and approach to management of bleeding in patients with AF. Consensus statements from this document are shown in **TABLE 2**.

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ARTYKUŁ POGLĄDOWY

Krwawienie u chorego z migotaniem przedsionków – ocena ryzyka i postępowanie

Główne przesłania dla praktyki klinicznej ze stanowiska European Heart Rhythm Association

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SŁOWA KLUCZOWE

doustna antykoagulacja, krwawienie, migotanie przedsionków, ocena ryzyka

STRESZCZENIE

Zapobieganie powikłaniom zakrzepowo-zatorowym jest głównym celem terapeutycznym u chorych z migotaniem przedsionków (*atrial fibrillation* – AF). Wykazano dużą skuteczność antagonistów witaminy K w zapobieganiu incydentom zakrzepowo-zatorowym u tych chorych i mimo postępu badań nad antykoagulacją doustną w ostatnim czasie leki te wciąż stosuje się najczęściej. Leczenie przeciwkrzepliwe zwiększa ryzyko krwawienia, jednak w aspekcie zapobiegania udarowi mózgu korzyści kliniczne ze stosowania antagonistów witaminy K wyraźnie przewyższają potencjalne działania niekorzystne. Roczna zapadalność na poważne krwawienie wśród chorych z AF przyjmujących doustne antykoagulanty jest mocno zróżnicowana i mieści się w zakresie 1,3–7,2%. Na ryzyko krwawienia wpływ mają takie czynniki, jak intensywność antykoagulacji, skuteczność metod monitorowania oraz indywidualne cechy chorego. Ta wieloczynnikowa etiologia sprawia, że przewidywanie ryzyka krwawienia jest złożone i wymaga walidacji klinicznych narzędzi predykcyjnych służących do oceny całkowitego ryzyka krwawienia w praktyce klinicznej. Niniejszy artykuł przeglądowy zawiera podsumowanie danych zawartych w ostatnim uzgodnionym stanowisku European Heart Rhythm Association, dotyczących definicji, przewidywania ryzyka, zapobiegania i leczenia krwawień związanych z doustnym leczeniem przeciwkrzepliwym.

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