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INCIDENCE OF DEEP VEIN THROMBOSIS IN PATIENTS WITH FRACTURE AROUND HIP: A PROSPECTIVE STUDY USING SERIAL COLOUR DOPPLER ULTRASOUND

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Abstract:

Background: The incidence of DVT in Asian countries has been presumed to be low and is not comparable to the western literature.

Method: The current article is based on a prospective study carried out on 95 Indian patients. All patients undergoing Hip arthroplasty and internal fixation of fractures around hip were enrolled for the study. A pre operative colour Doppler ultrasound was carried out to screen all the patients for pre operative DVT, followed by a postoperative scan on 4th and 10 postoperative day.

Results: Seven patients were found to have developed proximal DVT during hospitalization. Five patients was found to have DVT in the injured leg preoperatively. The prevalence of preoperative DVT was 5.26%. The incidence of postoperative DVT was 2.22%.

Conclusion: while the incidence of DVT was relatively low in our study still we believe that postoperative DVT is as common in the Indian population as any other parts of the world and routine prophylaxis for DVT in high risk patients should be recommended.

Keywords: Deep vein thrombosis, colour Doppler ultrasound, prophylaxis

Introduction

Deep vein thrombosis (DVT) and its sequelae continue to be an important cause of morbidity and mortality in patients with fracture around hip.¹ These patients are considered to be at increased risk for thromboembolic disease even before operative treatment because of trauma, immobilization and other factors such as advanced age, obesity and associated medical problems.² Virchow identified three categories of risk factors for DVT. Stasis, hypercoagulability, and vessel wall injury (Virchow's triad) are the 3 major contributing factors to the pathogenesis of venous thrombosis. Any of these factors can be activated during and after a major surgical procedure or injury of the hip and pelvis.³ The majority of thromboses in hip surgery patients involve the deep veins of lower extremities.

The Homan's sign of discomfort in the upper calf on dorsiflexion is misleading. The clinical assessment of DVT of the lower limb is notoriously unreliable, being correct in only approximately 50% of cases, or less. Lower limb venography is currently accepted as gold standard modality. However it is invasive and may cause allergic reactions, contrast induced thrombosis or nephrotoxicity. Real time ultrasound has consistently proven to be accurate in the diagnosis above knee venous thrombosis. Colour Doppler ultrasound is a new technical development that provides a combination of real time imaging and a dynamic colour vascular images. It has advantage of combining the compression sonographic technique, which has already been well established with colour venous flow in a manner analogous to venography^{4,5}

It has been presumed that Indian patient population has a very low

incidence of DVT if any. Kakkar *et al* in their review article have stated that the Indian perspective on this topic is lacking due to the non-availability of published Indian data.⁶ Some recent studies report an increasing incidence of VTE in the Indian subcontinent. We aim to investigate the prevalence of DVT prior to surgery and incidence of postoperative DVT in Indian patients undergoing surgeries for fracture around hip and to determine if prophylaxis should be recommended.

Material And Methods

In this prospective study, we recruited a total of 95 consecutive Indian patients who had suffered acute hip fractures and were admitted to PGIMS Rohtak Haryana between September 2009 and January 2011. No chemoprophylaxis against DVT, elastic compression stockings, or foot pumps were used. Patients with age fifty years and above scheduled for fracture fixation and joint replacement were included in the study. Exclusion criteria were patients who had a history of DVT, who suffered pathological fracture, or who had a known coagulation disorder. Of the patients, 69 suffered intertrochanteric femoral fracture, 3 suffered subtrochanteric femoral fracture, 19 suffered femoral neck fracture, 1 suffered fracture acetabulum, 1 suffered dislocation hip and 2 were having avascular necrosis of hip.

All the patients were interviewed and investigated for predisposing risk factors like diabetes mellitus, hypertension, smoking and obesity. They were evaluated daily for clinical signs and symptoms of DVT like pain and swelling of leg, calf tenderness and erythema during their course in hospital. Color doppler ultrasonography of both

lower extremities were performed preoperatively on 4th and 10th post operative day in every patient. Colour Doppler sonography was done with high resolution broad band linear array transducers of 7.5MHz-13MHz frequency in supine position with leg slightly externally rotated for common and superficial femoral vein. They were visualized in both transverse and longitudinal axis. Then patient was turned into lateral decubitus position with knee flexed approximately 30° for popliteal and calf veins. All venous segments were assessed for compressibility, intraluminal echogenicity and venous flow pattern both spontaneous and after distal calf compression. A diagnosis of DVT was made by detection of non-compressible intraluminal thrombus, diminished augmentation and lack of or poor flow. In DVT positive patients LMWH subcutaneously was started once daily initially and controlled by activated partial thromboplastin time (APTT). Oral anticoagulant was added on 3rd day and overlapping was done for next 3 days after which LMWH was switched off and patient remained on oral anticoagulants. The dose of oral anticoagulant was monitored with international normalized ratio (INR).

Results

Details of patients developing DVT

Patient no.	Age /Sex	Hip Pathology	Operative procedure	Site of thrombus	Time diagnosed
1	60M	Trochanteric fracture	DHS	Proximal	Preoperatively
2	55M	Trochanteric fracture	DCS	Proximal	10th Postoperative day
3	52M	Neck of femur	Blade plate	Proximal	Preoperatively
4	65M	Trochanteric fracture	DHS	Proximal	Preoperatively
5	61M	AVN Hip	THR	Proximal	10th Postoperative day
6	50M	Fracture Dislocation of hip	Conservative	Proximal	Preoperatively
7	60F	Fracture Acetabulum	Conservative	Proximal	Preoperatively

TOF denotes intertrochanteric femoral fracture, NOF femoral neck fracture, DHS denotes dynamic hip screw fixation, DCS Dynamic condylar, AVN Avascular necrosis.

The mean age of the 95 patients was 63 years and the sex ratio was 48 males to 47 females.

Standard orthopaedic operations were carried out including: dynamic hip screw fixation in 58 patients, dynamic condylar screw fixation in 12 patients, hemiarthroplasty in 14 patients, multiple cancellous screw fixation in 3 patients, blade plate fixation in 4 patients, THR in 2 patient and 2 were treated conservatively.

Seven patients were found to have developed proximal DVT during hospitalization. Five patients was found to have DVT in the injured leg preoperatively. The prevalence of preoperative DVT was 5.26%. The remaining 2 patients had negative preoperative scans but developed DVT postoperatively. The incidence of postoperative DVT was 2.22%. Postoperative DVT was detected on colour Doppler done on 10th

post operative day. In our study, the incidence of proximal DVT was found to be higher in the injured limb than the non-injured limb.

However, the differences were not statistically significant. In our series of 95 patients, 34 patients had clinical features of DVT post operatively. Among them 5 patients (14.70%) were diagnosed DVT positive. All these patients were subsequently started on LMWH and oral anticoagulants and were discharged without any complication. None of the patient in our study developed clinical pulmonary embolism during hospitalization.

Discussion

Hip fracture is one of the common orthopaedic conditions encountered. Western literature reports a higher incidence of DVT after hip surgery in the absence of prophylaxis. It is reported to be as high as 50% of which 20% to 30% are in proximal veins. The practice of prophylactic prevention of DVT is based on western literature.^{7,8} The incidence of postoperative deep vein thrombosis in

Indian population has been considered as insignificant to recommend general thromboprophylaxis. This assumption is based on the few Asian studies reporting low incidence of DVT in hospitalized patients varying from 4% to 9.7%.⁹⁻¹² Dillon et al reported 62.5% incidence of postoperative DVT in 88 Malaysian patients.¹³ Chotonaphuti reported 47.9% post operative DVT in 96 Thai patients.¹⁴ Recently higher incidence of postoperative DVT has been reported in studies conducted in indian subcontinents by Sen et al(28.6%)¹⁵, Agarwala et al (52.1%)¹⁶, Sharma et al(19.6%)¹⁷ Agarwala et al(34.44%)¹⁸.The prevalence of preoperative DVT in our study was 5.26% (5/95) and 2.22% (2/90) have postoperative DVT.

Several limitations of the current study should be considered. First, in current practice, DVT can be diagnosed using ultrasonography, venography, or CT angiography. The possible explanation of low incidence of DVT in our study is that we used serial duplex ultrasound to screen for DVT before and after hip operation. Duplex ultrasound is non-invasive and repeatable but less accurate for the calf and pelvic veins and in asymptomatic patients. Venography was done in most of the studies showing a higher occurrence of DVT. Venography is considered as gold standard for detecting DVT; however, we did not use it as the screening tool because it is invasive and can cause thigh or calf pain, allergic reactions, local ulceration at the site of contrast injection, and venous thrombosis.¹⁹ It is also impossible to perform the test before surgery because patients with hip fracture are unable to stand up. In addition, technical difficulties of venography remain such as failure in filling the deep femoral vein and the

unreliability of contrast enhancement of the muscular branches of the calf veins. As the sensitivity of venography is substantially higher than that of ultrasonography, the diagnostic method could affect the incidence of DVT.

Second, previous studies report that VTE risk persists up to 90 days after surgery and beyond hospital stay²⁰. In our study all the patients were investigated for DVT with colour Doppler only during hospitalization (upto 14 days). All the patients were evaluated clinically for minimum upto 3 months after discharge. Since clinical examination is unreliable in detecting DVT significant number of patients with DVT might have been remained undiagnosed.

In summary we believe that DVT is more common among Indian patients than generally reported. Our study supports the literature that clinical methods alone are inadequate in the diagnosis of DVT. Many institutions now include Computed tomographic venography and pulmonary angiography (CTVPA) as their initial diagnostic examination for suspected VTE and has been shown to be a accurate imaging study for thigh veins in comparison with lower extremity sonography. It readily and rapidly permits evaluation of inferior vena cava, pelvic veins, and all of the superficial venous system.²¹ Further studies implementing recent imaging modalities are required to study incidence of DVT in Indian patients to justify routine chemoprophylaxis for DVT.

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