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DOI: [10.1159/000330646](https://doi.org/10.1159/000330646)**Treatment Variations in Cerebral Venous Thrombosis: An International Survey**J.M. Coutinho^a, R. Seelig^a, M.-G. Bousser^b, P. Canhão^c, J.M. Ferro^c, J. Stam^a^aDepartment of Neurology, Academic Medical Centre, Amsterdam, The Netherlands; ^bDepartment of Neurology, Hôpital Lariboisière, Paris, France; ^cDepartment of Neurosciences, Hospital Santa Maria, Lisboa, Portugal*Introduction*

A variety of therapies are available to treat cerebral venous thrombosis (CVT), but evidence supporting the efficacy of most therapies is scarce. Heparin is considered the primary therapy [1], but there is no consensus whether to use unfractionated heparin (UFH) or low-molecular-weight heparin (LMWH). The 'European Federation of Neurological Societies' (EFNS) guideline recommends LMWH because of practical advantages and based upon data from randomized trials in leg-vein thrombosis [2]. In the 'International Study on Cerebral Vein and Dural Sinus Thrombosis' (ISCVT), however, UFH was used in the majority of patients [3]. Endovascular thrombolysis is generally reserved for severe cases, but no randomized trials have been performed [4]. The use of prophylactic anti-epileptic drugs (AED) in CVT is controversial [5, 6].

We hypothesized that considerable variations in treatment for CVT may exist among physicians. The aim of the present study is to determine how physicians worldwide treat CVT, using an on-line survey that was distributed among physicians with an interest in CVT.

Methods

An online survey creator (<http://www.enquetemaken.be>) was used to develop a web-based survey. We searched the MEDLINE database to identify publications regarding CVT in the past 5 years, excluding case reports and animal studies. The corresponding author of each publication was invited to participate. In addition, we invited physicians who have indicated that they are considering participation in the 2nd ISCVT study to complete the survey. Invitations were sent by e-mail.

Results

One-hundred and sixty-five physicians were invited to participate, of whom 91 (55%) completed the survey. The characteristics of the participating physicians are shown in table 1. The majority were neurologists (85%) and European (61%). Most were relatively experienced with CVT; 86% had treated more than 10

patients in last 5 years. Ninety-two percent considered heparin the standard therapy for CVT and 87% did not regard intracranial hemorrhage a contraindication for commencing heparin therapy (fig. 1). Sixty-four percent reported using UFH and 36% LMWH. Eight percent of the respondents prescribed prophylactic AED in all patients and 21% only in patients with focal cerebral lesions. The remaining 71% never prescribed prophylactic AED. With regard to long-term antithrombotic therapy, 81% stated that they prescribe oral anticoagulants in all patients, unless there is an absolute contraindication. The duration of treatment varied: 13% usually treat for 3 months, 64% for 6 months and 20% for 1 year.

Regarding more invasive therapies, 43% had used endovascular thrombolysis, the majority in less than 5 patients (fig. 2). Eighty-four percent used rt-PA and the remainder urokinase. When asked if they would consider decompressive craniectomy in a patient with impending cerebral herniation due to focal cerebral lesions, 93% responded positively, 43% had actually used this treatment.

Compared to other physicians, neurologists were more inclined to treat a patient with decompressive craniectomy (96 vs. 79%, OR 6.7, $p = 0.03$) and more frequently prescribed oral anticoagulation during the chronic phase (84 vs. 57%, OR 4.4, $p = 0.02$). On the other hand, neurologists were much less likely to prescribe prophylactic AED (21 vs. 77%, OR 0.08, $p < 0.001$).

Table 1. Characteristics of participating physicians (% values)

Origin	
Europe	61
North-America	17
South-America	17
Asia	6
Specialty	
Neurologist	85
Internist	5
Neurosurgeon	3
Pediatrician	3
Other	3
Medical experience	
<5 years	9
6–15 years	36
16–25 years	36
>25 years	19
Number of CVT patients treated in the past 5 years	
0–2 patients	1
3–5 patients	1
6–10 patients	12
>10 patients	86

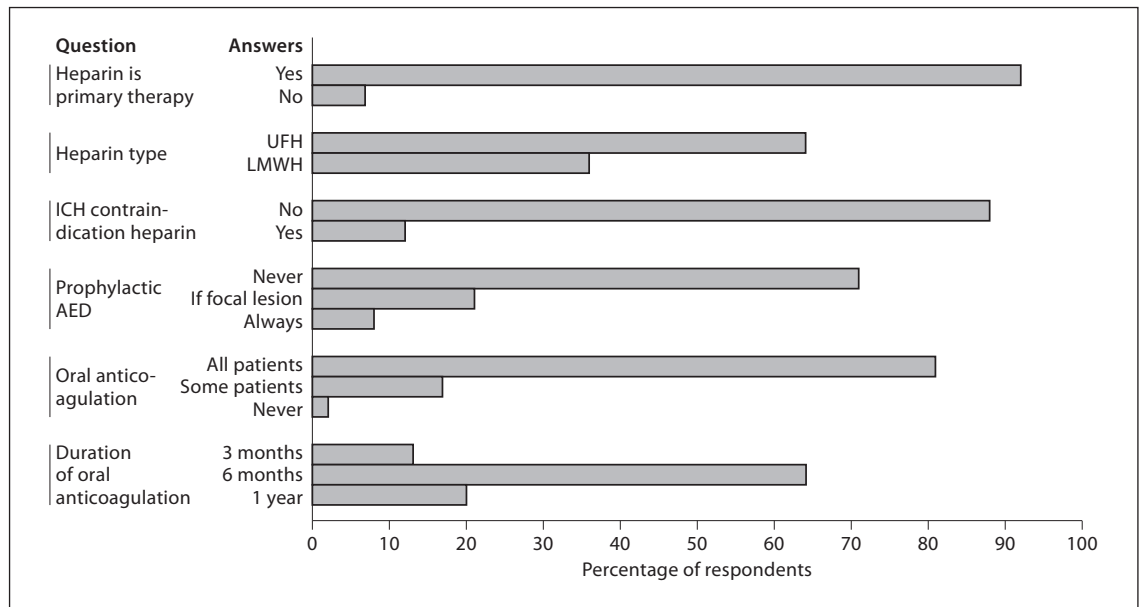


Fig. 1. Medical therapies. The answers regarding medical treatment of CVT are shown as percentages. UFH = Unfractionated heparin; LMWH = low-molecular weight heparin; ICH = intracranial hemorrhage; AED = anti-epileptic drugs.

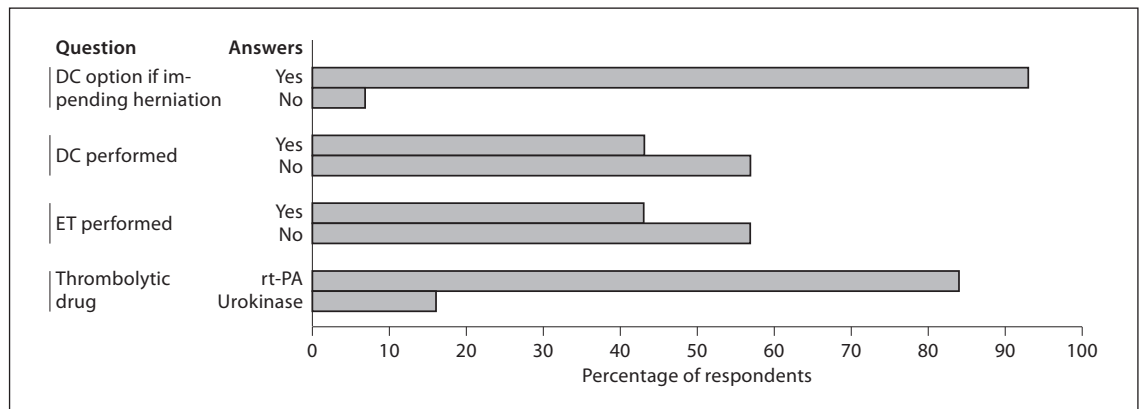


Fig. 2. Surgical and endovascular therapies. The answers regarding surgical and endovascular therapies are shown as percentages. DC = Decompressive craniectomy; ET = endovascular thrombolysis.

Discussion

This survey confirms that physicians worldwide consider heparin the primary therapy for CVT patients. However, while evidence-based guidelines advocate the use of LMWH, the majority uses UFH. Interestingly, the ratio LMWH vs. UFH in our survey is the same as in the ISCVT study, which was performed 10 years ago [3]. A stable ratio of heparin type over time in CVT patients has also been observed in a Portuguese study [7]. One might have expected an increase in the use of LMWH, as has been observed in leg-vein thrombosis [8].

It seems that both endovascular thrombolysis and decompressive craniectomy are increasingly used. In the ISCVT study, 2 and 1% of patients, respectively, received this therapy, while in our survey 43% of physicians had used either therapy during the last 5 years [3, 9]. Further, our study shows that rt-PA is currently the dominating drug used in endovascular thrombolysis. In contrast, in the case reports published until 2001, urokinase was used in 75% of patients. The two most likely explanations for this shift are the ban of urokinase from the US market and the use of rt-PA for thrombolysis in arterial ischemic stroke. Since it is unknown if

there is a difference in efficacy or safety between urokinase and rt-PA, the shift to rt-PA may reduce the – already scanty – validity of the existing evidence supporting the use of endovascular thrombolysis in CVT.

We found large practice variations regarding the duration of oral anticoagulation and the use of prophylactic AED. This suggests that there is clinical equipoise on both issues and that randomized trials of both therapies are ethically justified.

The majority of physicians who completed the survey are relatively experienced with CVT. This may be one of the reasons of the wide experience with endovascular thrombolysis and decompressive craniectomy. Further, pediatricians, who treat a substantial percentage of CVT patients, were underrepresented in the survey, as were non-European physicians. Because of these potentially confounding factors, care must be taken into extrapolating the results and they might not apply to the treatment of CVT patients in general.

In conclusion, our study shows considerable differences worldwide in the treatment of CVT and illustrates the variety of therapies used for the management of these patients. The results may help to identify areas of uncertainty that warrant new randomized trials.

Acknowledgements

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