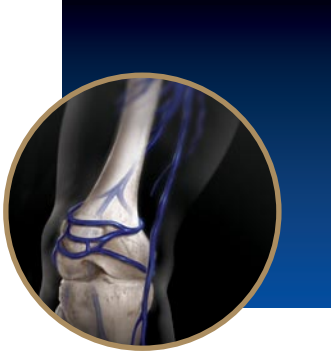

Aspirin Prophylaxis for Thromboembolic Disease After Total Joint Arthroplasty

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Abstract

The most appropriate prophylactic regimen for thromboembolic disease has not been determined. There appear to be several good alternatives, all of which yield similar results as determined by the incidence of symptomatic pulmonary embolism, but all are associated with various bleeding-related risks. Results from past research of almost 3500 total knee arthroplasties demonstrated a low risk for pulmonary emboli (0.1%) and a reduced risk for postoperative bleeding with use of aspirin and foot pumps as prophylaxis against thromboembolic disease. We continue to remain comfortable recommending this regimen for our patients.

It is generally agreed that patients undergoing total hip arthroplasty (THA) and total knee arthroplasty (TKA) have a transient increased risk for venous thromboembolism (VTE). However, incidence of deep venous thrombosis (DVT) is relatively high, whereas incidence of pulmonary embolism (PE) is very low. This disparity has created controversy. In the medical community, DVT is widely accepted as a reasonable surrogate marker for PE risk, but it does not appear to have the same significance after total joint arthroplasty (TJA). Although it has been assumed that any improvement in DVT prevention would be accompanied by proportional protection against PE, this has not been the case. Many anticoagulation studies have shown that certain agents can effectively reduce DVT; however, careful review of the literature does not demonstrate a proportional reduction in PE. At present, there are no studies that show any reduction in PE incidence after THA or TKA related to a specific prophylactic regimen.

There may be 2 explanations for this dichotomy. One may be that DVT studies are underpowered to demonstrate real differences in the low PE rate. From the Norwegian Arthroplasty Registry (1987–1989), which included 67,548 THAs, Lie and colleagues[1] reported that the incidence of PE was so low that it would require randomization of 30,000 patients who demonstrate a 50% reduction in mortality between 2 competing agents. Such a study would not be feasible. The second explanation may be that, after THA or TKA, DVT is not an accurate marker for patients at risk—in contrast to congestive heart failure or cancer patients who spontaneously develop DVT and are clearly at increased risk from PE. During TJA, the veins in the lower extremity may be traumatized and predisposed to form the DVT commonly noted after this surgery. This situation may explain why DVT incidence is 2- to 3-fold higher after TKA than after THA. However, this increase in DVT is not associated with a 3-fold increase in PE after TKA. This may indicate that DVT is not a good surrogate marker after TJA. Therefore, we must question if recommendations based on DVT alone are clinically valid for TJA patients.

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PE after THA or TKA is relatively uncommon. In a Medicare population undergoing primary THA in 1996, the nonfatal PE rate was 0.93%.[2] Death from PE is even less common. The 90-day death rate in 44,785 patients in the 1992–2001 Scottish morbidity record was 0.23%.[3] Nonfatal and fatal PE after TKA may be less common than after THA. According to the California discharge database of 223,684 patients undergoing TKA from 1991 to 2001, the nonfatal PE rate was only 0.41%.[4] In the Scottish registry of 27,000 TKAs, the fatal PE rate was 0.15%.[3] In addition, despite changes in prophylactic regimens and surgical techniques over the past 15 years, rates of PE and fatal PE have remained relatively constant.

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The bleeding risk associated with prophylactic agents is a major concern after THA and TKA. This risk must be carefully balanced against PE risk. Incidence of major bleeding can be as high as 5% and can seriously affect outcomes in THA and TKA. Bleeding is the most common cause of unplanned return to the operating room for evacuation of hematoma or treatment for infection of the prosthesis. Recent studies have shown that there is an important relationship between joint infection and early postoperative wound hematoma and drainage.[5,6]

The bleeding risk has been difficult to accurately determine. The literature has not been standardized with regard to defining major postoperative bleeding. There is great variation in what is regarded as major bleeding versus minor bleeding and in subsequent treatment options. This variation may lead to underreporting of risks. Furthermore, most anticoagulant studies do not report the final clinical outcome of prosthesis surgery in patients who have major or minor bleeding events.

Balancing Risks and Benefits

Selection of appropriate prophylaxis for THA and TKA requires careful balancing of the risks for bleeding against the expected effectiveness of preventing symptomatic PE. Using regimens that reduce DVT incidence does not necessarily imply that the risk–benefit ratio has been balanced, especially with the variable, relatively undefined risk from bleeding and the low PE incidence. Recommendations made by the American College of Chest Physicians[7] (ACCP) were challenged in a multiauthor editorial in the *Journal of Arthroplasty*.[8] The authors noted that the well-controlled prospective anticoagulant studies are designed to determine the effectiveness of competing anticoagulants against DVT. In such studies, patients are derived from select populations in which the frail and elderly are not enrolled and patients with a history of prior DVTs or prior bleeds are excluded by protocol, and so the study population did not truly represent the complete spectrum of the surgical population. In addition, none of the studies evaluated the clinical outcomes of TJA in patients who had major or minor bleeds. This situation, combined with the probability that DVT in TJA is not a good surrogate marker for identifying patients at risk for pulmonary emboli, has led to resistance in the orthopedic community to accepting the ACCP guidelines as published.

Recognizing these controversies in the literature, the American Academy of Orthopaedic Surgeons (AAOS) organized an epidemiology team from Tufts University to evaluate and assist in establishing guidelines appropriate for orthopedic surgeons. In May 2007, AAOS formally approved a set of guidelines for preventing PE after TJA. These guidelines are broader than the ACCP guidelines published in *Chest* and recognize the difficulties in depending on DVT alone and the risks related to bleeding.[10]

Selection of appropriate prophylaxis for THA and TKA requires careful balancing of the risks for bleeding against the expected effectiveness of preventing symptomatic PE.

Summary

The most appropriate prophylactic regimen for thromboembolic disease has not been determined. There appear to be several good alternatives, all of which yield similar results as determined by the incidence of symptomatic PE, but all are associated with various bleeding-related risks. In past research of almost 3500 TKAs, we (Lotke and Lonner[9]) demonstrated a low risk for pulmonary emboli (0.1%) and a reduced risk for postoperative bleeding with use of aspirin and foot pumps as prophylaxis against thromboembolic disease. We continue to remain comfortable recommending this regimen for our patients.

Author's Disclosure Statement

Dr. Lotke is a consultant for Bayer Healthcare Pharmaceuticals, DePuy Inc, and Stryker Orthopaedics.

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