

Prospective Study of Incidence of Deep Venous Thrombosis in Patients Undergoing Lower Limb Arthroplasty

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ABSTRACT

Background: Ongoing study is an effort to find out, do timely intervention & to treat patients of DVT in patients undergoing lower limb arthroplasty as the complication could be disastrous.

Material & Method: This prospective study was carried out in the department of Orthopedics & center of joint replacement in Ananta Institute of Medical sciences from Sept 2016 to Aug 2017 with assistance from department of Radiodiagnosis. Total of 40 patients were included in the study who have undergone total or hemi replacement. On the day of admission duplex ultrasound scanning with color Doppler was done & repeated after the desired procedure. Pre & post-surgery scan were compared & outcome of the comparison was evaluated.

Conclusion: In our study very few patient developed DVT & none had pulmonary embolism & other serious adverse effect of DVT. Although no serious complication happened but it has a potential of producing life threatening complication so all the precious life specially elder, have to be closely monitored & necessary action i.e. prior color Doppler, anticoagulation,

immediate post-surgery physiotherapy, DVT pump, should be taken before & after major lower limb orthopedic procedure.

Keywords: Deep Venous Thrombosis, Pulmonary Embolism, Arthroplasty, Color Doppler.

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INTRODUCTION

By definition Deep Venous Thrombosis (DVT) is the formation, development or existence of blood clot or thrombus in the deep vascular system of veins. Literature suggests that DVT of the lower extremity is a major cause of morbidity & mortality in patients undergoing major orthopedics surgery.

DVT causes morbidity & mortality both by its behavior in the deep veins and by embolisation to the lungs and other parts of the circulation. Because DVT & pulmonary embolism (PE) are a single disease, it is misleading to consider the two conditions separately. Prospective study in patients with proven DVT but without any signs or symptoms to suggest PE find that roughly half of these 'asymptomatic' patients have experienced undiagnosed PE. The more precise the test, the more it appears that virtually every case of DVT embolizes to some extent. With or without PE, DVT may be occult. Two thirds of the patients with proven PE have no DVT symptoms, and one third of the time it is impossible to find the original site of DVT. The Virchow Triad, as first formulated (ie venous stasis, vessel wall injury, hypercoagulable state), is still

the primary mechanism for the development of venous thrombosis. The relative importance of each factor is still debated. Once formed, the fate of a thrombus depends on the persistence of factors involved in its formation. Many will spontaneously lyse or will be reduced in size, but others may extend & embolize posing a threat to the patient.

Idea behind our study is that DVT is one of the most common complication of lower limb arthroplasty. Though the reported incidence of DVT is very high that of proximal is low and that of PE is very low.

Hence the prophylaxis for DVT remains controversial. Also the incidence of DVT is based on various studies in European & American populations. The Asian population is genetically & socially quite different from American & European, and incidence of DVT can be quite different.

The studies suggests that 40- 60 % of incidence rates among Western population, undergoing lower limb arthroplasty whereas, low as 4-6 % & as high as 40 -60 % incidence rates have been

observed among Asian population. In Indian context the reported rates are low 8-10 % to as high as 20-30 %. So the bias among previous studies needs further evaluation to know the incidence rates among Indian population.

AIMS & OBJECTIVES

- To investigate the incidence of DVT developing in Indian population under going lower limb arthroplasty.
- To analyze risk factors leading to DVT in such patients.
- To correlate positive cases with probability score.
- To analyze & review the available literature on the subject.

MATERIALS & METHODS

This is the prospective incidence study started from September 2016 & finished in August 2017 in the department of Orthopedics at Ananta Institute of Medical Sciences, Rajsamand, Rajasthan.

Inclusion Criteria

- 1) Patients who had undergone lower limb arthroplasty (Hemi or Total arthroplasty of hip, Total Knee Replacement).
- 2) No history suggestive of previous episode of lower limb DVT.
- 3) No DVT prophylaxis till the Doppler examination.

Exclusion Criteria

- 1) Pathological fractures
- 2) Patients who has DVT prior to the surgery.
- 3) Patients not consenting for the color Doppler examination.

42 patients were included in the study for a period of one year. Among these 2 patients were excluded from the study as they had

DVT prior to surgery detected by the color Doppler. All patients who had undergone lower limb arthroplasty were included in the study, who prior to surgery were not having DVT. No antiplatelet or anticoagulation medication was used. 6 patients who were given prophylaxis with LMWH were excluded. 2 patients were also excluded as they had history suggestive of DVT. Patients were advised to move the ankle joint & quadriceps exercise immediately after the surgery. After a bed rest of 3 days patients were mobilized using walker. Pre operatively US scan was done to detect DVT was completed for all patients and postoperatively was repeated between day 4 & 14.

Each lower limb was scanned from the inguinal region to the level of ankle, including visualization of common femoral, popliteal, peroneal, posterior & anterior tibial vein, deep soleal vein.

Detailed history of present & past illness taken with history of risk factors along with detailing about period of immobilization. Clinical examination included inspection of lower limbs, swelling or tenderness over calf noted.

The calf circumference of injured & uninjured limbs were taken. Results were evaluated as according to Pre-test probability score. Pretest probability score of patients were calculated using the clinical decision rule (CDR) proposed by Wells PS et al & then patients were categorized as low, moderate or severe risk of developing DVT.

Investigation of choice in our study was duplex ultrasound scanning with color flow imaging as it is noninvasive, simple, does not alter the course of disease, sensitive (92-95 %), specific (97 – 100 %) and having positive predictive value of 100 %.

Table 1: Wells Pre-test Probability Scoring System

Clinical finding	Score
Active cancer	1
Paralysis, paresis or recent cast immobilization of lower extremity	1
Recently bedridden >3 days or major surgery within 4 weeks of application of CDR	1
Localized tenderness along distribution of deep venous system	1
Entire lower extremity swelling	1
Calf swelling by > 3 cms compared with asymptomatic opposite lower limb.	1
Pitting edema	1
Collateral superficial veins	1
Alternative diagnosis as likely or greater than that of deep vein thrombosis	-2

All the individual points are added to obtain full score, which decides the probability of developing DVT-

- Total score 0 or < 0 = Low probability.
- Total scoe 1 or 2 = Moderate probability.
- Total score equal to or > 3 = High probability.

OBSERVATIONS

Patient Profile & Demography

40 patients included in the study but 2 patients had DVT before surgery thus in the last 40 patients were the part of study.

In our study 32 patients had undergone hemiarthroplasty & 8 patients had undergone total hip replacement.

Age of Patients:

Minimum age: 28 yrs

Maximum age: 80 yrs

Mean age: 55.97 yrs.

Mean age of patient undergoing THR: 36.37 yrs.

Mean age of patient for hemiarthroplasty: 63.18 yrs.

- Percentage of females in study: 52 %.
- Fracture neck of femur was the most common reason for patient undergoing lower limb arthroplasty.
- Most common mode of injury for fracture neck of femur was trivial trauma due to fall while walking at home.
- Most of the patient who had undergone lower limb arthroplasty had a pre-test probability score of 2 on day 4 after surgery.
- Largest number of patients i.e. 85 % comes into moderate group.

- Most of the patients i.e. 52 % had a pre-test probability score of '2'.
- 5 patients (12.5 %) developed DVT, which was picked up on the duplex scan.
- None of the positive patients developed fatal pulmonary embolism or signs & symptoms of PE.

Table 2: Overall incidence of DVT

Total no. of patients	Patients positive for DVT	Patients negative for DVT	Percentage of positive patients
40	5	35	12.5%

Table 3: Age wise distribution of patients

Age group	No. of Patients
25-40	7
41-55	08
56-70	23
71-85	02
Total	40

Table 4: Age wise distribution of patients positive for DVT

Age group	No. of positive patients
25-40	01
41-55	00
56-70	03
71-85	01
Total	05

Table 5: Age wise percentage positivity

Age group	Positive Patients	Total Patients	Percentage Positivity
25-40	1	7	1.43
41-55	0	8	0
56-70	3	23	13.04
71-85	1	2	50

Percentage positivity was maximum in the 71-85 years age group & quite high above 60 years of age.

Table 6: Sex wise distribution of patients

Sex	No. of Patients
Males	19
Females	21
Total	40

Table 7: Sex wise distribution of Patients positive for DVT

Sex	No. of Positive Patients
Males	02
Females	03
Total	05

Table 8: Treatment wise distribution of Patients

Group	No. of Patients
Hemiarthroplasty	32
Total hip Arthroplasty	08
Total	40

Table 9: Treatment wise distribution of patients positive for DVT

Group	No. of Patients
Hemiarthroplasty	04
Total Hip Arthroplasty	01
Total	05

Table 10: Period of Immobilization in different groups

Hemiarthroplasty	3.12
Total Hip Arthroplasty	4.75

Table 11: Pre-test probability score wise distribution of patients

Score	No. of patients
0	0
1	13
2	21
3	05
4	01
5	00
Total	40

Table 12: Probability wise distribution of Patients

Probability	No. of Patients
Low	00
Moderate	34
High	06
Total	40

DISCUSSION

In our study, the overall incidence of DVT in all patients undergoing lower limb arthroplasty was 12.5 %. Maini PS et al¹ in their study of fracture of neck of femur treated with Bipolar Hemiarthroplasty found 9.9% incidence rate of DVT in 2006.

Bhan S, Dhaon BK² reported 7 cases out of 30 patients who did not receive any form of prophylaxis for DVT in patients undergoing lower limb arthroplasty in study conducted in 2004.

Young – Hoo Kim et al³ in 2007 in their study reported incidence of DVT in 26 % of patients who had undergone THR bilaterally & 20 % incidence rate in patients undergoing unilateral THR. Piovella et al⁴ in 2005 reported 0.5 % incidence rates of PE following major orthopedic surgery.

In our study 40 patients were examined. The study population had a mean age of 55.97 years with range of 28-80 years. Mean age in patients undergoing hemiarthroplasty was 63.18 years. Mean

age in THR group was 36.37 years. Maini PS et al examined 270 patients with mean age of 69.80 years. Young Hoo Kim et al³ in 2007 reported that advanced age does not seem to effect DVT probability.

HTWE M. Zan et al in 2002 reported that beyond age of 40 years & specially after 60 years the relative risk VTE increases exponentially in both men & women.

In our study females constituted 51.5 % of study population & males constituted 49.5 % of population.

In our study on analyzing the age distribution of patients developing DVT, it was found that the maximum incidence of DVT 50 % was in the age group 71- 85 years. The incidence of DVT was higher than overall incidence of 12.5 % in patients with > 60 years of age. Similar conclusion was given by Kakkar VV et al⁵ in their study titled –“DVT of the Leg”. Are there any risk factor?

In our study on analyzing the incidence of DVT in different sex, it was found that the females had an incidence of 14.28 % which was greater than overall incidence. It appears that females are at high risk as far as DVT is concerned while undergoing major lower limb arthroplasty.

In our study, on comparing the incidence of DVT in different groups as per the mode of treatment, equal incidence was seen in patients treated surgically with THR or hemiarthroplasty. This signifies that age factor plays a definitive role in DVT, as the mean age of the patients in THR group was 36.37 years significantly lower than mean age in hemiarthroplasty group which was 63.18 years. This correlates with the previous studies in which there was steep rise in DVT rates in the patients if they were aged > 60 years at the time of surgery.

In our study, on analyzing the individual incidence of DVT in different probability groups and probability scores as per the pre-test probability scoring system devised by the Wells PS et al. it was found that the incidence was 100 % if the score was 4 or above & DVT developed invariably in all these patients. Also acute rise in the incidence was seen, from 9.52- 40 %, when moved from a score of 2 to 3. Incidence in the different probability groups showed the same trend. 5.88 % in the moderate group & 50 % in high probability group. This also showed acute rise in the incidence in going from moderate to high probability.

These estimates are comparable with the earlier studies by Wells PS et al & colleagues in which the estimates were found to be 5.6%, 14.1% & 47.4% in these probability groups respectively.

The data clearly shows that the probability scores correlate closely with the risk of developing DVT. Thus these diagnostic scoring systems can be an important tool to identify the patients at a greater risk and subject only these patients to further workup. This can also help to reduce the number of unnecessarily ordered investigations.

CONCLUSION

As evident by the present prospective study, DVT is common entity in orthopedics in patients undergoing major lower limb surgery like Hemi or Total arthroplasty, although it does not pose a major threat in most cases as it remains asymptomatic in large numbers & life complicating PE is rare.

But these patients have to be closely monitored as PE cannot be predicted & negligence could be disastrous & chances of PE increases exponentially with age. So keeping this fact in the mind, close monitoring, simple color Doppler of lower limbs & anticoagulation therapy can significantly improve the outcome of the major orthopedics surgery, the counts of which is expected to rise as increase in life expectancy thus reducing the financial & health burden.

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