Venous Thromboembolism and Postoperative Management of Anticoagulation

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KEYWORDS

• Deep venous thrombosis • Pulmonary embolism • Prevention

KEY POINTS

- The incidence of venous thromboembolism (VTE) after fracture repair has decreased over time, as a result of improved surgical technique and earlier mobilization.
- Hip fracture patients are considered to be in the highest risk category for VTE.
- All hip fracture patients should receive VTE prophylaxis, which may include pharmacologic and nonpharmacologic approaches.
- There are many pharmacologic options for VTE prophylaxis, and the choice should be based on each patient's characteristics and circumstances.
- Optimizing VTE prophylaxis requires consideration of both the risk of thromboembolism and bleeding risk.

INTRODUCTION/EPIDEMIOLOGY

The reported risk of venous thromboembolism (VTE) following hip fracture repair is substantial, but varies depending on how it was measured and when the study was completed. Earlier studies, which were placebo-controlled, showed that the incidence of VTE without prophylaxis ranged from 46% to 75%[1–4]; however, many of these cases were determined through screening and were asymptomatic. The incidence of proximal deep venous thrombosis (DVT) is 27% without prophylaxis,[5] and the rate of fatal pulmonary embolism (PE) has been estimated previously at 1.9%.[6] VTE is the second most common complication following hip fracture surgery.[7] Because of this, the American College of Chest Physicians (ACCP) puts hip fracture patients in the highest risk group.[8]

The incidence of VTE has decreased over time, as a result of improved surgical techniques, reductions in time to surgery, and earlier mobilization. Still, without

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prophylaxis, current estimates for symptomatic VTE are 4.3% within 35 days of surgery, with symptomatic DVT and PE incidence of 1.8% and 1%, respectively, in the first 10 to 14 days following surgery.[9] With low molecular weight heparin (LMWH) treatment for 35 days, the incidence of symptomatic VTE is reduced to 1.8% (ie, a number needed to treat [NNT] of 40).

The rationale for thromboprophylaxis is multifold.[8] As described previously, VTE following hip fracture surgery is common, and usually silent. Screening patients who are at risk is neither effective nor cost-effective. Morbidity (including symptomatic DVT and PE and postphlebitic syndrome) and mortality are high. Finally, thromboprophylaxis is effective at preventing symptomatic VTE and fatal PE, and has repeatedly been shown to be cost-effective.

The process of developing VTE starts early. In 1 study, 62% of those who waited 48 hours or more for surgery had venographic evidence of DVT.[10] However, the presentation of symptoms is often delayed until after the initial hospitalization.[11] In 1 study, patients presented with DVT or PE a median of 24 days and 17 days after surgery, respectively.[12]

Hip fracture patients have many reasons for being at risk for VTE. Virchow triad requires the development of at least one of the following: venous stasis, vascular intimal injury, and hypercoagulable state.[13] Following a hip fracture, patients can develop venous stasis due to immobility, as well as from supine positioning for surgery. Vascular intimal injury may occur at the time of the fracture or during surgery. A transient hypercoagulable state may occur from the release of tissue factors.

PATIENT EVALUATION OVERVIEW

The first step in evaluating patients for postoperative anticoagulation is to determine both their risk of VTE as well as their risk of bleeding. In addition to the risks common to all hip fracture patients, other factors increase risk further (**Box 1**). A history of malignancy increases risk of VTE, and metastatic disease confers higher risk than localized disease.[14] Certain malignancies, such as pancreatic and stomach malignancies,

Box 1
Risk factors for VTE

Patient characteristics

- Age ≥85
- Malignancy
- Previous VTE
- Obesity
- Congestive heart failure
- Charlson comorbidity score ≥3
- Paralysis
- Presence of an inhibitor deficiency state

Surgical characteristics

- Surgical delay
- Prolonged surgery
- Extracapsular fracture