

Deep vein thrombosis after total hip arthroplasty in Indian patients with and without enoxaparin

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ABSTRACT

Purpose. To study the incidence of deep vein thrombosis in Indian patients undergoing total hip arthroplasty with or without prophylaxis, and the effect of enoxaparin on deep vein thrombosis.

Methods. The study covered a total of 50 hips in 40 patients who underwent total hip arthroplasty. Patients were assessed for deep vein thrombosis using Doppler ultrasonography. The hips were numbered and divided into 2 groups: the odd-numbered hips did not receive any thrombo-prophylaxis, whereas the even-numbered hips received 40 mg of enoxaparin subcutaneously, once a day for 2 weeks, until the time of discharge.

Results. Deep vein thrombosis was not found in both groups. We found wound haematomas in 9 patients (all of whom were on enoxaparin) ($p < 0.05$), superficial infection in 2 patients (one on enoxaparin, one not),

and local bruising in 4 patients (all of whom were on enoxaparin). Major haemorrhage did not occur in any of the cases.

Conclusion. The incidence of deep vein thrombosis in Indian patients is very low compared to that in European and American patients. Enoxaparin failed to provide any advantage to the patients. It is therefore not advisable to give prophylaxis/low-molecular-weight heparin for deep vein thrombosis to patients undergoing total hip arthroplasty without any risk factors.

Key words: arthroplasty, replacement, hip; venous thrombosis

INTRODUCTION

Total hip replacement has become a standard treatment for patients exhibiting hip joint deterioration by a number of causes, even in the third world countries.

Deep vein thrombosis (DVT) is one of the most common complications of total hip arthroplasty (THA), which is under the high-risk category and requires prophylaxis of the highest degree.¹⁻³

The triad of venous stasis, hypercoagulability, and endothelial injury is associated with thrombus formation. The greatest risk of femoral vein occlusion and activation of the clotting cascade occurs during the insertion of the femoral component. The use of cemented implants has been found to promote the occurrence of DVT as well.⁴

The significance of DVT lies in its ability to cause pulmonary thromboembolism, especially in cases of proximal DVT, and also chronic venous insufficiency at later stages. Calf thrombi (distal thrombosis) carry a low risk of embolisation and chronic venous insufficiency; however, without prophylaxis, they are more likely to propagate proximally, which substantially increases the risk of pulmonary thromboembolism.⁵

Proximal DVT usually occurs as a result of local vessel wall injury or an extension of distal DVT. The majority of proximal DVTs can resolve spontaneously without any clinical sequelae, although the rest of them are more likely to result in pulmonary thromboembolism than distal DVT. The highest risk of occurrence of DVT has been reported to be on the fourth postoperative day,⁶ and the second highest, on the 13th day.⁷ The highest incidence of fatal pulmonary embolism occurs in the second week,⁸ and the risk is supposed to exist until approximately 3 months after the surgery. The incidence of DVT in the non-operated leg is about 20%.⁹

After performing THA without prophylaxis, the incidence of DVT is 40% to 70%^{7,10}; proximal DVT is 10% to 20%⁷; clinical DVT is 1% to 3%⁷; non-fatal symptomatic pulmonary thromboembolism is 1% to 2%⁷; and fatal pulmonary thromboembolism is 0.1% to 1%.^{7,8,11,12} Although the incidence of DVT is very high, that of proximal DVT is low and that of fatal thromboembolism is very rare,^{7,8} this, along with concerns about efficacy and side-effects of various methods used for prophylaxis, has led to widespread differences in opinion among orthopaedic surgeons in using prophylaxis for DVT. Thus, the whole issue of prophylaxis for DVT is very controversial.

The statistics on DVT are mainly based on various studies of European and American populations. Because there are some genetic differences exist between Asian populations and European and American populations, the incidence of DVT can be different in Asian populations, for example, the incidence of DVT after THA has been insignificant at our institute. Thus, we initiated this study to

Table 1
Diagnosis of patients undergoing total hip replacement

Diagnosis	No. of cases	Percentage (%)
Avascular necrosis	25	50
Ankylosing spondylitis	15	30
Femoral neck fracture	9	18
Seronegative arthritis	1	2

determine the most cost-effective treatment for our patients.

DVT can be diagnosed by using a number of diagnostic modalities. Doppler ultrasonography is a non-invasive and cost-effective modality. It can be used repeatedly, as and when required; it has no side-effects and matches the sensitivity and specificity of the venography as far as proximal DVT is concerned.¹³ Low-molecular-weight heparins (LMWHs) are commonly used to provide prophylaxis for DVT after THA.¹⁴ Enoxaparin is one of the most popular LMWHs used for this purpose.

MATERIALS AND METHODS

This study covers a total of 50 hips in 40 patients (27 men and 13 women; mean age, 47 years; range, 27–61 years) who underwent THA at L.N. Hospital, New Delhi, India between March 2002 and April 2004. The hips were numbered and divided into 2 groups: the odd-numbered hips did not receive any thromboprophylaxis, whereas the even-numbered hips received 40 mg of enoxaparin subcutaneously, once a day for 2 weeks, until the time of discharge. The diagnosis of the patients undergoing total hip replacement is shown in Table 1.

Patients with a history of DVT, chronic venous insufficiency, hypersensitivity to LMWH, uncontrolled hypertension, haemorrhoids, gastrointestinal ulcers, stroke, bleeding disorders, thrombocytopenia, large malignancies, pulmonary tuberculosis, chronic alcoholism, cirrhosis, and renal insufficiencies were excluded from this study.

Preoperative assessment for DVT was performed in all patients, using a Doppler ultrasonography ATL 5000 HDI machine (ATL Ultrasound, Bothell [WA], US) on both lower limbs. Assessments included examinations of the common femoral, superficial femoral, popliteal, anterior tibial, and posterior tibial veins. They were assessed for flow, visualised thrombus, compressibility, and augmentation. A diagnosis of DVT was made in cases of visualisation of thrombosis, absence of flow, lack of compressibility,

or lack of augmentation. All patients were encouraged to do exercises on isometric quadriceps and ankle postoperatively.

All patients were operated on using the Liverpool approach. Patients were assessed daily for any signs of DVT, local haemorrhage, haematoma at the operative site (on the fifth day), local bruising at the site of injection, and major haemorrhage, which is defined as a decrease in haemoglobin level by 20g/l compared with the last postoperative value, or requiring 2 or more units of blood transfusion, or intracranial/retroperitoneal bleed.

Enoxaparin was started 12 hours postoperatively, after the removal of the epidural catheter in patients who received spinal and epidural anaesthesia. Patients were not given any non-selective, non-steroidal, anti-inflammatory agents or compressive stockings during the study period. Doppler ultrasonography was used to assess DVT on day 4 (± 1) and day 13 (± 1) postoperatively. The same radiologist assessed all the cases and was not told whether each patient had received any prophylaxis.

Spinal and epidural anaesthesia was given in 40 (80%) cases, whereas general anaesthesia was given in the remaining 10 cases. Hybrid THA was performed in 25 (50%) hips, non-cemented THA in 16 (32%), and cemented THA in 9 (18%). Primary THA was done in 45 hips and revision procedure in 5 hips. Of the 10 patients underwent bilateral THA, 6 (3 hybrid THA and 3 cemented THA) did not receive enoxaparin during both surgeries; 3 patients (one hybrid THA and 2 non-cemented THA) received enoxaparin during both surgeries; and one patient (non-cemented THA) received enoxaparin during the first surgery but did not receive it during the second surgery.

One patient, who underwent hemiarthroplasty 7 years earlier for a fracture of the femoral neck, was excluded from the study because of a preoperative detection of DVT that extended from the common iliac vein downwards.

RESULTS

Clinical symptoms of DVT were found in 10 out of 50 hips postoperatively; however, DVT was not found in the operated or contralateral limb of any of the patients in both groups postoperatively, on the fourth or 14th day. Wound haematomas were found in 9 patients, all of whom were on enoxaparin ($p < 0.05$). They required prolonged antibiotic treatment for a mean of 10 days. Superficial infection occurred only in 2 patients: one was on enoxaparin, the other was not. Local bruising was found in 4 patients

Table 2
Comparative parameters between the 2 groups

	With enoxaparin (n=25)	Without enoxaparin (n=25)
Mean age (years)	48	46
Mean body mass index (kg/m ²)	25	24
Superficial infection	1	1
Wound haematoma	9	0
Local bruising	4	0

on enoxaparin. Major haemorrhage and thrombocytopenia did not occur in any of the cases, with or without enoxaparin. The comparative parameters between the 2 groups are shown in Table 2.

DISCUSSION

THA is a potent stimulus for thrombogenesis. DVT is significant because it may result in pulmonary thromboembolism, particularly in cases of proximal DVT.

Studies regarding the incidence of DVT in Asian patients are inadequate compared to those in the western literature. A study by Kim and Suh¹⁵ in 1988 found that 10% of 146 Korean patients who underwent non-cemented THA had DVT. Atichartakarn et al.¹⁶ did not find any cases of DVT in a study of 19 Thai THA patients. In 2003, Ko et al.¹⁷ reported 4 cases of DVT in 22 Chinese THA patients. Dhillon et al.¹⁸ conducted a study in 1996 on a multi-ethnic population that underwent replacement arthroplasty of the lower limb in Malaysia. They found that the incidence of DVT was 64.3% in 14 THA patients. Until now, these studies and the western literature formed the basis of the argument for providing prophylaxis to Indian patients after THA.

The incidence of DVT following THA has been extremely rare at our institute. Our study aimed to determine the best cost-effective treatment for our patients. Because thrombogenesis is a complex process, it is difficult to explain the differences in our findings compared to those of western studies.

Old age is a risk factor for DVT⁶; the mean age of our patients was 47 years, with only 4 patients beyond the age of 60 years. This is partly due to the fact that patients with avascular necrosis and ankylosing spondylitis form a large part of the Indian population requiring THA, unlike the western populations where the major reason for THA is primary osteoarthritis of the hip in the elderly.

Spinal and epidural anaesthesia was given in

40 cases, whereas general anaesthesia in 10 cases. Because our study did not reveal any cases of DVT, differences between spinal and epidural anaesthesia and general anaesthesia could not be established. None of the patients had any risk factors predisposed to DVT. The Food and Drug Administration of the United States issued a warning regarding the use of enoxaparin with spinal anaesthesia, in view of reports of spinal haematoma formation leading to neurological complications. Patients were started on enoxaparin 12 hours postoperatively, after the removal of the epidural catheter. There were no cases of any neurological complications due to enoxaparin.

Our study also found that clinical symptoms for DVT are not reliable in diagnosing DVT, as reported by Stulberg et al.¹⁹

No cases of DVT were found in 35 hips that used cemented femoral implants and 10 cases of bilateral THA in which both sides were operated on with an interval of only 3 weeks. Considering the fact that the risk of DVT exists till 3 months after the surgery and 20% of DVT develops in the contralateral hip,⁹ the risk of developing DVT on the side that is operated on later is compounded, especially within 3 months after the first surgery. Of the 10 cases of bilateral THA, 6 received no prophylaxis, whereas one received prophylaxis only during the first THA. Doppler ultrasonography was performed to detect DVT till 5 weeks after the first surgery, i.e. till 2 weeks after THA was performed on the contralateral side. DVT was not detected in any of the cases. On the basis of this observation, the need for prolonged prophylaxis cannot be justified. Enoxaparin reduces the incidence of DVT in patients undergoing THA, but does not entirely eliminate the risk of DVT.²⁰⁻²³ It is a significant observation that we did not find any cases of DVT in the patients who received enoxaparin.

Though our study on 50 hips was small, it can be concluded that the incidence of DVT in Indian patients is very low compared with that in European and American patients. The differences may be attributed to the genetic differences between the populations, as well as to the differences in diet and lifestyle.¹⁶ Recently, it has been postulated that

Factor V Leiden is a risk factor of thrombosis. The relative risk of thrombosis in patients with Factor V Leiden has been shown to be more than 10 times than those with deficiencies of protein C, protein S, or antithrombin III.²⁴ Factor V Leiden was found in 5.27% of Caucasians and 0.45% of Asians, during a screening of 4047 people in the US.²⁵ This difference in prevalence of Factor V Leiden may be responsible for the difference in the incidence of DVT.

Preoperative Doppler ultrasonography revealed DVT in one patient who had undergone hemiarthroplasty before. Therefore, it is necessary to perform preoperative Doppler ultrasonography to detect any pre-existing DVT, especially in patients undergoing a repeat procedure at the same or opposite hip. This prevents any false positive results and forewarns the surgeon regarding the increased risk of DVT.

Major bleeding did not occur in any of the patients, although wound haematomas were found in 9 patients ($p < 0.05$), all of whom were on enoxaparin; this necessitated an additional 5 days of antibiotics. We concluded that enoxaparin increased the risk of wound haematoma. There were also 2 cases of superficial bruising associated with enoxaparin. The cost of providing enoxaparin to a patient for 14 days was about 5000 rupees (US\$100).

CONCLUSION

Based on the outcome of this study, enoxaparin failed to provide any advantage in preventing DVT. No cases of DVT were found in both groups of THA patients—with or without prophylaxis. Rather, enoxaparin harmed the patients by increasing the incidence of wound haematoma, which required prolonged antibiotics and considerably increased the cost of treatment. In countries like ours where government funding is restricted, emphasis should be placed on providing basic essential treatment to the maximum number of people. In an era of evidence-based medicine, it is therefore not advisable to give prophylaxis/LMWH for DVT to patients undergoing THA who have no risk factors.

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