TABLE V.—*Modified risk stratifications for perioperative thromboembolism.*

Risk Stratum as per CHA_2DS_2-VASc Score	Indications for anticoagulant therapy		
	Mechanical heart valve	Atrial fibrillation	VTE
High risk* >10% annual risk for thromboembolism	• Any mitral valve prosthesis • Any caged-ball or tilting disc aortic valve prosthesis • Recent (within 6 months) stroke or transient ischemic attack	• CHA2DS2-VASc score>7 • Recent (within 3 months) stroke or transient ischemic attack • Rheumatic valvular heart disease	• Recent (within 3 months) VTE • Severe thrombophilia§
Moderated risk 5% to 10% annual risk for thromboembolism	• Bileaflet aortic valve prosthesis and one or more of the of following risk factors: atrial fibrillation, prior stroke or transient ischemic attack, hypertension, diabetes, congestive heart failure, age>75 years	• CHA2DS2-VASc score of 5-6	• VTE within the past 3-12 months • Non severe thrombophilia§§ • Recurrent VTE • Active cancer§§§
Low risk <5% annual risk for thromboembolism	• Bileaflet aortic valve prosthesis without atrial fibrillation and no other risk factors for stroke	• CHA2DS2-VASc score of 1 to 4 (assuming no prior stroke or transient ischemic attack)	• VTE>12 months previous and no other risk factors

VTE: venous thromboembolism; CHA_2DS_2-VASc: congestive heart failure, hypertension, age ≥75 years (2 points), diabetes mellitus, prior stroke or transient ischemic attack or thromboembolism (2 points), vascular disease (peripheral artery disease, myocardial infarction, or aortic plaque), age 65 to 74 years, sex category female.
*High-risk patients may also include those with a prior stroke or transient ischemic attack occurring >3 months before the planned surgery and a CHA_2DS_2-VASc score<5 (those with prior thromboembolism during temporary interruption of anticoagulation, or those undergoing specific types of surgery associated with an increased risk for stroke or other thromboembolism [*e.g.*, cardiac valve replacement, carotid endarterectomy, major vascular surgery]); §deficiency of protein C, protein S, or antithrombin; antiphospholipid antibodies; multiple abnormalities); §§heterozygous factor V Leiden or prothrombin gene mutation; §§§treated within 6 months or palliative.
[Adapted from Spyropoulos *et al.*[50]].

be made. Timing of anticoagulation hiatus is determined by the risk of periprocedural bleeding and the anticoagulant used. Patients at high risk of thrombosis require a bridging strategy with LMWH than in in those on vitamin K antagonists. Patients not deemed to be at high risk of thrombosis can avoid bridging and simply pause anticoagulation or at times continue with anticoagulation, have the procedure, and later restart anticoagulation once hemostasis is achieved after surgery. Studies reveal that, generally, stopping anticoagulation is noninferior than bridging and, at times, there is no benefit to bridging due to bleeding.[50-53]

Reversal of anticoagulation in emergent surgery is critical to prevent hemorrhage during surgery.[54, 55] Prothrombotic immediate reversal agents are needed in the treatment of life-threatening bleeding or anticipated severe bleeding in unplanned emergent major surgery. Each prothrombotic agent has a specific strategy for the reversal of either vitamin K antagonist or-DOACs. Unlike the reversal of vitamin K antagonists, the reversal of DOACs does not need coagulation tests as it is guided by pharmacokinetic dynamics during perioperative management. Due to the cost and thrombotic potential of DOAC reversal agents, reversal should only be considered if the bleeding risk associated with the procedure is high enough that intervention cannot be safely performed while the patient is anticoagulated or if surgery cannot be delayed due to an emergency. Since 2015, idarucizumab, a humanized monoclonal antibody fragment antidote for dabigatran anticoagulation, has been in use. Idarucizumab's reversal relies on dabigatran's higher affinity to it than to thrombin. Later, in 2018, andexanet alfa was approved for use as an antidote to reverse the anticoagulant effects of rivaroxaban and apixaban in life-threatening or major bleeding, however, its actions manifest via its binding to, and sequestering of, factor Xa inhibitors in circulation. Andexanet alfa is only licensed for use in patients treated with rivaroxaban or apixaban, however, in patients undergoing edoxaban therapy requiring urgent surgery with a need for a reversal agent, off-label treatment with andexanet alfa is acceptable.

Overview of topical hemostatic agents

Hemorrhage ensues if the vascular wall integrity gets disrupted ("blood comes from vessels"…).[56] External hemostatic dressings can be used to stop bleeding in emergency situations, such as major traumas, war, etc.[57] Intraoperatively, surgeons usually employ direct mechanical pressure or compression, thermoelectric cautery, and surgical ligation to stop bleeding.

Topical hemostats are often used as adjunctive measures to improve hemostasis during or after surgery.[58] Hemostatic agents have been developed relatively recently with the intent of facilitating hemostasis either by providing intravascular coagulation cascade component(s) or extravascular substrate(s).[59]

Topical hemostats include several product categories,