

Incidence of Clinical Deep Venous Thrombosis in 218 Filipino Patients Undergoing Primary and Revision Hip and Knee Replacement Surgeries

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INTRODUCTION

Thromboembolic disease continues to present a significant risk to patients undergoing total joint arthroplasty. However, the methods to prevent this problem remain controversial. In orthopaedics, the incidence of post-operative DVT after total joint arthroplasty may be as high as 65%⁵, but the risks associated with these clots have not been clearly defined. The formation of deep vein thrombosis after such an operation is well documented and therefore it is imperative that the appropriate prophylaxis regimen is provided for these patients at risk. The incidence of DVT present in association with hip or knee surgery has been addressed by numerous studies in the literature². Without prophylaxis, patients having total joint replacement have a 1-2% incidence of potentially fatal pulmonary embolism¹. Commonly, a screening examination such as venogram or ultrasound is used to determine the existence and location of a DVT. Much has been written about the etiology of DVT but surprisingly little is known about its natural history. Proximal DVT is an established cause of pulmonary embolism⁴.

Many authors have recommended routine chemical prophylaxis to reduce the incidence of post-operative DVT, assuming that it will result in a reduction in the rate of fatal pulmonary embolism⁴. Many researchers concluded that the ideal non-invasive, low risk method of thrombus detection had not yet been developed. They also recommended that formal anticoagulation therapy (heparin and/or warfarin) be reserved for post-operative patients who had developed proximal vein thrombosis.

OBJECTIVES

Our aim was to find out the adequacy of aspirin and early mobilization as prophylaxis to occurrence of deep vein thrombosis and pulmonary embolism based on clinical symptomatology amount patients who underwent primary and revision joint replacement surgeries at the Makati Medical Center in a fifteen year period. We will also assess

the readmission and mortality rate from thromboembolic complications after surgery as well as compare our results with studies done among Caucasians. The demographic profile of patients shall likewise be described.

METHODS

This is a retrospective review of records of all patients at the Makati Medical Center and Philippine Orthopaedic Institute who underwent joint replacement surgeries. This included primary and revision surgeries of hip and knee done by the given author from August 1985 to June 2000. Readmission six months after surgery was noted and the reasons for such were identified. Signs and symptoms pertaining to a possible thromboembolic complication were also reviewed including the type of prophylaxis used. All patients were followed up for a minimum of six months and examined by either the operative surgeon, the internist or the family physician taking care of the patient. Results were tabulated and subjected to statistical analysis.

RESULTS

Records revealed that since August 1985 to June 2000, there had been 218 patients who have undergone joint replacement surgeries. There were 81 males (37.2%) and 137 females (62.8%) with a male to female ratio of 1:1.7. Average age for both sexes was 63 years old, with age range from 18 to 90. Cases were tabulated into 4 groups. They are (1) primary hip arthroplasty, (2) hip revision, (3) primary knee arthroplasty and (4) knee revision. The records also revealed that no one received low molecular weight heparin and all patients were routinely given Aspirin 80 mg once daily started on the first post-operative day and continued for three months. Likewise, early mobilization, physical therapy program and the use of TED (anti-embolism stockings) were implemented on the second post-operative day.

Among 60 patients who underwent hip arthroplasty, one (0.4%) patient, a 66-year old female, suffered from right calf tenderness and swelling which was experienced immediately after surgery and did not resolve for the next two months. Despite negative findings on Doppler ultrasound, she was still treated with heparin and eventually resolved.

None of the 42 patients who had hip revision presented with any clinical signs and symptoms of deep vein thrombosis.

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Of the 100 patients who had primary knee arthroplasty, there were three (3%) who presented with signs and symptoms of DVT. They all presented with leg swelling and calf tenderness on the operated limb. The first patient was a 75-year old female who developed progressive calf tenderness and swelling of the right leg two months after surgery. A Doppler ultrasound done on readmission showed negative results. Because of strong evidence of clinical thrombophlebitis, heparinization was done and eventually placed in coumadin for three months. Last follow-up revealed that the thrombophlebitis resulted without residual signs or symptoms. The second patient was a 66-year old male who continued to experience calf swelling and some tenderness five months after surgery. His condition failed to improve and he was readmitted for heparinization. Doppler ultrasound failed to show the presence of thrombus. The last patient was a 70-year old female who

manifested with clinical DVT of the left leg two weeks post-op. Doppler ultrasound was done and yielded negative results. Clinical signs and symptoms of DVT resolved after receiving heparin and coumadin treatment.

There were 16 patients who underwent knee revision and all of them were asymptomatic for the possibility of thromboembolism (Table 1).

In the entire series, four patients (1.7%) were readmitted and treated for signs and symptoms of deep vein thrombosis and none manifested with pulmonary embolism. There was one death that occurred six weeks post-op giving a mortality rate of 0.4%. She was a 77-year old female who underwent a revision procedure for an infected total knee arthroplasty that was done outside by another surgeon. She was discharged improved and was clinically asymptomatic for DVT. She had a sudden death at home six weeks after surgery. However, an autopsy was not done to determine the cause.

Table 1. Demographic profile of patients according to procedure

Procedure	Male	Female	Total
Total hip arthroplasty	25 (11.5%)	35 (16%)	60
Total hip revision	15 (6%)	27 (12.3%)	42
Total knee arthroplasty	34 (15.6%)	66 (30%)	100
Total knee revision	7 (3.2%)	9 (4.1%)	16
Total	81 (37.2%)	137 (62.8%)	218

DISCUSSION

Venography is being used for post-operative screening of deep vein thrombosis in patients who undergo hip arthroplasty and total knee arthroplasty. It remains to be the gold standard in the diagnosis of deep venous thrombosis. However, this is an invasive procedure with exposure to radiation and is not totally without risk. More so, this test is expensive, technically demanding and has the risk of contrast reaction⁶. In the early 90's there has been a switch to the use of ultrasound because it is non-invasive, expedient and less costly. Doppler ultrasound is the most technically advanced ultrasonic technique and combines Doppler analysis with high-resolution tissue imaging and flow information. In the study done by Westrick comparing Doppler to venography resulted to a sensitivity of 85%, high specificity of 97% and high accuracy of 95%¹. Short of doing venography, all our patients who presented with clinical signs of DVT were subjected to Doppler ultrasound. None of the patients showed significant ultrasonographic findings referable to DVT. Can we therefore infer that none of our patients had thromboembolism? Such presumption may be unsafe since a negative Doppler ultrasound does not guarantee absence of thromboembolism. More so, true DVT when missed, may go untreated and can lead to life threatening condition such as pulmonary embolism. Eriksson et al have seen that 40 of 44 patients with symptoms truly have DVT⁹. Another study done by Sabri et al found that 50% of his subject population who had clinical signs indeed had DVT¹⁰, while Stulberg et al found in his series that out of 25 patients who had clinical evidence of DVT, 20 turned out positive on venographic examination¹¹, which is equivalent to a high probability rate of 80%. In our population, only four out of 218 patients had clinical evidence of DVT, and it has been therefore practiced in this study that all symptomatic

patients (for safety reasons despite normal ultrasound) be treated for DVT as well using heparin. True enough, heparin being a standard drug for the treatment of thromboembolic conditions, indeed offer resolution of clinical signs of DVT in our patients. Heparinization served both as a diagnostic and therapeutic regimen.

Deep vein thrombosis is a well-established complication of total hip or knee replacement. Rate of DVT after knee arthroplasty alone without prophylaxis has been as high as 84%⁶. Issue of prophylaxis has been therefore controversial. Pulmonary embolism has been documented in 2% to 5% of patients who have not had prophylaxis and fatal embolism has been reported in 1-2%⁷. All patients in our study received a widely accepted prophylaxis regimen – that of using a pharmacologic drug Aspirin supplemented by a mechanical method such as early mobilization and pressure bandage.

The problem of DVT after hip or knee surgeries among Filipinos in particular and Asians in general is markedly lower than that seen in Caucasians. This may be the reason why the turnover of venographic evidence of DVT among our subjects is zero. It was reported by White et al that in his multi-racial subjects he concluded that compared to Americans, Asians have lower incidence of thromboembolism and a lower chance of developing DVT¹⁶. This finding was supported by Klatsky et al which yielded similar results¹⁷. Contrary to this, Dhillon et al of Malaysia concluded that secondary DVT is high at 62% among his subjects and incidence is similar to western statistics¹⁸. However, his conclusion was criticized due to a small number of his study population and inclusion of trauma cases. A study was also done in the Philippines by Tanchuling et al which had a 12.6% incidence of DVT among Filipinos²⁰. This, however, also included fracture cases where patients were in bed for 5 to 10 days prior to

surgery and may have falsely increased the incidence. A Korean study by McYoo et al, favored the proposition that western groups have significantly higher incidence as compared to Asian counterparts¹⁹. What leads to a high incidence of DVT among Caucasians and why is the problem seemingly rare among Asians? The closest answer to this problem is **Factor V Leiden** – a blood coagulation mutant factor substantially proven to cause blood hypercoagulability – a state essential to venous thrombosis. Also, in the coagulation pathway, Factor V is an important substance that leads to conversion of prothrombin to thrombin. Thrombin then acts on converting fibrinogen into a fibrin clot. Clots may therefore be easily formed if there is a lot of Fibrin V available. Is Factor V Leiden present in all races? Zoller et al had seen that Factor V mutation is a major risk factor that increases thrombosis up to ten times, and that this mutation is common among Caucasians ranging from 1 to 15%, whereas it is NOT found in ethnic groups such as Japanese and Chinese²². A study in China done by HoCh Chau et al, similarly revealed that Factor V Leiden was not found among the subjects²¹. It has been found that patients bearing Factor V Leiden alleles are the subjects at high risk of developing thromboembolic accidents and is the target group for prophylaxis. Incidence of Factor V Leiden alleles on some localities are as follows : Greece – 13.4%, Quebec – 8.9%, Oregon – 7.6%, Iceland – 4.2%, Asia minor – 1.1%, Asia – 0%, Africa – 0% and Middle East – 0%. Due to this fact, Filipinos, being Asians inherently protected from secondary DVT. This is supported by our study, which revealed only 1.8% or four clinical DVT out of 218 patients.

The distribution of clinical DVT in this study varies greatly between primary arthroplasty (100% - all 4 cases) and revision surgery (0%). This may be an interesting angle to look at, as it could be a significant variable or just totally incidental. Review of literature did not reveal support to this issue. One study came up with prevalence of deep vein thrombosis at 32% (16% distal, 16% proximal) after total hip replacement and 66% (50% distal, 16% proximal) after total knee replacement⁴. Our study appears to bear similar

result – that of DVT was seen more in knee replacement (75%) compared to high arthroplasty (25%).

Arthroplasty deaths are primarily seen among cases with fatal pulmonary embolism. A reduction in the prevalence of pulmonary embolism has been associated with reduction in the prevalence of deep vein thrombosis. And without prophylaxis, patients having total joint replacement have a 1 to 2% incidence of having a fatal pulmonary embolism develop¹, which result in 10,000 deaths every year. In our study, a 77-year old patient was seen dead at home six weeks after knee arthroplasty. There was no report of clinical DVT – that is of more value if seen in the more proximal part of the extremity nor symptoms referable to a possible pulmonary embolism (unattended death). It is not clear whether the death is related directly to surgery or due to other illness. An autopsy could have helped resolve the dilemma.

CONCLUSION

There were 218 patients who have undergone joint replacement surgeries at Makati Medical Center and Philippine Orthopaedic Institute from August 1985 to June 2000 by the author. Of which 37.2% are males and 62.8% are females. Average age for both sexes was 63 years.

The incidence of clinical deep vein thrombosis is low at 1.7% and mortality is 0.4%. While this low value may possibly reflect that Filipinos being Asians most likely have none or very low Factor V Leiden, leading to diminished occurrence of thromboembolic complication. DVT was seen three times more after knee replacement than hip replacement surgeries and these results are comparable to those seen in the literature. While all patients who presented with clinical signs of DVT were manifested in the distal area of the extremities, there were no reports of symptoms attributable to pulmonary embolism. Cause of death of one patient was not ascertained.

The use of Aspirin coupled with early mobilization, physical therapy twice daily and the use of anti-embolism stockings has been an effective form of prophylaxis for this population.

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