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REVIEW ARTICLE

SYNOPSIS OF DEEP VEIN THROMBOSIS TREATMENT IN TOTAL KNEE ARTHROPLASTY

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ABSTRACT

The goal of deep vein thrombosis prophylaxis is prevention of mortality and multiple other major or minor complications resulting from venous thromboembolic events. Many guidelines have been proposed and available for ready reference and are also rigidly followed in patients undergoing knee arthroplasties. The medicolegal ramifications of obviating the deep vein thrombosis prophylaxis is immense. We take a review of all the available medications and treatments modalities including mechanical devices in the present article.

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INTRODUCTION

Total knee replacement (TKR) is a safe surgical procedure to relief pain and amelioratelimited function caused by severe arthritis, if nonsurgical treatments are no longer helpful. However some complications may occur. One potential complication is deep vein thrombosis (DVT). There are some risk factor for DVT development:age older than 60 years, obesity, use of oral contraceptives, patch, or hormone replacement therapy, varicose veins, inflammatory bowel disease, history of DVT or pulmonary embolism (PE), family history of thrombosis, and prolonged tourniquet time. White *et al*. (1998) reported that the incidence of DVT plus PE was 2.1 % in 24,059 primary TKR. Thereby is important to provide ways to prevent DVT event. Basically there are mechanical and pharmacological methods used for DVT prevention.

MECHANICAL METHODS

Patient early mobilization is the simplest and costless way to prevent thrombus formation. There are some modalities of DVT prevention with mechanical methods. Intermittent pneumatic compression is used to diminish venous stasis, enhance blood flow speed, and to raise circulating fibrinolysins' level. Venous foot pumps may simulate the physiological pump action on the venous plexus that happens during weight bear and walking and thus may increase venous flow. Compression stockings promote gently pressure to the legs for excessive blood accumulation prevention. However mechanical compression are usually less efficacious to demote DVT prevalence than pharmacologic methods. They can be used in patients who are at high risk of bleeding or combined to pharmacologic methods.

Pharmacological Methods of DVT Prevention

Some medical specialties attempted to creat a practical clinical guide to prevent DVT occurrence. The first one was done by the American College of Chest Physicians (ACCP), in 1985. This guide had two levels of recommendation. The most effective was based in randomized controlled trials with consistent results. The drugs that matched this indications was warfarin with an International Normalised Ratio (INR) of 2 to 3, low-molecular-weigh the parin and fondaparinux. On the other hand there is the concern that the INR of 2 to 3 might be high for orthopaedic surgeries and the use of drugs indicated to obtain this level regardless patients' risk profile could place someone with relative low risk of DVT to a hazard for bleeding (Barrack, 2012). Also there is a very low correlation between

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the presence of DVT and PE and the significance of asymptomatic DVT is questioned (Parvizi *et al*., 2010). In 2011 the American Academy of Orthopaedic Surgeons published a guideline on preventing venous thromboembolic disease (VTD) in patients undergoing elective hip and knee arthroplasty (Jacobs *et al*., 2012). Their recommendation are the use of pharmacologic agents and/or mechanical compressive devices for the prevention of VTD in patients who are not at elevated risk beyond that of the surgery itself for venous thromboembolism or bleeding. For patients who have had a previous venous thromboembolism, pharmacologic prophylaxis and mechanical compressive devices are indicated. For those who also have a known bleeding disorder and/or active liver disease, they suggest the use mechanical compressive devices only. Drugs precribed to prevent thrombi formation or growing are labeled antithrombotics and they consist of antiplatelet and anticoagulants drugs. Aspirin is an effective antiplatelet drug. Some studies related excellent results of aspirin use, with or without mechanical compression to prevent DVT, especially in TKR (Bozic *et al*., 2010; Callaghan *et al*., 2008; Lotke and Lonner, 2006). The recommended prescription is 325 mg twice a day. Coumarins (warfarin) are antagonists to vitamin K oral anticoagulant drugs. There are some disadvantages of warfarin use : long time to action begining, long half-life, INR control requirement, and common interaction with diety. Low Molecular Weight Heparin (LMWH) are anticoagulants drugs that have high activity anti-factor Xa e low activity anti-IIa or antithrombin. LMWHs may reduce DVT risk in 70-80% without an increase in major bleeding events. Enoxaparinis aLMWH utilized , in a dose of 40 to 60 mg subcutaneous (SC) daily. Fondaparinux is a factor Xa synthetic specific inhibitor. In a study comparing fondaparinux to enoxaparin it showed to be more effective in preventing DVT after TKR, but patients had more frequent episodes of major bleeding (Bauer *et al*., 2001). The recommended dosage is 2.5 mg SC daily. Rivaroxaban is a direct factor Xa inhibitor. In a randomized, double-blind trial, with 2531 patients rivaroxaban was superior to enoxaparin for VTD after TKR, with similar rates of bleeding (Lassen *et al*., 2008). The usual prescription is 10 mg once a day orally. Dabigatran is an indirect thrombin inhibitor. The proposed dosage for TKR is 110 mg, one to four hours after the surgery, then 110 mg twice a day for 10 days. In a study with 1728 patients undergoing primary joint replacement, the use of dabigatran led to a significant increase in post-operative wound leakage. The rate of thromboembolism in patients receiving dabigatran was higher than in those receiving LMWH low molecular weight heparin and aspirin (Bloch *et al*., 2014). Because of the increased risk of bleeding complications several experienced surgeon who perform joint arthroplasty advise caution with the use of anticoagulants (Callaghan *et al*., 2005). It was reported that clinical PE happens despite the use of heparin, ximelagatran, fondaparinux, or rivaroxaban and their use may lead to higher mortality (Sharrock *et al*., 2008). Currently the trend is to keep the pharmacological prevention for two weeks only, since 88.8% of PE are supposed to come about in the postoperative first week (Parvizi *et al*., 2012).

In summary, when performing total knee replacement surgeons must be aware of potential DVT risk. Early mobilization and mechanical methods of prevention may be used. Risk and benefit of pharmacological methods should be discussed with patients. If, on the one hand, the goal is preventing DVT occurrence, conversely avoid bleeding complications is essencial.

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