



INCIDENCE OF DEEP VENOUS THROMBOSIS AFTER HIP FRACTURE SURGERY DETERMINED BY DOPPLER ULTRASONOGRAPHY

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Abstract:

Objective: This study aims to determine the incidence of Deep Venous Thrombosis after hip fracture surgery by using Doppler Ultrasonography.

Study Design: Descriptive observational.

Setting: This study was conducted in the Orthopedics Department at Mardan Medical Complex, Mardan - Pakistan.

Materials and Methods: This study was performed on 50 consecutive patients of 40 years and above with proximal femur fractures (fracture of femoral head, femoral neck fracture and intertrochanteric fractures) who were fulfilling the inclusion criteria. Informed consent was taken and operated on regular operation list. During the study period all the patients undergoing major orthopaedic surgery for Total Hip Replacement, Austin Moore Prosthesis, AO Screw fixation and Proximal femur fracture fixation by Dynamic Hip Screw and Interlocking Nail were investigated by Doppler ultrasonography by the same radiologist and were assessed for the occurrence of DVT. These patients were followed for 6 weeks post-operatively. The statistical significance of the results was analyzed using SPSS computer program.

Results: The total numbers of patients were 50 with average age of 62 years +/- SD. Male to female ratio was 1.2:1. THR was performed in 3 (6%) patients, AMP in 11 (22%) patients, DHS was performed in 28 (56%) patients, AO screw was performed in 6 (12%) patients and Interlocking Nail was performed in 2 (4%) patients. Overall incidence of DVT in the entire study group was 4% (2 of 50 patients). None of the patient received any form of thromboprophylaxis during the entire study period.

Conclusion: Our results suggest that incidence of DVT in Pakistani patients is low and is not comparable with American and European populations. Routine Thromboprophylaxis is perhaps not justified in every patient undergoing hip surgery. However, prophylaxis for patients with higher risk may be considered individually.

Key Words: Doppler Ultrasonography, Total Hip Replacement, Austin Moore Prosthesis, Dynamic Hip Screw, Interlocking Nail, Thromboprophylaxis.

INTRODUCTION

The most typical type of fracture among older people is a hip fracture.^{1, 6} Hip surgery has many complications, one of the most common and life-threatening complication is Deep Venous Thrombosis, which manifest as clotting of blood in the deep veins, usually in the lower extremities^{2, 7}. DVT is divided as proximal or distal. DVT of proximal segment of limbs is referred to as clotting at the popliteal veins level or above, whereas DVT of distal part of limb is rendered as clot affecting the axial calf veins⁸.

Thrombosis in the deep veins and its subsequent complication, i.e., venous thromboembolism is one of the leading causes of mortality and morbidity in people who endured surgery for hip fracture². The incidence of DVT varies from 40% to 60% in most of orthopedic surgeries and having an incidence of fatal PE of 2% to 3% in hospitalized patients for elective hip replacement and 4% to 7% following surgery for hip fracture³. Thrombus usually develops in 29% of patients between 1st to 12th and in 23% of patients, it develops between 12th to 24th post operative days⁴. Among post-op patients, hip and knee surgery carries high propensity for deep venous thrombosis up to 3 months^{3, 7}.

Risk factors that make deep vein thrombosis occurrence more likely, includes; age of more than 40 years, obesity, prior history of DVT, cancer, contraceptive pills, increased duration of immobility after surgery, multiple fractures, and fracture of the pelvis, hip, lower limb³. Among them epidural or spinal anesthesia has 50% less occurrence of deep venous thrombosis as compared to general anesthesia¹. Females also show a greater relative risk for DVT than males^{7, 8}.

DVT can be symptomatic or asymptomatic. Patients manifests with symptoms of pain, swelling, tenderness and discoloration in calf and thigh, with prominence of the veins and fever⁴. Contrast venography is the gold standard for the diagnosis of deep vein thrombosis⁵, among which CT Venography has a high sensitivity and specificity². However, doppler studies are now used for the diagnosis of deep venous thrombosis, due to its safety, effectiveness and easy availability for diagnosing DVT^{1, 2}.

Deep vein thrombosis can be prevented by mechanical means which includes early mobilization, graduated compression stockings, intermittent pneumatic compression devices and venous foot pumps³ and by pharmacologic means which includes aspirin, unfractionated heparin (UFH), low molecular weight heparin (LMWH), adjusted dose vitamin K antagonists (VKA), synthetic Penta saccharide factor Xa inhibitor (fondaparinux) and newer oral anticoagulants (Rivaroxaban and Dabigatran)³. Although **chemoprophylaxis** is offered in routine to patients with major trauma in developed countries, still its regular use in our setup lacking due to sparsity of data. Thus, our study is designed to determine the incidence of DVT in post-op Pakistani population, who have undergone surgery for hip fracture.

MATERIALS AND METHODS:

This study was conducted on 50 consecutive patients who met the inclusion criteria and had proximal femur fractures (fractures of the femoral head, neck of femur and inter- trochanteric fractures). These patients provided their informed consent. On a routine operation list, all patients underwent surgery. During the study period, Doppler Ultrasonography was used to check for the

presence of DVT in all patients undergoing crucial orthopedic surgeries for Total Hip Replacement (THR), Austin Moore Prosthesis (AMP), AO Screw fixation, and Proximal Femur Fracture Fixation by Dynamic Hip Screw (DHS) and Interlocking Nail. A skilled radiologist utilized a 7.5 MHz linear transducer and a 3.5 MHz convex probe to perform Colour Doppler Sonography on all of the enrolled patients. Obese patients were given a 3.5 MHz probe. Three days after surgery, three weeks, and six weeks after surgery, these patients underwent scans. A computer program, SPSS, was used to examine the results' statistical significance.

RESULTS:

The total number of patients were 50. The male to female ratio was 1.2:1, with 27 (54%) men and 23 (46%) women among the patients.

The age ranged 40-85 with mean age of 62 years ± 12.17SD. 15 (30%) patients were below 60 years of age and 35 (70%) patients were 60 years or above.

30 patients (60%) received Spinal Anesthesia and the remaining 20 (40%) were given General Anesthesia.

The mean duration of surgery was 68.10 minutes ± 22.17 SD. The mean duration of post operative stay in ward was 5 days ± 0.70SD. 31(62%) patients remained in ward for 5 days post-operatively, 13 (26%) patients for 6 days and only 6 (12%) patients had 7 days hospital stay post-operatively.

THR was performed in 03 (6%) patients; AMP in 11 (22%) patients, DHS in 28 (56%) patients, AO screw in 06 (12%) patients and Interlocking Nail was performed in 02 (4%). DVT was reported in 9% of cases (01 out of 11) who had AMP surgery, 3.57% (01 out of 28) in DHS group of patients.

Incidence of DVT was 4% throughout the entire research group (02 patients out of 50) and the remaining 48 patients (96%) were found normal during Doppler ultrasonographic examination. Both of these patients were identified with Deep Vein Thrombosis in the initial postoperative phase (3–7 days) and no DVT was identified in the prolonged postoperative period (3–6 weeks) during follow-up Doppler Ultrasonography.

GENDER DISTRIBUTION			
Gender	N	Percentage (%)	
Male	27	54	
Female	23	46	
Total	50	100	
TYPE OF ANESTHESIA			
Type	N	Percentage (%)	
General Anesthesia	20	40	
Spinal Anesthesia	30	60	
Total	50	100	
TYPE OF SURGERY & INCIDENCE OF DVT			
Surgery	n	Percentage (%)	DVT cases
THR	03	06	-
AMP	11	22	01 (9%)
DHS	28	56	01 (3.57%)
AO Screw	06	12	-
Interlocking Nail	02	04	-
Total	50	100	02 (4%)
DURATION OF POST-OP STAY IN WARD			
Days	n	Percentage (%)	
05	31	62	
06	13	26	
07	06	12	
Total	50	100	

DISCUSSION:

In the western world, post-surgical DVT is a well-known complication following significant orthopedic procedures on the lower limb. In complex lower limb orthopedic procedures without any thrombo-prophylaxis, the reported incidence in developed nations ranges from 32 to 88%.^{4, 6} Asians are often thought to have a lower incidence of DVT than people in the West.⁴ The prevalence of DVT in Pakistani patients is however poorly understood, and the majority of our patients requiring these surgeries do not receive any kind of prophylaxis despite their risk profile.

It has been presumed that Pakistani population has a low incidence of DVT⁸. Therefore, it is crucial to investigate how frequently DVT occurs in the population of Pakistan who have hip fracture surgery. Clinicians' ability to make critical decisions regarding thromboprophylaxis in the peri-operative phase will likely be aided by an accurate estimate of the incidence in this ethnic group. As a result, we conducted a prospective study at our facility to ascertain the prevalence of post-operative deep vein thrombosis in Pakistani patients having hip fracture surgery as indicated by Doppler ultrasonography.

Following the repair of proximal femur fractures, up to 24% of patients had venographic proof of post-operative DVT while not receiving pharmaceutical thromboprophylaxis, according to an international and ethnically diverse study conducted in Asia.¹⁰ Similarly, in research conducted using contrast venography by Agarwala et al. found that Indian patients who underwent significant lower limb surgery without receiving chemoprophylaxis experienced a 60% incidence of DVT⁴. The incidence of DVT without thromboprophylaxis in our study was 4%.

The above-mentioned studies, which demonstrate a far higher frequency of DVT than our study, do not correspond with our findings. The fact that the diagnostic approach used in the two trials was different might be the reason of the discrepancy. We used colour doppler ultrasonography to find postoperative DVT while they utilised contrast venography, the gold standard, to diagnose both proximal and distal DVT.

There is a much-decreased incidence of thromboembolic conditions, according to several additional analyses. 147 Indian patients who had major orthopaedic surgery in 2006 for total knee replacement (TKR), total hip replacement (THR), and proximal femur fracture fixation (PFF) without any preventive measures were the subject of the study. The results of the Duplex ultrasound scan revealed that the overall incidence of DVT in the study group was 6.12% (9 of 147 patients).¹¹ Similar results were found in a research on Chinese individuals who underwent serial duplex ultrasonography examinations and were found to have a 5.3% incidence of deep vein thrombosis (DVT) across the ilio-femoral venous region without having received any DVT prophylaxis.¹² One out of one hundred patients in a study from Faisalabad in 1991 presented with sonographic signs of DVT, and neither of them took any kind of thrombo-prophylaxis.¹⁴ In a comparable study, conducted at PIMS in Islamabad to assess the prevalence of DVT following traumatic hip, femur, and knee surgery, only three patients out of 100 showed positive compression sonographic evidence of DVT between the third and tenth postoperative days.¹⁵

In our study, 4% (02 out of 50 patients) of patients having hip surgery had verified DVT via ultrasonography, and none of them had received any DVT prophylaxis. Our study's findings are comparable to those of the studies mentioned above, which likewise found a very low prevalence of DVT and confirmed that Asian patients had a substantially lower incidence of the condition than people in the West.

Our findings imply that the incidence of DVT among Pakistani patients is minimal and not comparable to populations in the United States and Europe. The variations could be attributable to dietary and lifestyle variations as well as genetic variations between the populations.¹⁶ Factor V Leiden has recently been speculated as a thrombosis risk factor, It has been determined that patients with Factor V Leiden have a relative thrombosis risk that is more than ten times higher than that of patients with protein C, protein S, or antithrombin III deficiency.¹⁷ During a screening of 4047 people in the US, factor V leiden was discovered in 5.27% of Caucasians and 0.45% of Asians. It's

possible that the variation in DVT incidence is due to this variation in Factor V Leiden prevalence.^{13,18}

The greatest likelihood of deep vein thrombosis was discovered by Sikorski, Hampson, and Staddon to be on day 4 following surgery, and they hypothesized that the probability of thromboembolism is small after day 17. Our two DVT cases both happened in the first few days following surgery. This was in agreement with the results indicating that early postoperative phase is when DVT is most prevalent, as opposed to late rehabilitation phase.^{19,20}

Deep vein thrombosis (DVT) is a disease of ageing, and being older is an established predictor for developing it.^{7,8} Our DVT-positive study participants were both older than 60 years old and belonged to the older age group.

Females possess a greater risk of postoperative DVT^{21,22}. The fact that both of our DVT-positive patients in our study were female supports the findings mentioned above.

General anesthesia increases the risk of venous thrombosis.^{23,24} Spinal or regional anesthesia reduce this risk of post operative DVT in comparison with general anaesthesia.^{25,26} In the present study, both patients who developed deep venous thrombosis were operated under general anesthesia.

Comparing femoral neck fracture surgery to other procedures like total knee and total hip replacement, DVT occurred more frequently after the femoral neck fracture surgery.²² In the current evaluation, DVT emerged in patients who had intertrochanteric fractures and fractures of the neck of the femur, but no cases of DVT were discovered in patients who had total hip replacements. Our results lend support to the studies mentioned above in this regard.

CONCLUSION

The study shows that the incidence of deep vein thrombosis (DVT) is significantly lower (4%) in Pakistani patients receiving lower limb orthopaedic surgeries than in Western populations. It implies that standard thromboprophylaxis might not be essential for all patients and that it should be tailored to each individual, particularly those at higher risk. The findings, however, are based on limited research, emphasising the necessity for larger, multi-center studies across varied patient populations to back up these findings.

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