ORIGINAL ARTICLE

A shortened course of anticoagulation to treat deep venous thrombosis after total joint arthroplasty

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Abstract

Objective: To study whether the course of anticoagulation therapy in patients who have deep venous thrombosis (DVT) after total joint arthroplasty can be shortened with a minimal risk of recurrence.
Design: A case series.
Setting: Kingston General Hospital, a university-affiliated tertiary care centre.
Patients: Eleven patients who were found to have DVT after total hip or knee arthroplasty on colour duplex Doppler ultrasonography, who fulfilled the study criteria and gave their informed consent. Exclusion criteria included chronic predisposing factors for thromboembolic disease, revision arthroplasty and a previous DVT.
Interventions: Anticoagulation with warfarin to achieve an International Normalized Ratio of 2.0 to 2.5, adjusted 3 times a week until resolution of the DVT by duplex ultrasonography. Clinical and ultrasonographic evaluation at 1 year to monitor DVT recurrence.
Outcome measures: Resolution and recurrence of the DVT.
Results: All patients showed resolution of the DVT at their first follow-up ultrasonography (mean 34 days postoperatively). There was no clinical or ultrasonographic evidence of recurrence at 1 year.
Conclusion: Further study of a shorter course of anticoagulation therapy in patients who suffer DVT after joint arthroplasty should be considered.

Résumé

Objectif : Déterminer s'il est possible de raccourcir, tout en réduisant au minimum le risque de répétition, la durée de la thérapie aux anticoagulants chez les patients qui ont une thrombose veineuse profonde (TVP) après une arthroplastie totale d'une articulation.
Conception : Série de cas.
Contexte : Hôpital général de Kingston, centre de soins tertiaires affilé à une université.
Patients : Onze patients chez lesquels on a constaté une TVP après une arthroplastie totale de la hanche ou du genou, révélée par une échographie Doppler duplex couleur, et qui ont satisfait aux critères de l'étude et donné leur consentement éclairé. Les critères d'exclusion comprenaient des facteurs prédisposants chroniques à la thrombo-embolie, une arthroplastie de révision et une TVP antérieure.
Interventions : Anticoagulation à la warfarine afin de parvenir à un ratio normalisé international de 2,0 à 2,5, rajusté trois fois par semaine jusqu'à dissolution de la TVP par échographie duplex. Évaluation clinique et échographique à un an pour surveiller la répétition de la TVP.
Mesures de résultats : Disparition et réapparition de la TVP.
Résultats : La première échographie de suivi (en moyenne 34 jours après l'intervention) a montré la disparition de la TVP chez tous les patients. On n'a constaté aucune indication clinique ou échographique de répétition à un an.
Conclusion : Il faudrait envisager une étude plus poussée d'un traitement plus court aux anticoagulants chez des patients atteints d'une TVP après une arthroplastie d'une articulation.

Introduction

Deep venous thromboembolic disease is a common, potentially life-threatening complication of hip and knee arthroplasty. Consequently, anticoagulation prophylaxis is common practice postoperatively. Despite these measures, an estimated 2% to 12% of patients are found on screening to have deep venous thrombosis (DVT)[1] although the rate of symptomatic DVT is reported to be 1%.[2]

Treatment for DVT generally consists of anticoagulation. For an initial episode, recommendations for duration of therapy range from 3 to 6 months.[3,4] These recommendations however, are derived from studies using diverse patient populations in which many patients suffer from chronic predisposing factors for thromboembolic disease such as venous insufficiency, systemic lupus erythematosus, cancer and idiopathic venous thromboembolism.[4,5] Therefore, these guidelines may not be entirely applicable to patients exposed to a transient risk factor for DVT and specifically to joint arthroplasty. Anticoagulation therapy is itself associated with complications and potential morbidity and mortality.[6] If a shorter course of anticoagulation therapy was found to be effective, it would minimize the incidence of these complications while maintaining therapeutic benefit. The purpose of the study was to determine the results of a shortened duration of anticoagulation therapy for patients without chronic predisposing factors for thromboembolic disease who suffer DVTafter elective hip or knee arthroplasty. Arbitrary end points were used to determine the duration of anticoagulation treatment reported in the literature.[7] We hypothesize that in patients exposed to a transient risk factor for DVT, the restoration of normal venous flow in the deep venous system of both legs represents thrombus resolution and allows anticoagulation therapy to be stopped with minimal risk of recurrence. Therefore, we selected resolution of DVT on duplex ultrasonography as the end point in this study.

Patients and methods

The study population comprised patients who underwent primary hip or knee arthroplasty at Kingston General Hospital between April 1996 and September 1997 and who subsequently were found to have DVT. To provide a cohort with a transient risk factor, namely hip or knee arthroplasty only, patients were excluded if they had chronic predisposing factors for thromboembolic disease. Patients scheduled for revision arthroplasty were also excluded because of the possibility of prolonged surgery with more tissue disruption and postoperative restrictions on mobilization than those having a primary total joint replacement; we felt this could present an added risk for recurrent thromboembolism. Similarly, patients with a previous DVT were also excluded because of an added risk for recurrent thromboembolism.

During the study period, all postoperative hip and knee arthroplasty patients were screened for proximal DVT of both lower extremities, with a high-resolution colour duplex Doppler scanner having a 7.4 MHz linear array transducer and a self-adjusting 5 to 10 MHz probe. The proximal common femoral vein to the trifurcation of the popliteal vein was imaged. Calf veins were not studied. The criteria used for a positive diagnosis of DVTwere inability to fully compress the vein, absence of flow changes with a Valsalva maneuver or distal compression of the vein above and below the knee or thrombus visualization. DVT resolution was defined as normal venous flow and normal responses to compression.

All patients who underwent hip or knee arthroplasty were treated with warfarin for DVT prophylaxis. Warfarin dosage was adjusted to achieve an International Normalized Ratio (INR) for prothrombin time in the target range of 2.0 to 2.5.

Patients found to have proximal DVT despite anticoagulant prophylaxis were immediately given heparin intravenously if their INR was below the desired range 2.0 to 3.0. Warfarin therapy was continued and the dose was adjusted daily until control within the therapeutic range was achieved. Intravenous heparin was discontinued when the INR was above 2.0 for 2 consecutive days.

Patients who gave informed consent were then enrolled in the study and monitored for DVT resolution on duplex ultrasonography at monthly intervals. Warfarin dosage was adjusted 3 times a week on an outpatient basis to maintain the INR within the therapeutic range. Anticoagulation therapy was discontinued when duplex ultrasonography demonstrated

resolution of the DVT. Patients returned for repeat clinical and ultrasonographic evaluation at 1 year to monitor DVT recurrence. Patients were instructed to go to the Emergency Department immediately if at any time during the study they noted increasing leg pain or swelling or chest symptoms of pain or shortness of breath.

Of the 306 hip replacements and 272 knee replacements carried out during the study period, 12 patients were identified as satisfying the criteria for this study. Of these, 11 patients (4 men, 7 women) provided informed consent and were enrolled. The mean patient age was 69 years (range from 45 to 84 years). Eight patients underwent knee arthroplasty and 3 had total hip arthroplasty.

Results

A complete set of data was available for all 11 patients. Resolution of the DVT was noted at the first follow-up ultrasonography in all patients. The mean time from diagnosis to documented resolution was 34 days (range from 19 to 55 days). Chart review showed that there were no recurrences of DVT, pulmonary embolism, bleeding complications or death before the 1-year follow-up appointment. All patients returned for 1-year follow up at which time there was no evidence of recurrence.

Discussion

DVT and subsequent pulmonary embolism is the most common cause of death after total joint arthroplasty.[1] The treatment of DVT is also associated with hemorrhagic complications, the incidence of which has been shown to be directly related to the duration of therapy.[6] Patients maintained on oral anticoagulation therapy for the treatment of DVT also require regular blood determinations to monitor the INR. This is associated with added cost and patient inconvenience. Therefore, it is desirable to determine the minimum effective duration of therapy in an effort to minimize patient morbidity while maintaining therapeutic efficacy.

Currently, the optimal duration of anticoagulation therapy for an initial DVT is a matter of debate, with the recommended treatment time being 3 to 6 months.[3,4] These recommendations were derived from studies including diverse patient populations in which many had chronic predisposing factors for thromboembolic disease.

A study by Research Committee of the British Thoracic Society[8] found that the rate for recurrence of DVT or a pulmonary embolus postoperatively was 1.7% in the group treated with anticoagulation for 4 weeks and 0% in the group treated for 3 months. In patients who had not undergone surgery, the rate of recurrence was 9.1% in the group treated for 4 weeks and 4.7% in the group treated for 3 months. The authors therefore stated that in patients with DVT postoperatively, 4 weeks of anticoagulation was likely sufficient. They tempered this statement by adding that this was based on a post-hoc subgroup analysis and recommending a study consisting solely of postoperative patients. Schulman and colleagues[4] reported that the rate for recurrence in patients with temporary risk factors for thromboembolism was 8.6% in the group who received 6 weeks of anticoagulation and 4.8% in the group who received 6 months of therapy ($p = 0.24$). In patients having permanent risk factors, the rate of recurrence was 24.2% in the group treated for 6 weeks and 12.1% in the group treated for 6 months ($p < 0.001$). Although in patients with temporary risk factors there was no statically significant difference between the 6-week and 6-month treatment groups, no recommendations were made concerning the optimal duration of anticoagulation. Levine and associates[5] reported a rate of recurrence in patients with transient risk of 5.4% in a group receiving 4 weeks of anticoagulation and 0% in a group treated for 3 months ($p = 0.2$). In patients with continuing risk, the rate of recurrence was 14.9% in the group treated for 4 weeks and 10.8% in the group treated for 3 months ($p = 0.6$). The authors stated that 4 weeks of oral anticoagulant therapy (or even less) may be all that is required in patients without continuing risk factors for thrombosis. In an editorial, Hirsh[9] discussed the papers by the Research Committee of the British Thoracic Society,[8] Schulman and colleagues[4] and Levine and associates[5] and concluded that it would be reasonable to use anticoagulation therapy for 6 weeks in patients with reversible risk factors.

Our study is a prospective case series restricted to

patients who developed proximal DVT after hip or knee arthroplasty. Duplex ultrasonography was used as an objective end point to document resolution of the DVT and monitor for recurrence in all patients. We hypothesized that once there was DVT resolution and the transient risk factor resolved, anticoagulation could be safely discontinued. The results of our study support the hypothesis. They also confirm the subgroup analysis of papers in the literature,[4,5,8] suggesting that a shorter duration of therapy may yield acceptable results for patients with DVT postoperatively. A definite duration of anticoagulation therapy cannot be defined because DVT resolution by our ultrasonographic criteria occurred in all cases by the time of the first follow-up and the sample size is not sufficient for statistical significance.

This study has several limitations. Ultrasonography was chosen as the diagnostic investigation for determining the presence and resolution of proximal DVT because it is noninvasive. Although it is reported as the noninvasive test of choice,[10] its limitations in sensitivity and specificity as a screening test for postoperative DVT are well documented.[11] The major limitation of this study is the small sample size. Preliminary statistical analysis suggested that a considerably larger sample would be required to produce statistically significant results. Nevertheless, the results demonstrate a clinically significant trend toward a shorter course of anticoagulation therapy for DVT in patients who have undergone hip and knee arthroplasty. We hope that these findings will provide the impetus for a larger prospective randomized trial to confirm the findings and modify the treatment of DVT in this patient population.

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