

## OCCURRENCE OF DEEP VEIN THROMBOSIS IN SPINAL CORD INJURED PATIENTS

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### ABSTRACT

The aim of this descriptive study was to describe the occurrence of Deep Vein Thrombosis (DVT) in spinal cord injured patients. 50 patients of both sexes (43 men and 7 women) with less than 90 days duration of injury and without other risk factors of DVT were studied over a period of two years. Most of the patients were in 20-39 years age group. They were evaluated for DVT on development of clinical signs or completion of 90 days of injury by Duplex Ultrasound Scan. DVT was found in 6 subjects (12%), all were male. One patient had bilateral, two had right sided and three had left sided involvement. None of the patients with incomplete spinal cord injury developed DVT. DVT is not a rare complication as is considered commonly and therefore requires adequate prophylactic measures in patients with concomitant various risk factors.

**Keywords:** Deep vein thrombosis, spinal cord injury

### INTRODUCTION

Spinal cord injured patients are at high risk of developing DVT after sustaining injury [1]. The incidence of DVT in spinal cord injured patients is estimated at 12-100% by various investigators depending upon the method of study [2,3,4,5].

The most dangerous complication of DVT is pulmonary embolism (PE), which varies from 8-14%, with a mortality rate of 2.5-4.7%. Although early thrombi may form in the iliac and femoral veins, the commonest site for the development of DVT is in the calf [4].

In general, deep vein thrombosis and venous thromboembolism is considered to be rare in Asian and Oriental patients. Therefore, the study of venous thromboembolism (VTE) in Asian populations, in general, has attracted limited attention [6].

The study was carried out to observe and document the occurrence of Deep vein

thrombosis during first three months of SCI in 50 patients. The need of the day is to create awareness about the prevalence of this important complication and its prevention.

### MATERIALS AND METHODS

A descriptive study was carried out from June 2000 to June 2002 at Armed Forces Institute of Rehabilitation Medicine and Rehabilitation Medicine departments of Combined Military Hospital (CMH) and Military Hospital Rawalpindi (MH) which is providing tertiary health care facilities to personnel of the Armed Forces and their families.

Fifty adult patients of spinal cord injury of both sexes were admitted in rehabilitation medicine wards of Military Hospital, Combined Military Hospital Rawalpindi and Armed Forces Institute of Rehabilitation Medicine Rawalpindi.

It was a purposive sampling. Sample population had to be small as traumatic spinal cord injuries are not very common

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amongst the armed forces personnel and most of injuries sustained at forward defence lines are usually fatal.

The following exclusion criteria were observed to select the patients of spinal cord injury for the study:

- a) Post injury period more than three months post injury.
- b) Associated injury to lower limbs.
- c) Patients on drug prophylaxis for the DVT due to any reason.
- d) Presence of risk factors for developing deep vein thrombosis i.e. varicose veins, use of oral contraceptive, pregnancy, previous history of DVT, age over 60 years, malignancy and thrombophilia.

Patients were transferred to rehabilitation medicine wards of CMH and MH Rawalpindi from Neurosurgical and Orthopedic Departments of the same hospitals and from peripheral hospitals of Armed forces all over the country. No patient was given any drug prophylaxis. Routine care of patients included turning them every two hours, exercise therapy; both passive and active, chest physical therapy and Tubigrip® pressure stockings of appropriate sizes. Bladder and bowel management was carefully achieved. Every patient was clinically examined for the possible presence of DVT in lower limbs, as follows:

- a) Swelling of entire leg.
- b) Calf swelling more than 3 cm on asymptomatic side (10 cm bellow inferior, patellar margin)
- c) Pitting edema confined to the symptomatic leg.
- d) Collateral superficial veins (non-varicose).

The laboratory investigations were carried out as per (Table-1).

All patients underwent duplex ultrasound scan of lower limbs. Laboratory

investigations were carried out immediately when patient developed signs of DVT. In patients who did not develop signs of DVT, duplex scan was carried out on completion of 90 days of injury. Doppler ultrasound machine LOGIC ® 500 by GE, USA was used duplex and color Doppler of common femoral vein, superficial femoral vein and popliteal vein.

Plain radiographs of the limb were also done and serum alkaline phosphatase level was measured in every patient suffering from DVT in order to exclude pathological fracture and heterotopic ossification.

## RESULTS

DVT was found in 6 (12%) out of the total 50 patients. This occurrence is quite high as compared to the other studies carried out in Pakistan [8,9].

A total number of 10 different thrombi were observed in 6 patients. Six proximal and four distal thrombi were found. Out of 6 patients, 4(8%) had multiple thrombi. There was bilateral involvement of legs in one patient (2%), whereas patients three (6%) had thrombi in left side while two (4%) had on right side.

Two cervical (28.57% of total cervical group), 4 thoracic (15.38% of total thoracic group) and none of lumbar patients developed DVT (Table-3).

According to American Spinal Cord Injury Association (ASIA) impairment scale is presented in (Table-4). A number of 39 patients had a complete while 11 patients had a partial lesion of spinal cord. None of the patients developed DVT who had incomplete lesion, as shown in (Table-5).

Nine (18%) out of 50 patients showed increase in leg circumference at some time during their admission. Five of these patients had thrombosis. The remaining patients had negative duplex scan. Further investigations revealed development of heterotopic

ossification in two patients and lymphatic obstruction due to tight pressure stockings in other two. Increase in local temperature was detected in three (6%) patients who had developed DVT.

DVT was found in one patient alongwith the presence of Ashworth grade 2 spasticity. Rest of the patients of DVT did not develop spasticity till the time they were diagnosed for DVT.

One patient was diagnosed to have developed pulmonary embolism on lung perfusion scan. He underwent investigations when he complained of shortness of breath.

## DISCUSSION

Myllynen found the rate of DVT in SCI patients with no prophylaxis as 100% [10], Merli 48% [7], and Patteja 67% [8] by using Fibrinogen uptake test. Geerts found it to be 81% [7] and Gunduz 53.3% [4] using venography. Kulkarni found the rate to be 26% [11] by clinical diagnosis. Afzal reported the rate as two percent in major surgical procedures by using I125 Fibrinogen uptake test [7]. Masood Umar reported 3.31% rate of venous thromboembolism in their retrospective study of admitted cases [8]. The literature survey did not reveal any similar study in patients of spinal cord injury in Pakistan. Studies in other Asian centers on patients suffering from general surgical problems reported DVT rates ranging from 3% - 19.1%[12,13,14] which appeared to be less than in Caucasian populations where post surgical DVT rates ranged from 6% - 35%[15].

The occurrence of DVT calculated in our study is quite low (12%) but the finding is significant to be considered for further evaluation in routine drug prophylaxis amongst high risk patients. There may be contribution of racial, geographical and dietary factors in the development of DVT which are responsible for this low rate finding in our study.

**Table-1: Laboratory Investigations carried out in the subjects studied.**

<b>In All patients</b>	- Blood Complete Picture - X-ray chest Postero-anterior view - ECG - Duplex ultrasound scan(lower limbs)
<b>Who developed DVT</b>	- d-dimers - Fibrin degradation products (FdP) in Plasma - Alkaline phosphatase level in serum - Plain radiographs of involved limb

**Table-2: Age and sex distribution in Patients of DVT.**

Age group	Patients	Male	DVT	Female	DVT
20-29 Yrs	17	14	1	3	-
30-39 Yrs	19	15	3	4	-
40-49 Yrs	9	9	1	-	-
50-59 Yrs	5	5	1	-	-

**Table-3: Distribution of patients with spinal level so injury and occurrence of DVT.**

Neurological level	Patients	DVT
Cervical	7(14%)	2(28.6%)
Thoracic T-1 to T-6	8(16%)	1(3.8%)
Thoracic T-7 to T-12	18(36%)	3(11.5%)
Lumbar/Cauda equina	17(34%)	-

**Table-4: ASIA impairment scale for completeness.**

<b>Complete</b>	No sensory or motor function in the sacral segments S4-S5.
<b>Incomplete</b>	Sensory but not motor function is preserved below the neurologic level and includes sacral segments S4-S5.
<b>Incomplete</b>	Motor function is preserved below the neurologic level, and more than half of the key muscles below the neurologic level have a muscle grade less than 3.
<b>Incomplete</b>	Motor function is preserved below the neurologic level and at least half of key muscles below the neurologic level have a muscle grade greater than or equal to 3.
<b>Normal</b>	Sensory or Motor function are Normal.

ASIA\*-American Spinal Cord Injury Association

**Table-5: Distribution of patients and occurrence of DVT according to the ASIA classification for the Completeness of lesion.**

ASIA Class	Patients with %	DVT
A	39(78%)	6(15.4% of total 39)
B	2(4%)	-
C	3(6%)	-
D	6(12%)	-

**Table-6: Causes of spinal cord injury.**

Cause of trauma	No of patients
Fall from height	24
Road traffic accident	11
Gun shot wound	6
Others	9

Although the period of greatest risk for VTE is the acute care phase, symptomatic DVT and PE also occurred during rehabilitation phase. Chen found that 10% of 1649 patients admitted to 18 SCI rehabilitation units developed DVT and 3% had PE [2]. Based on this evidence, it has been recommended that DVT prophylaxis be continued for a minimum period of 3 months (or at least until the completion of rehabilitation phase) in patients with acute SCI [16,17].

We acknowledge that present study may have flaws because of certain in built biases; all patients belonged to a specific group of population (Armed Forces personnel and their families), who serve in peculiar circumstances. Technical problems while performing duplex ultrasound scan might have played some role in effecting the data. On the basis of these shortcomings, we should not draw concrete conclusions. However, certain important trends and patterns are worth recording. The patients who come earlier in Rehabilitation Medicine Ward showed the lower rate of this complication (only 1 out of total 6). This might be the outcome of regular range of motion (ROM) exercises, Tubigrip® pressure stockings and chest physiotherapy in the ward.

Very little work has been done in this field in Pakistan. Present study is a preliminary work to stress the need and importance to recognize the complication of DVT in SCI patients population. However, we are not certain that in which patients routine prophylaxis is indicated.

## CONCLUSION

Deep vein thrombosis and its consequent pulmonary embolism represent a serious complication in spinal cord injured patients. However, further investigations are required to find out the factors responsible for the less common occurrence of DVT in this part of the World. It is suggested that a multi-center prospective study may be conducted to assess

the real occurrence of DVT and the role of drug prophylaxis in SCI patients with in Pakistan.

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