

Therapy of deep vein thrombosis with low molecular weight heparin, compression and walking exercises

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Our conservative routine therapy of symptomatic deep vein thrombosis (DVT) is based on three columns:

1. Anticoagulation
2. Compression
3. Walking exercises in mobile patients.

Anticoagulation is performed by subcutaneous injections of body weight- adjusted doses of low molecular weight heparin (dalteparin, Fragmin®, 200 IU/Kg/24 hours), for at least 5 days, overlapping with phenprocoumon (Marcoumar®). When INR values between 2,0 and 3,0 are achieved, LMWH is stopped after two days.

Compression is done using very firmly applied Unna boot bandages wrapped over with a short stretch bandage (Rosidal K®) on the lower leg and adhesive bandages (Paneleast®) on the thigh. Mobile patients who had no bed rest for the last days are encouraged to walk as much as possible.

Acute outcome

Between 1992 and 1999 1289 consecutive patients with DVT were admitted to the hospital and treated on this basis¹.

The following endpoints were registered:

1. Prevalence of pulmonary embolism (PE) (V/Q scan at admission).
2. Incidence of new PE, (second lung scan after 10 days).
3. Fatal events (all undergoing autopsy).
4. Occurrence of malignancy.
5. Bleeding complications and heparin induced thrombocytopenia (HIT).

Table 1 and 2 show the results.

At admission more than 50% of patients with proximal DVT have pulmonary embolism, most of them without any clinical symptoms. About 30% only show some respiratory problems which, however, did not change the therapeutic regimen. 17 patients died, only 3 from pulmonary embolism (Table 1).

18% of the patients had malignant disease; one third was only detected by our screening. Bleeding complications were rare and most of them mild. 4 of 5 major bleedings came from the gastrointestinal tract and one was a retroperitoneal bleeding after trauma. 3 cases with HIT II were detected; all of them developed DVT after LMWH prophylaxis (Table 2).

Importance of compression and walking

Bed rest is not able to prevent patients from pulmonary embolism compared with compression treatment and walking exercises^{2,3}.

The benefit of compression and walking may be explained by enhancing venous blood flow velocity thereby counteracting venous stasis but has never been proved according to evidence-based medicine.

We therefore conducted a randomised controlled trial in patients with proximal DVT, all treated with dalteparin, containing three arms⁴:

1. Bed-rest (n=17);
2. Sigvaris 503 thigh length compression stockings (n=18);
3. Unna boot bandages on the lower leg and adhesive bandages on the thigh (n=18).

Both compression groups were encouraged to walk as much as possible. Their average daily walking distance, measured by a pedometer, was between 500 and 12000 meter per day.

There was no difference between the frequency of pulmonary embolism at the beginning and after 10 days, all investigated by V/Q-scan.

Duplex examinations concentrating on the most proximal extension of the clot in the femoral vein revealed a higher degree of thrombus progression in the bed rest-group than in the compression groups.

Table 1.
Frequency of pulmonary emboli at baseline and after 10 days. Fatal events

	iliofemoral (366)	fem. popl. (682)	lower leg (241)	χ^2
1. prevalence PE (first Q/V-scan)	190/356 (53,4%)	355/675 (52,6%)	84/239 (35,1%)	p<0,001 (a/c,b/c)
symptomatic PE	51/190 (26,8%)	100/355 (28,2%)	28/84 (33,3%)	ns
2. new PE (second scan)	26/344	43/659	8/228	ns
3. fatal events (autopsy: 12/4 malignancy)	8/366 (2,2%)	6/682 (0,9%)	0	
fatal PE	3*/366 (0,8%)	0	0	ns

*3 fatal PE: 87f, day 3 (+MCI), 98m, before ther. 76m, day 21 (+liver metast.)

	iliofemoral (366)	fem. popl.	lower leg	χ^2
4. malignant disease	88/366 (24%)	118/682 (17,3%)	25/241 (10,4%)	$p < 0,001$ (a/c) $p < 0,05$ (b/c)
newly detected	24 (27,3%)	45 (38,1%)	8 (32%)	
5. bleedings	13/366 (3,6%)	25/682 (3,7%)	5/241 (2,1%)	ns
major bleeding	4/366 (1,1%)	1/682 (0,15%)	0	

Table 2. Frequency of malignant disease and of bleeding complications

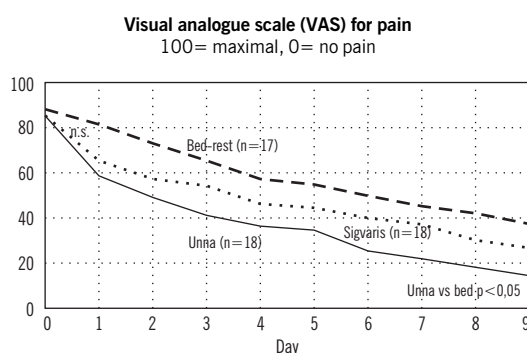
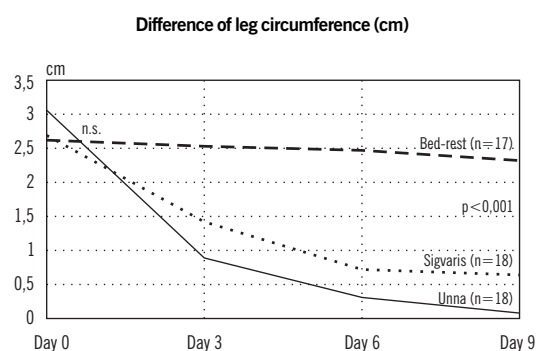


Figure 1. Mean values of the difference between the calf circumference of the thrombosed leg and the normal contralateral leg. After 9 days of treatment the swelling has nearly completely disappeared in the compression groups but not in the bed-rest group ($p < 0,001$)

The results concerning leg swelling and pain measured by visual analogue scale and are summarized in Figure 1 and Figure 2.

Conclusion

Mobile patients with deep vein thrombosis, treated by therapeutic doses of LMWH, benefit from immediate ambulation with firm leg compression.

When home treatment of DVT patients is considered, advises should be given not only concerning the administration of LMWH injections but also instructing the patients to use good compression and to perform walking exercises.

References

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3. Aschwanden M, Labs KH, Engel H, Schwob A, Jeanneret C, Mueller-Brand J, Jäger KA. Acute deep vein thrombosis: early mobilization does not increase the frequency of pulmonary embolism. *Thromb Haemost* 2001;85:42-6.
4. Partsch H, Blättler W. Compression and walking versus bed rest in the treatment of proximal deep venous thrombosis with low molecular weight heparin. *J Vasc Surg* 2000;32:861-9.

Figure 2. Faster and more intense fall of the pain level in the compression groups compared with bed-rest