BOFAS Position statement on Venous Thromboembolism (VTE) – 2025

BOFAS recommends that all patients with foot and ankle injuries requiring immobilisation (with cast/splint/boot) and patients undergoing foot and ankle surgery should be individually risk assessed for risk of venous thromboembolism (VTE). If sufficient risk factors are present, VTE prophylaxis through mechanical and/or chemical interventions should be considered and weighed against the potential risks of the prophylaxis.

It appears that ROUTINE use of chemical thromboprophylaxis is not beneficial for low risk patients with foot and ankle injuries or those undergoing foot and ankle surgery (Malhotra et al 2024). Many risk factors for VTE have been identified. Patient factors such as previous history of venous thrombosis and increasing body mass index are associated with the highest risk of VTE (Mangwani et al 2015). Achilles ruptures are also associated with increased VTE risk, irrespective of non-operative or operative treatment methods (Mangwani et al 2023).

A multimodal approach to VTE prophylaxis should be adopted for patients at increased risk of a thromboembolic event. This includes addressing any modifiable risk factors, minimising immobilisation and encouraging early weight bearing where possible. The specific type of chemical thromboprophylaxis used should be in accordance with local hospital protocols, and the duration of prophylaxis is currently undefined. BOFAS recommends following good clinical practice of assessing each patient for their individual VTE risk, and documenting the discussion between the clinician and patient with the resultant VTE prophlaxis plan.

The Thromboprophylaxis in Lower Limb Immobilisation (TiLLI) study, evaluating the effectiveness of different methods of pharmacological prophylaxis for patients with temporary lower limb immoblisation, will provide additional evidence (Horner et al 2020). Further research is required on VTE prophylaxis in patients undergoing foot and ankle surgery.

References:

- Malhotra K, Houchen-Wolloff L, Mason L, Mangwani J. Characteristics of Patients Not Receiving Chemical Thromboprophylaxis Following Foot and Ankle Surgery: Data From the Multicenter, Prospective UK Foot and Ankle Thrombo-Embolism Audit (UK-FATE). Foot Ankle Int. 2024 Sep;45(9):943-949.

- Mangwani J, Sheikh N, Cichero M, Williamson D. What is the evidence for chemical thromboprophylaxis in foot and ankle surgery? Systematic review of the English literature. Vol. 25, Foot. Churchill Livingstone; 2015. p. 173–8.

- Mangwani J, Mason LW, Malhotra K, Houchen-Wolloff L. UK Foot and Ankle Thrombo-Embolism Audit (UK-FATE): A Multicentre Prospective Study of Venous Thromboembolism in Foot and Ankle Surgery. Foot Ankle Orthop. 2023 Dec 23;8(4):2473011423S00076. doi: 10.1177/2473011423S00076. PMCID: PMC10748749.

- Horner D, Goodacre S, Pandor A, et al. Thromboprophylaxis in lower limb immobilisation after injury (TiLLI). Emergency Medicine Journal 2020;37:36-41.

Summary of other guidance:

ICM 2022:

All the statements below had strong consensus or unanimous consensus at ICM 2022 statement.

1- Should patients undergoing surgical debridement of diabetic foot ulcers receive routine VTE prophylaxis?

Response/Recommendation:

There is currently no evidence in the literature to determine if a diabetic patient undergoing ulcer debridement requires venous thromboembolism (VTE) prophylaxis. There is, however, an increased risk for morbidity and mortality in diabetic foot ulcers (DFU) patients who develop VTE. Therefore, it is justified to propose that patients with DFU are given thromboprophylaxis, particularly if they have reduced mobility and other medical comorbidities. This may not be true for all cases of surgical debridement alone of DFU without additional interventions when prolonged limited weight-bearing is not required. – Limited evidence. 100% agree.

2 - Is routine VTE prophylaxis needed for patients placed in walker boot immobilization?

Response/Recommendation:

Patients in walker boot immobilization may be at increased risk of development of venous thromboembolism (VTE). Patients should be risk assessed, and VTE prophylaxis offered on an individual basis. – limited 96%.

3 - Does the weight-bearing status of the patient after foot and ankle surgery influence the selection of VTE prophylaxis?

Response/Recommendation:

Non-weight-bearing restrictions of the lower extremity are an independent risk factor for venous thromboembolic (VTE) events. This risk is mitigated by load-bearing of the operative limb greater than 50%. No additional conclusions can be made regarding the selection of VTE prophylaxis as it relates to non-weight-bearing based on the available literature. – limited 100% agree.

4 - Concerning VTE risk, which surgeries can be considered major, and which surgeries can be considered non-major in foot and ankle surgery?

Response/Recommendation:

There is insufficient data to characterize foot and ankle surgical procedures as either major or non-major risk with regard to postoperative venous thromboembolic (VTE) event risk. Certain diagnoses, such as achilles rupture, do seem to demonstrate a higher rate of VTE, but this may be independent of surgical or non-surgical management and instead relate to impaired venous return. Patient-specific risk factors are critical towards understanding the risk of VTE after foot and ankle (F&A) surgery, and may include age > 50 years, splint or cast immobilization, Charlson Comorbidity Index (CCI) > 2, varicose veins, history of VTE, hypercoagulability disorder, and inflammatory arthritis. – limited 100%.

5 - Is routine VTE prophylaxis required for patients undergoing forefoot and midfoot surgery who would be allowed to fully weight-bear?

Response/Recommendation:

The risk of venous thromboembolism (VTE) following forefoot and midfoot is rare, with pulmonary embolism (PE) and even more so, fatal PE being exceedingly rare. The rates appear to be lower in forefoot surgery as opposed to midfoot surgery, while both appear low. We do not recommend routine anticoagulants for VTE prevention following elective a forefoot and midfoot in low-risk patients, especially after immediate weight-bearing.

We do encourage further high-quality research into routine VTE chemoprophylaxis. – limited agree 100%.

6 - Is routine VTE prophylaxis needed for patients undergoing achilles tendon repair?

Response/Recommendation:

In the absence of concrete evidence, we recommend that venous thromboembolism (VTE) prophylaxis (mechanical and/or chemical) be administered to patients at high risk of VTE (as determined by the risk stratification scores), unless contraindicated. Routine administration of chemoprophylaxis for patients undergoing achilles repair is not supported with the current literature. – weak 100%.

7 - Is there a role for routine VTE prophylaxis undergoing ankle and/or hindfoot fusion?

Response/Recommendation:

The risk of venous thromboembolism (VTE) following ankle or hindfoot fusion surgery is rare, with pulmonary embolism (PE) and even more so, fatal PE being exceedingly rare. We cannot recommend routine anticoagulants for VTE prevention following elective ankle/hindfoot fusion in low-risk patients. We do encourage further high-quality research into routine VTE chemoprophylaxis following foot and ankle (F&A) surgery. – limited agree 96%.

8 - Is routine VTE prophylaxis required for patients undergoing total ankle arthroplasty?

Response/Recommendation:

There is contradictory data on the role of chemoprophylaxis for the prevention of venous thromboembolism (VTE) events after total ankle arthroplasty (TAA). VTE rates after TAA appear to be substantially lower than those after total hip or knee arthroplasty in the

absence of chemoprophylaxis, but they are certainly not negligible. Subpopulations of patients such as those with a prior history of VTE or known thrombophilia may be at sufficiently heightened risk to justify chemoprophylaxis. The implications of prolonged below-knee immobilization or non- weightbearing as well as the risk-benefit ratio of chemoprophylaxis in the perioperative setting needs to be further elucidated. – limited agree 100%.

AOFAS Position statement 2020:

There is currently insufficient data for the American Orthopaedic Foot & Ankle Society (AOFAS) to recommend for or against routine venous thromboembolic disease (VTED) prophylaxis for patients undergoing foot and ankle surgery. Further research in this field is both necessary and encouraged.

Background

VTED, encompassing both deep venous thrombosis (DVT) and pulmonary embolism (PE), is a potentially fatal complication of orthopedic surgery. In hip replacement surgery, for instance, the historical incidence of VTED in patients not receiving prophylaxis is as high as 69%. The incidence decreases dramatically with various prophylactic measures. Prophylaxis, however, especially by chemical means, is not without risk, including the risk of major bleeding. Clearly defining and studying VTED in patients undergoing foot and ankle surgery is difficult. First, VTED occurs in patients undergoing foot and ankle procedures with less frequency than in patients undergoing knee and hip arthroplasty. Also, in the surgical treatment of foot and ankle conditions, the procedures performed range widely including isolated toe surgery, arthroplasty, and major trauma surgery. This variability is compounded by the diversity of post-operative protocols, including the use of different levels of immobilization and weight bearing restrictions. Finally, analysis of VTED after foot and ankle surgery is complicated by the fact that the thrombotic endpoint varies in the literature (e.g. clinical versus phlebographic detection and proximal versus distal location). The existing literature regarding VTED after foot and ankle surgery is conflicting. In a group of patients who underwent Achilles tendon repair, the overall incidence of phlebographically confirmed DVT was 36% in patients not receiving prophylactic anticoagulation, 6% of which were proximal. These rates were not significantly different from those in the patients who did receive prophylactic anticoagulation with dalteparin. A retrospective study of 945 patients with Achilles ruptures treated non-operatively found an incidence of clinically identified DVT of 1.05% and PE of 0.32% without any prophylaxis. 2 Historical data from a randomized controlled

study of plaster immobilization following fracture has reported an incidence of symptomatic DVT of 4.3% without prophylaxis and a 0% incidence with prophylaxis. Meanwhile, a much larger study that examined clinically symptomatic disease reported a rate of VTED under 1% in over 45,000 patients undergoing ankle fracture surgery.10 Similarly, a study evaluating non-operative treatment of fractures distal to the knee with immobilization and no thromboprophylaxis found only 4 objectively confirmed VTEDs in a population of 1179 subjects. In a more diverse population of 2600 patients undergoing elective foot and ankle surgery over a 7 year time frame, the incidence of symptomatic VTED was between 0.42% and 1.43% with no difference between those treated with aspirin and those who received no prophylaxis. Guidelines from several different organizations are available to aid in directing clinical decision making, but these, too, are incomplete and contradictory. The United Kingdom's National Institute of Clinical Excellence (NICE) recommends anticoagulation following foot and ankle surgery when there will be prolonged immobilization, when surgical time is greater than 90 minutes or when risks of VTE outweighs the risk of bleeding. The American CHEST guidelines do not recommend use of prophylaxis in isolated lower leg injuries requiring leg immobilization. Neither of these guidelines clearly define best practice for elective foot and ankle surgery cases or the types of surgeries for which prophylaxis should be considered. Both recommendations agree on the importance of risk assessment specific to each patient when making a decision on the use of prophylaxis. The decision to implement anti-thrombotic prophylaxis, as well as the measures used to do so, should be based upon a patient specific risk/benefit analysis. This must take into consideration the patient's risk for VTED and the potential risks of the proposed prophylactic measures. There are several known risk factors for VTED. A personal history of thromboembolic disease and a hypercoagulable state have been identified as strong risk factors. Additional risk factors that have been cited include, but may not be limited to, history of recent malignancy, family history of VTED, obesity, oral contraceptive use, multi-trauma, age > 60 years, venous stasis/varicose veins, and prolonged immobilization. The amount of increased risk attributed to any individual risk factor has not been definitively defined and their correlation with any specific foot and ankle procedure has not been robustly investigated. Obesity, for instance, has not been shown to be an independent thrombotic

risk in all cases. Graded risk assessments have been used in other specialties but have not been validated in foot ankle surgery.

Risks and Benefits of VTED Prophylaxis

Mechanical prophylaxis such as elastic compression stockings and sequential compression calf pumps or foot pumps on the contralateral extremity can be utilized intraoperatively and continued post operatively through the duration of the hospital stay. While the true efficacy of this modality in foot and ankle surgery is unknown, complications are negligible and compression pumps may be considered in both the outpatient and inpatient setting. Whether there is a threshold duration of the surgical procedure for which these are beneficial is unknown, as is the optimal duration of their use post-operatively. An alternative for mechanical prophylaxis is the utilization of inferior vena cava (IVC) filters. Indications for these devices include patients at high risk for VTED with a specific contraindication to chemical anticoagulation and those who have sustained a pulmonary embolism despite therapeutic anticoagulation. IVC filters are not indicated as first line prevention against thrombosis or embolism and do not prevent the development of a deep vein thrombosis. They are also associated with the risk of significant complications, including vessel injury, hemorrhage, migration, fistula formation, pneumothorax, and thrombosis. Chemical prophylaxis includes the use of anti-coagulants such as warfarin, unfractionated heparin, and low molecular weight heparins (LMWHs). It also includes aspirin, which is an antiplatelet agent. Aspirin, warfarin, and LMWHs may be continued beyond the hospital or outpatient stay and, therefore, may offer more prolonged protection. The specific indications for the use of these agents in foot and ankle surgery, however, remain undefined. For instance, one investigation failed to demonstrate a statistically significant difference between the incidence of both proximal and distal DVT in patients who underwent Achilles tendon repair and were randomized to receive either dalteparin or placebo. Another investigation, however, demonstrated that in patients requiring prolonged immobilization for treatment of either an Achilles rupture or leg fracture, the use of riviparin resulted in a statistically significant decrease in the rate of distal, but not

proximal, DVT confirmed by venography. The extrapolation of either of these studies is limited due to their small numbers. Several larger, more recent studies have also found mixed results in rates of VTED prevention with the use of chemical prophylaxis. In a study of 1,540 ambulatory patients with ankle fractures requiring open reduction and internal fixation, the incidence of thromboembolic events was 2.99%, with 2.66% involving a deep venous thrombosis and 0.32% involving a nonfatal pulmonary embolism. The clinically detectable thromboembolic event was not influenced by the use of LMWH, warfarin, or no thromboprophylaxis. A British review examined rates of VTED in 2654 patients who underwent 2 or more weeks of immobilization and who were treated with either no prophylaxis (n=1576) or aspirin (n=1078). The overall incidence s of symptomatic VTE's in the two groups was 0.47% and 0.39%, respectively. When assuming all those patients lost to follow up had VTE, in the non-treatment group the rate only rose to 1.46%. A recent randomized, controlled double blinded study of 258 surgically managed isolated fractures below the knee compared dalteparin to placebo and found no statistically significant difference in the rates of VTED's (1.5% vs 2.3%, p=0.68). In fact, the study was cut short as they deemed that there was no additional benefit to treatment. It should be noted that, in all of these studies, patients identified as having increased risk for VTED's were excluded, making it difficult to extrapolate best practices for this population. Chemical prophylaxis has risks, including both major and minor bleeding events. Major 4 bleeding events, defined as those that require transfusion, can result in significant morbidity and even be life threatening. These include intra-ocular and intra-cranial bleeds, major bleeds at the surgical site and bleeding in the gastrointestinal tract. Minor bleeds do not require transfusion but can still result in substantial morbidity for the patient. Chemical anti-coagulation may also result in increased wound drainage and peri-incisional hematoma, which can contribute to longer hospital stays and increased risk of surgical site infection. Finally, heparin based chemoprophylaxis carries the specific risk of heparin induced thrombocytopenia (HIT), a potentially fatal side effect characterized by abnormal platelet activation. Patients with HIT may develop DVT, PE, leg ischemia, bleeding, stroke, and myocardial infarction. HIT has been reported to occur more frequently following orthopedic surgery compared to other types of surgery.

Conclusion

The exact risk of VTED in patients undergoing foot and ankle surgery remains unclear due to the wide variation in injuries, treatments and rehabilitation protocols. There is currently insufficient data to make broad recommendations for or against the use of routine VTED prophylaxis in patients undergoing foot and ankle surgery. We can recommend that a comprehensive assessment of risk factors should be performed to aid in the decision making process. If sufficient risk factors are present, VTED prophylaxis through mechanical and/or chemical interventions should be considered and weighed against the potential risks of prophylaxis. Exactly what constitutes sufficient risk, however, remains undetermined, especially in those patients without a strong risk factor. The AOFAS recognizes that further research in this field is necessary and strongly encourages future investigations into VTED in patients undergoing treatment for foot and ankle conditions.

Definitions

Venous thromboembolic disease (VTED) - A clinical spectrum of pathologic clotting that encompasses both deep venous thrombosis and pulmonary embolism (see below).

Deep venous thrombosis (DVT) - The formation of a blood clot, or thrombus, in one of the deep veins of the body.

Pulmonary embolism - A pulmonary embolism is a sudden blockage of one or more of the arteries in your lung by a blood clot that has travelled from another body part (e.g. the leg).

Mechanical prophylaxis - The use of external, physical devices to prevent the occurrence of VTED. These include elastic compression stockings worn on the legs and also sequential compression pumps that cause the blood to continue flowing through the veins of the leg.

Chemical prophylaxis - The use of pharmacologic agents to prevent the occurrence of VTED. These include medications taken by mouth (e.g. aspirin and warfarin) and those administered by an injection (enoxaparin).