Final Draft

Inpatient Enoxaparin, Outpatient Aspirin following primary hip and knee arthroplasty

Abstract:

Introduction:

Thromboembolic disease is a well recognized complication following hip and knee arthroplasty. There is near universal agreement regarding the need for perioperative thromboprophylaxis1. The optimal regimen would be safe, effective, and inexpensive 2. Such a regimen has been elusive. Modern hip and knee replacement protocols emphasize early mobilization and mechanical compression devices. These methods alone have proven safe and beneficial 3,4. The major controversy remains chemoprophylaxis. Conflicting recommendations from the American College of Chest Physicians (ACCP)5 and the American Academy of Orthopedic Surgeons (AAOS)6 have added to this dilemma. Pay for performance and medical liability must also be factored in to the decision making for the practicing joint replacement surgeon7,8,9.

Enoxaparin is recommended by both the AAOS and ACCP 5,6. It has demonstrated efficacy in numerous clinical trials 9,10,11. Safety concerns do exist 12,13, and the exact duration of treatment is controversial 10,11 . The increased cost must also be considered especially with extended treatment regimens10.

Aspirin has been advocated by multiple authors and is included in the AAOS guidelines 6,14,15. It is not recommended by the ACCP secondary to concerns regarding efficacy5. Aspirin is believed to be the safest and least expensive regimen1.

At our institution, we have been using inpatient enoxaparin and outpatient aspirin following hip and knee arthroplasty for our patients at standard risk for venous thrombosis. This regimen incorporates recommendations from both the ACCP 5 and the AAOS 6 and has not previously been reported in the literature. Our hypothesis is that this is a safe and effective means of chemical thromboprophylaxis.

Materials and Methods:

We performed a retrospective review of all primary hip and knee arthroplasties performed at our institution between January 2009 and February 2010. 500 primary hip and knee arthroplasties in 472 patients were selected. Exclusion criteria included prior history of thomboembolic disease, current treatment with warfarin, current diagnosis of malignancy, and history of bleeding disorder or major bleeding episodes defined as intracranial bleed, or gastrointestinal bleed requiring transfusion. All surgeries were performed by 2 experienced arthroplasty surgeons at a dedicated orthopedic hospital. Patient demographics are included in figure 1. Average age was 62.9, body mass index (BMI) 29.0, American Society of Anesthesiologists (ASA) grade 2.418. There were 247 hip and 253 knee arthroplasties.

All hip and knee replacements were performed under general anesthesia. Knee replacement patients were also given femoral and sciatic nerve blocks. Mechanical compression devices were utilized in all patients. Physical therapy was begun the day of surgery or on postoperative day one for afternoon operations. Enoxaparin was begun on postoperative day one and renally dosed. For a creatinine of less than 1.5, enoxaparin dosing was 30 mg twice daily for knee arthroplasty and 40 mg once daily for hip arthroplasty. For a creatinine of greater than 1.5, enoxaparin dosing was 30 mg daily for both hip and knee arthroplasty. Upon discharge from the hospital, patients were prescribed enteric coated aspirin 325 mg twice daily for 1 month. Routine followup care was performed at 6 weeks, and 6 months. Investigations for deep venous thrombosis or pulmonary emboli were initiated only in symptomatic patients. Review of records for deep venous thrombosis, pulmonary emboli, acute blood loss, infection, and general complications was performed.

For comparison, a control group of 500 hip and knee arthroplasty cases was selected. This group received surgery by a different experienced surgeon at the same institution. The control group received enoxaparin for a total of 2 weeks postoperatively, and then aspirin 325 mg twice daily for an additional 2 weeks. Anesthesia, therapy, and general postoperative protocol were otherwise similar between the two groups. Demographic data are included in table 1.

Results:

For the study group, 500 cases in 472 patients were reviewed. There was one documented deep venous thrombosis and two pulmonary emboli. 9 patients required 3 or more units of packed red blood cells (RBC) , with 2 gastrointestinal bleeds, and 1 patient with newly diagnosed lymphoma who required 6 units of RBC and factors. There was 1 deep infection requiring a 2 stage exchange. There were 14 superficial infections, one requiring a superficial irrigation and debridement. There were 5 other readmissions in the 3 month postoperative period (transient ischemic attacks, atypical chest pain, constipation / dehydration, Crohns exacerbation, and pancreatitis.) There were no deaths.

In the control group, 500 cases in 473 patients were reviewed. There were 6 deep venous thromboses and 2 pulmonary emboli. 14 patients required 3 or more units of RBC. There were 4 deep infections, 2 requiring and incision and drainage with polyethylene exchange, and 2 requiring a 2 stage exchange. There were 23 superficial infections, one requiring a superficial incision and drainage. There were 7 readmissions in the 3 month postoperative period (bowel obstruction, nausea/dehydration, acute renal failure, congestive heart failure, transient ischemic attacks, and arrhythmia). There were no deaths.

For the study group, average length of stay was 3.75 days (3.49 for hips and 4.00 for knees.) The average number of enoxaparin doses given was 4.26 ( 2.494 for hips, and 5.984 for knees.) Our institution’s unit price for enoxaparin was $28.91 per 40 mg dose, and $21.69 per 30 mg dose. The cost of 325 mg enteric coated aspirin was $ 0.226 per dose. Comparing our inpatient only enoxaparin group with a 2 week regimen, this corresponds to a total saving $200,148.57 or $400.30/case.

Discussion:

Thromboembolic disease is a well recognized phenomenon following hip and knee arthroplasty. The exact incidence of deep venous thrombosis and pulmonary emboli is controversial. Incidence rates of over 50% are reported without prophylaxis ref 1,5,AAOS,. With modern joint protocols utilizing early mobilization, mechanical compression devices, and improved anesthetic techniques, the incidence has dramatically decreased. . A recent review of 1179 cases by Dorr et al using a multimodal approach for thrombosis prevention reported a 0.25% rate of pulmonary emboli and 5.2% rate of deep venous thrombosis (only 0.4% which were clinically symptomatic.) Even protocols using no chemical prophylaxis have shown a thrombosis rate of less than 5% after total hip arthroplasty ref 3 and Colwell

Enoxaparin is a low molecular heparin (LMWH) which has rapid antithrombotic action, limited variability in its effects, and linear pharmacokinetics2. It is advocated by both the AAOS and ACCP for chemical thromboprophylaxis following hip and knee arthroplasty. It is also approved by the SCIP and almost all oversight groups. The efficacy of LMWH is well documented. Concerns regarding safety do exist and attempts by some centers to adhere to the ACCP guidelines have met with increased bleeding and wound complications. Also, the exact duration of treatment with enoxaparin is debatable. The AAOS recommends a 7-10 day course. The ACCP recommends a 28-35 day course. Extended dose treatment has been shown to significantly decrease the rate of venographically documented thomboembolism. It is unclear whether this will result in any significant clinical improvements or cost savings.

The advantages of ecasa especially in the outpatient setting are numerous. It is inexpensive, well tolerated with a low side effect profile, and has shown efficacy especially when combined with a multimodal approach. Aspirin is not recommended by the ACCP as the older literature has shown a high rate of thromboembolic disease with isolated use.

A short course of aggressive inpatient only anticoagulation is not a new concept. The prior literature using such regimens have noted an average length of stay of 7-10 days. As the length of stay has decreased considerably, protocols must adapt. In our study, the average length of stay was 3.75 days. As enoxaparin was initiated on postoperative day 1, the average length of treatment with enoxaparin was 2.75 days . This was followed by a 28 day course of 325 mg enteric coated aspirin 325 mg. When combined with early mobilization and mechanical compression devices, our inpatient enoxaparin, outpatient aspiring regimen proved to be an effective means of thromboprophylaxis. Symptomatic deep venous thrombosis was noted in one patient (0.2%) and pulmonary emboli in 2 patients (0.4%). Complications associated with this regimen were low with 9 bleeding complications (requiring 3 or more units of RBC) and 15 infections only one of which was deep. Compared with a control group which utilized a 2 week course of enoxaparin, there was actually a significantly lower rate of thrombosis and complications. Using inpatient only enoxaparin resulted in cost savings of $200,148.157 for the 500 cases, or $400.30 per case.

This was a pilot study to review our thromboprophlaxis protocol. This is a retrospective review so criticisms associated with such a study design are present. The control group was with a different surgeon and there were minor demographic differences with the study group. No routine monitoring was employed for venous thrombosis and only symptomatic patients were evaluated for thromboembolic disease. Strengths of this study are that it is unfunded, and the endpoints of symptomatic thromboses, infection, and bleeding represent the major concerns of the practicing joint replacement surgeon.

In summary, our protocol of inpatient enoxaparin and outpatient aspirin proved safe and effective in standard risk patients following hip and knee arthroplasty. When combined with mechanical compression devices and early mobilization, a low rate of symptomatic thromboembolic disease was noted. There were significant cost savings with a low complication rate and no deaths.

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referrence 15.

19,586 THA 2.8 DVT / PE – 76% noted as outpt, 17 days to dg

24,059 TKA 2.1 DVT / PE – 47% noted as outpt, 7 days to dg

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