THROMBOPROPHYLAXIS AFTER TOTAL KNEE ARTHROPLASTY

An Essay
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صدق الله العظيم

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List of Abbreviations

AAOS	American Academy of Orthopedic Surgeons
AC	anticoagulant
ACCP	American College of Chest Physicians
aPPT	activated partial thromboplastin time
ASRA	American Society of Regional Anesthesia
AT	antithrombin
COX	cyclo oxygenase
CTPH	chronic thromboembolic pulmonary hypertension
d	Dalton
Disc AC	discontinuation of anticoagulant
DVT	deep venous thrombosis
ESA	European Society of Anesthesiology
GCS	graduated compression stockings
GI	gastrointestinal
HIT	heparin induced thrombocytopenia
hrs	hours

HRT	hormone replacement therapy
HT	hormonal therapy
ICU	intensive care unit
IgG	Immunoglobulin G
INR	International Normalized Ratio
IPCD	intermittent pneumatic compression device
IU/kg	international unit per kilogram
iv	intravenous
IVC	inferior vena cava
LDUH	low dose unfractionated heparin
LMWH	low molecular weight heparin
mg/d	milligram per day
mmHg	millimeter mercury
PE	pulmonary embolism
PTS	post thrombotic syndrome
RA	rheumatoid arthritis
sc	subcutaneous
THA	total hip arthroplasty
TKA	total knee arthroplasty

t-PA	tissue plasminogen activator
UFH	unfractionated heparin
U/kg/d	unit per kilogram per day
VFP	venous foot pump
VKA	vitamin K antagonist
VTE	venous thromboembolism
VVs	varicose veins

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INTRODUCTION

Total joint replacement surgery is one of the most common and successful treatments for all types of arthritis and other painful conditions of the hip or knee. It replaces destroyed or worn-out surfaces with new, uniform surfaces. In an arthritic knee the damaged ends of the bones and cartilage are replaced with metal and plastic surfaces that are shaped to simulate knee movement and function. (1)

Dramatic advancements in the knowledge of knee mechanics have led to design modifications that appear to be durable. Significant advances have occurred in the type and quality of the metals, polyethylene, and, more recently, ceramics used in the prosthesis manufacturing process, leading to improved longevity. As with most techniques in modern medicine, more and more patients are receiving the benefits of total knee arthroplasty (TKA). Approximately 130,000 knee replacements are performed every year in the United States.(2)

The primary indication for total knee arthroplasty is to relieve pain caused by severe arthritis. The pain should be significant and disabling .

Correction of significant deformity is an important indication but is rarely used as the primary indication for surgery.(3)

Deep Venous Thrombosis (DVT) is one of the most feared complications of total knee replacement surgery and potentially can be fatal if the thrombous embolises to the lungs. A DVT may be silent, presenting as a pulmonary embolism with shortness of breath, chest pain, and cyanosis, without limb symptoms. Alternatively, it may present with a painful calf or thigh usually 5-7 days postoperatively or earlier.(4)

The release of thromboplastins from dissected soft tissue and especially reamed bone, as well as venous stasis both during surgery and during relative postoperative immobility, provoke a high risk of thromboembolism.(5)

There is general agreement that prophylaxis against venous thromboembolism is necessary after total joint arthroplasty, but the ideal prophylactic regimen has not been identified. The selection of a prophylactic regimen is a balance between efficacy and safety.(6)

Without thromboprophylaxis , 40–60% of patients will develop objectively confirmed, hospital-acquired, asymptomatic, or symptomatic deep vein thrombosis.(7)

It is likely that early mobilization, careful surgical technique, and adequate rehydration will all reduce the risk of DVT after joint arthroplasty. Graduated compression stockings are of some benefit but must be well fitted. Mechanical foot or calf compressors are effective in total knee arthroplasty, although probably not quite as effective as the best pharmacological methods.(8)

Many pharmacologic agents are currently available to prevent thrombosis. Pharmacologic agents presently include warfarin, LMWH (low molecular weight heparin), fondaparinux, rivaroxaban, dabigatran,and apixaban.(9)

Although LMWHs are safe and effective as anticoagulants after THA and TKA, they require subcutaneous (sc.) administration. Fondaparinux, a synthetic pentasaccharide that inhibits thrombin generation by binding to anti-thrombin and selectively inhibiting factor Xa, also needs sc. administration.(10) Warfarin has the advantage of oral administration,

but has a narrow therapeutic window with unpredictable pharmacokinetics and pharmacodynamics. Regular coagulation monitoring and dose adjustment of warfarin is required to ensure optimal anticoagulation.(11)

The new oral anticoagulants; anti Xa agents rivaroxaban and apixaban, and the direct thrombin inhibitor dabigatran are now approved for prophylaxis against venous thromboembolism in patients undergoing knee replacement surgery.(12)

High risk orthopedic procedures place patients at risk for DVT. Therefore, prophylaxis with anticoagulant medications, as well as the adjunctive use of mechanical devices, is essential. The most effective treatment protocol for a patient must be determined on a case by case basis and account for the risk benefit ratio in each situation.(13)

Aim Of The Work

The aim of this work is to discuss the different methods of decreasing the incidence of deep venous thrombosis in patients undergoing total knee replacement surgery.