Examination of venous thromboembolism prophylaxis in patients undergoing total knee arthroplasty

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Elective total knee arthroplasty (TKA) is the most frequently performed surgery in the United States. Complications of this procedure include deep vein thrombosis (DVT) and pulmonary embolism (PE), which are the most common complications of knee arthroplasty. Various pharmacological agents exist for VTE prophylaxis. Warfarin and low-molecular-weight heparins (LMWH) are commonly used for VTE prophylaxis in the past, but with the emergence of novel anticoagulants including factor Xa inhibitors and direct thrombin inhibitors (DTIs), warfarin is used far less frequently. Aspirin is also approved for VTE prophylaxis. The purpose of this study was to determine whether a superior drug or combination of drugs existed for VTE prophylaxis based on patient outcomes, cost effectiveness, and risk profile. This review of literature and study was performed over the past 10 years compared aspirin, warfarin, Lovenox, and the novel anticoagulants for VTE prophylaxis in post-operative TKA studies. Study outcomes included VTE prophylaxis, bleeding risk, and cost. Reversal agents were also examined. Findings of this author’s literature review demonstrated that, currently, no one superiority is established for prophylaxis of VTE events in patients undergoing TKA (Calti et al., 2017). However, current research indicates that both factor Xa inhibitors and aspirin have emerged as the medications of choice. The combination of aspirin and unfractionated heparin or LMWH is a common practice worldwide. However, aspirin is often considered as an inadequate alternative for prophylaxis in patients undergoing TKA (Calti et al., 2017). Currently, aspirin is the only medication approved for VTE prophylaxis in patients undergoing TKA. However, due to its multiple potential drug interactions, frequent required laboratory monitoring of the INR, and difficulty maintaining a therapeutic INR, warfarin is being used far less frequently. Clinicians have been favoring a combination of factor Xa inhibitors and both of these agents being endorsed by the AAOS and AACP as sole options for management of VTE prophylaxis in patients undergoing TKA. Studies, as discussed above, have demonstrated the superiority of aspirin and factor Xa inhibitors over LMWH and warfarin in terms of efficacy of DVT prevention. Factor Xa inhibitors are cost-effective and demonstrate an increased bleeding risk compared to aspirin. Neither drug requires laboratory monitoring, and one daily and twice daily dosing options are available for both drugs.

After extensive review of the literature, this author’s opinion is that, in low risk patients undergoing TKA, aspirin is a safe and effective thromboprophylactic agent. However, this agent has a limited risk profile, is cost-effective and available over the counter, and does not require laboratory monitoring. The dosing regimen is simple and consists of one 81 mg tablet twice daily for six weeks postoperatively. Further, in the case of overdose, a reversal agent is available. Clinicians must be prudent in analyzing each patient’s DVT risk preoperatively so as to choose the most superior prophylactic agent based on the patient’s history and anticipated period of immobilization.

Introduction

Elective total knee arthroplasty (TKA) is the most frequently performed inpatient surgical procedure in the United States, with an estimated 700,000 TKA procedures performed in 2010 and a projected 3.48 million procedures per year by 2050 (Katz, Los, Moser, & Halpern, 2007). With well-known complications of this procedure include DVT and PE, commonly referred to as VTE. VTE events place a large burden on patients’ medical history, must be considered when considering a patient’s anticoagulation regimen. Literature has demonstrated the greatest cost effectiveness with the fewest risks.

Literature Review

Literature Review

An online database search of PubMed, Dynamed, Cochrane, and Science Direct was performed. Studies were included if the patient population underwent a TKA, received surgical intervention, and did not have a prior history of valve repair or preexisting condition requiring prior anticoagulation therapy.

Stewart et al. (2013) evaluated the suitability of aspirin in prevention of VTE in high-risk orthopedic surgery patients. After analysis, researchers were unable to conclude whether aspirin was a safe and effective option for VTE prophylaxis in high-risk patients undergoing TKA, or hip fracture surgery. They concluded that there was insufficient evidence for practitioners to use aspirin as the sole means of VTE prophylaxis, but not enough evidence remained to rule out the use of a coxib use of aspirin for practitioners who currently use a more potent antiplatelet agent.

Neumann et al. (2012) evaluated the risks and benefits of oral direct factor Xa inhibitors versus LMWH in patients undergoing TKA. The factor Xa inhibitors did show a significant reduction in symptomatic DVTs compared to enoxaparin.

Bala et al. (2017) performed a study utilizing Humana and Medicare databases from 2007 to 2013 to evaluate outcomes of TKA procedures. The purpose of this study was to determine whether differences in VTE incidence existed for patients undergoing TKA’s depending on whether they were administered aspirin, warfarin, enoxaparin, or factor Xa inhibitors.

The authors concluded factor Xa inhibitors were associated with the lowest incidence of DVT and PE at 90 days post surgery. At two weeks and at 30 days, aspirin had the lowest DVT incidence. At six weeks, both aspirin and factor Xa inhibitors shared the lowest incidence of DVT.

Calti et al. (2017) evaluated the safety and efficacy of aspirin, LMWH, factor Xa inhibitors, and vitamin K antagonists for prophylaxis following TKA.

The researchers concluded that a lack of evidence existed to indicate the superiority of any agent relative to aspirin.