

# Factors Affecting Recanalisation after Optimal Management of Deep Vein Thrombosis; A single institution based study

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## ABSTRACT

### Background

Presence of recanalisation will favour for better physiological recovery after medical management of Deep Vein Thrombosis (DVT) along with lesser chances of post thrombotic syndrome. Rate of recanalisation is varied and can range from 43-57% and the factors that affect recanalisation are still a dilemma.

### Objective

To know the factors for recanalisation following Deep Vein Thrombosis.

### Method

This is a single institution based retrospective-prospective analytical study encompassing all ultrasonologically diagnosed cases of Deep Vein Thrombosis in adults from January 2015 to November 2017. All the cases were admitted with oral warfarin bridged by Heparin/ Enoxaparin and were discharged once International Normalization Ratio was in therapeutic range. The patients were followed up for three months with minimal of three outpatient followup. Best finding in the doppler ultrasonography (done by Acuson P500, Seimens) in relation to recanalisation was taken for the study.

### Result

There were 67 cases of Deep Vein Thrombosis. Of these cases male to female ratio was 0.91. The mean age was 48.07. Most common extent was up to common femoral vein (47.8%) followed by upto popliteal vein (40.3%). Remaining 11.9% had extension upto iliac veins. There was no recanalisation in 2 cases (3%). Partial recanalisation was seen in 23 cases (34.3%) while complete recanalisation was seen in 42 cases (62.7%). Recanalisation is more in DVT involving popliteal vein while it decreases as the extension goes up. In contrast to 79.4% complete recanalisation in popliteal vein, that in common femoral vein is 62.5% while in iliac vein is only 37.5%. Mean age in no recanalisation group is much younger than partial or complete recanalisation groups.

### Conclusion

Recanalisation following Deep Vein Thrombosis distal to popliteal vein is more than that in proximal Deep Vein Thrombosis. The information on recanalization can be considered to use to decide upon the duration of medical management of Deep Vein Thrombosis.

## KEY WORDS

*Deep vein thrombosis, Doppler ultrasonography, Recanalisation*

## INTRODUCTION

Deep vein thrombosis (DVT) is presence of thrombus in deep system of veins and commonly affects lower limb veins. DVT can have complication pertaining to the limb in the form of Chronic Venous Insufficiency (CVI) or sometimes can cause life threatening condition as Pulmonary Embolism. As of now, appropriate prolonged anticoagulation is main stay of management with the aim of limiting thrombus extension and recanalisation. Presence of recanalisation will favour for better physiological recovery after medical management. Absence of recanalisation or delayed recanalisation are known predictors for development of post thrombotic syndrome which is a dreaded complication of DVT.<sup>1,2</sup> Rate of recanalisation is varied and can range from 43-57% and the factors that affect recanalisation are still a dilemma.<sup>3</sup> In our study, we are trying to unravel some of the factors that can predict recanalisation of the diseased vein segment following DVT.

## METHODS

This is a single institution based retrospective-prospective analytical study encompassing all ultrasonologically diagnosed cases of DVT in adults from January 2015 to November 2017. Cases with malignancy, pregnant ladies and patients using warfarin for other indications were excluded from this study. Institutional approval from ethical committee was taken for the study. Informed consent was taken from each participant. All the cases were admitted with oral warfarin bridged by Heparin/Enoxaparin and were discharged once International Normalization Ratio (INR) is in therapeutic range. The patients were followed up for three months with minimal of three outpatient followup. Best finding in the doppler ultrasonography (done by Acuson P500, Seimens) in relation to recanalisation was taken for the study. Statistical analysis was done in SPSS 19.0 (SPSS Inc, Chicago, USA). Scalar variables were expressed in terms of mean, standard deviation (S.D.) and range. Independent sample t-test was done for comparison of parametric scalar variables. P value of less than 0.05 was considered statistically significant.

## RESULTS

During the study period there were 67 cases of DVT. Of these cases male to female ratio was 0.91. The mean age was 48.07 (S.D. 17.11, Range 15-89). Figure 1 shows extent of DVT in different location. Most common extent of DVT was up to common femoral vein (47.8%) followed by upto popliteal vein (40.3%). Remaining 11.9% had extension upto iliac veins.

Of all the cases, there was no recanalisation in 2 cases (3%). Partial recanalisation was seen in 23 cases (34.3%) while

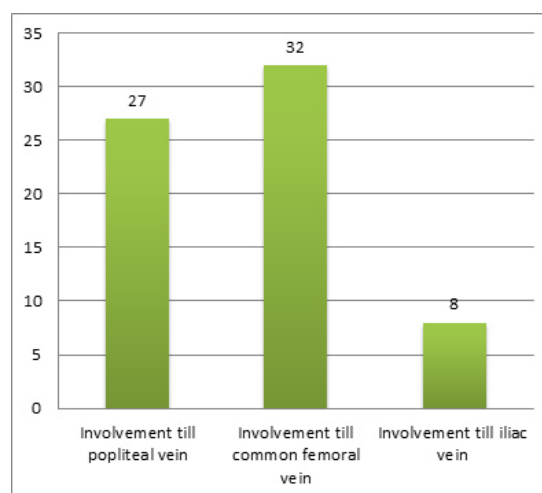


Figure 1. Table showing number of DVT cases in different extension (N=67).

Table 1. Percentage of recanalisation in DVT with different extension.

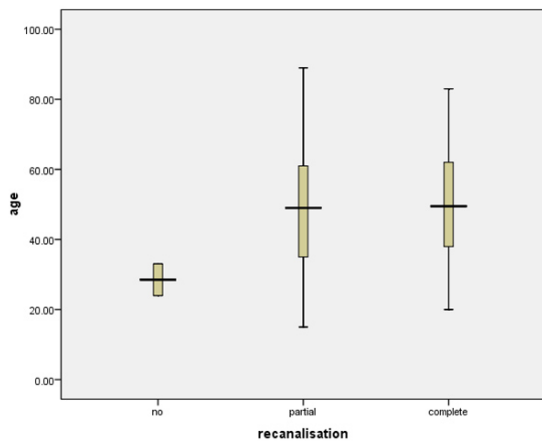
DVT extension	No recanalisation	Partial recanalisation	Complete recanalisation	Total
Popliteal vein	0 (0%)	8 (29.6%)	19 (70.4%)	27
Common femoral vein	1 (3.1%)	11 (34.4%)	20 (62.5%)	32
Iliac vein	1 (12.5%)	4 (50%)	3 (37.5%)	8
Total	2	23	42	67

complete recanalisation was seen in 42 cases (62.7%). Table 1 shows percentage of recanalisation in DVT with different extension. It is noted that recanalisation is more in DVT involving popliteal vein while it decreases as the extension goes up. In contrast to 79.4% complete recanalisation in popliteal vein DVT, that in common femoral vein is 62.5% while in iliac veins is only 37.5%. Table 2 and Figure 2 shows mean age in different recanalisation groups. It is observed that mean age in no recanalisation group is much younger than partial or complete recanalisation groups. Table 3 compares recanalisation in right and left sided involvement. It is observed that recanalisation is better in DVT involving right limb compared to left limb. In terms of recanalisation rate in male and female, significant difference was not observed. No recanalisation rate was 2.9% in female while that in male was 3.1%.

Table 2. Mean age in different recanalisation groups along with standard deviation and range.

Recanalisation groups	Mean	S.D.	Range
No recanalisation	28.5	6.36	24-33
Partial recanalisation	47.60	19.14	15-89
Complete recanalisation	49.26	15.9	20-83

Pvalue: < 0.05 between no recanalisation group and complete recanalisation group.



**Figure 1.** Table showing number of DVT cases in different extension (N=67).

**Table 3.** Table showing number and percentage of no recanalisation, partial recanalisation and complete recanalisation in left and right lower limbs.

Side	No recanalisation(%)	Partial recanalisation(%)	Complete recanalisation(%)	Total
Left	2 (4.9%)	15 (36.6%)	24 (58.5%)	41
Right	0 (0%)	8 (30.8%)	18 (69.2%)	26
Total	2 (3%)	23 (34.3%)	42 (62.7%)	67

## DISCUSSION

In our study, proximal extent of DVT has been found to be most common in common femoral vein (46%) followed by popliteal vein (42%). Isolated calf vein thrombosis is rare and accounts to 13% of all cases of DVT in a study.<sup>4</sup> In our study no recanalisation was noted only in 3% of cases. This figure is comparatively lower compared to the findings in other studies. In study by Park et al. where they studied calf DVTs, they found no recanalisation in 18% patients at the end of 3 months followup.<sup>5</sup> In another study, recanalisation in popliteal vein was 57% while that in proximal vein was 43%.<sup>6</sup> They also found better recanalisation in female sex compared to male. In that study the no recanalisation rate in female is 13% while that in male is 17% ( $p < 0.05$ ). This finding is in contrary to our study where no recanalisation rate in female and male is almost same. Better recanalisation was observed in right sided DVT. This finding can be attributed to the fact that in the left side, the common iliac vein is longer along with more chances of compression at the level, thus is more prone to DVT compared to the right side.<sup>6</sup> Recanalisation was also better in the DVT involving popliteal veins compared to that in proximal veins. Study

by Brandao et al. on recanalisation after DVT including some novel Doppler parameters like vein diameter index and thrombosis score also confirmed more complete recanalisation in popliteal vein thrombosis compared to proximal DVT.<sup>7</sup> The study found that recanalization in the form of increase in vein diameter index is better in distal DVT compared to proximal DVT. The study quantified recanalization at the end of three months and six months. The study also gave percentage estimates of recanalization rather than more conventional partial recanalization and complete recanalization.

There are newer hypothesis on anatomical aspects of recanalisation including presence of Arterio Venous Fistula like flow in the recanalised segment owing to neovascularisation.<sup>8</sup> This neoangiogenesis theory suggests that within the thrombosis few vascular channels can form which can cause some recanalization. These studies have also found out that recanalization not necessarily occur late but can start very early and most of the recanalization can happen within six months.

Importance of knowing recanalization helps not only to know about the disease process but also helps in planning on the medical management. Some recent studies have recommended that once complete recanalization of DVT has been confirmed in Doppler ultrasonography, oral anticoagulant drugs can be stopped.<sup>9</sup> However they suggested that in order to stop the oral anticoagulant drug, the patient should ensure that they can come for regular followup and the treatment provider should recheck the recanalization status regularly. In this study no significant thromboembolic event was noticed in three months period after holding the oral anticoagulant following complete recanalization of deep vein thrombosis. This finding has also been shown in another study where anticoagulation were stopped following negative finding in complete compression ultrasound of the lower limb veins.<sup>10</sup>

## CONCLUSION

Knowing about recanalisation following DVT helps in appropriate management and the duration of medical therapy. It also helps to know about possibility of post thrombotic syndrome in case there is absence or delay in recanalization. DVT distal to popliteal vein is found to have better recanalisation compared to proximal DVT. Long term follow-up and study in larger number of patients can help to know about different parameters in better way.

## REFERENCES

1. Yamaki T, Hamahata A, Soejima K, Kono T, Nozaki M, Sakurai H. Factors Predicting Development of Post-thrombotic Syndrome in Patients with a First Episode of Deep Vein Thrombosis: Preliminary Report. *Eur J Vasc Endovasc Surg.* 2011; 41: 126-33.
2. Takashi Yamaki. Post-thromboticsyndrome - Recent aspects of prevention, diagnosis and clinical management. *Reviews in Vascular Medicine.* 2016; 6: 10-9.
3. Jezovnik MK, Poredos P. Factors influencing the recanalisation rate of deep venous thrombosis. *Int Angiol.* 2012; 31:169-75.
4. Palareti G, Cosmi B, Legnani C. Diagnosis of Deep Vein Thrombosis. *Seminars in Thrombosis and Hemostasis.* 2006; 32: 659-72.
5. Park Y J, Lee K B, Kim D I, Roh Y N. Risk factors for delayed recanalisation of calf vein thrombosis. *J Korean Surg Soc.* 2012; 82:306-11.

6. Narayan A, John E, Lemoire C, Siobhan M. Iliac Vein Compression as Risk Factor for Left- versus Right-Sided Deep Venous Thrombosis: Case-Control Study. *Radiology*. 2012; 265: 949-57.
7. Brandão GM, Sobreira ML, Malgor RD, Rollo HA. Recanalization rates after acute deep vein thrombosis: a single-center experience using a newly proposed vein diameter variation index. *Ann Vasc Surg*. 2014; 7; 1751-60.
8. Gustavo B, Marcone L, Hamilton R. Recanalization after acute deep vein thrombosis. *J Vasc Bras*. 2013; 12: 296-302.
9. Elias A, Mallard L, Elias M, Alquier C, Guidolin F, Gauthier B et al. A single complete ultrasound investigation of the venous network for the diagnostic management of patients with a clinically suspected first episode of deep venous thrombosis of the lower limbs. *Thromb Haemost*. 2003; 89:221-7.
10. Sevestre MA, Labarere J, Casez P, Bressollette L, Taiar M, Perod G et al. Accuracy of complete compression ultrasound in ruling out suspected deep venous thrombosis in the ambulatory setting. A prospective cohort study. *Thromb Haemost*. 2009; 102: 166-72.