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Stroke severity, early recovery and outcome are each related with clinical classification of stroke: Data from the 'Tinzaparin in Acute Ischaemic Stroke Trial' (TAIST)

Nikola Sprigg [a], Laura J. Gray [a], Philip M.W. Bath [a,*], Ewa Lindenstrøm [b], Gudrun Boysen [c], Peter Paul De Deyn [d], Pal Friis [e], Didier Leys [f], Reijo Marttila [g], Jan-Edwin Olsson [h], Desmond O'Neill [i], Erich Bernd Ringelstein [j], Jan-Jacob van der Sande [k], Alexander G.G. Turpie [l] for the TAIST Investigators

[a] *Institute of Neuroscience, University of Nottingham, Nottingham, UK*
[b] *Leo Pharma A/S, Ballerup, Denmark*
[c] *Department of Neurology, Bispebjerg Hospital, Copenhagen, Denmark*
[d] *Department of Neurology, A. Z. Middelheim, ZNA, University of Antwerp, Antwerpen, Belgium*
[e] *Vest-Agder Sentralsykehus, Kristiansand, Norway*
[f] *Clinique Neurologique, CHRU de Lille, Lille, France*
[g] *Department of Neurology, Turku University Central Hospital, Turku, Finland*
[h] *Institutionen för Neurologi, Universitetssjukhuset, Linköping, Sweden*
[i] *Department of Age Related Health Care, Adelaide and Meath Hospital, Dublin, Ireland*
[j] *Klinik für Neurologie, Universität Münster, Münster, Germany*
[k] *Slotervaartziekenhuis, Amsterdam, The Netherlands*
[l] *Hamilton General Hospital, Hamilton, Canada*

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Abstract

Introduction: Baseline severity and clinical stroke syndrome (Oxford Community Stroke Project, OCSP) classification are predictors of outcome in stroke. We used data from the 'Tinzaparin in Acute Ischaemic Stroke Trial' (TAIST) to assess the relationship between stroke severity, early recovery, outcome and OCSP syndrome.
Methods: TAIST was a randomised controlled trial assessing the safety and efficacy of tinzaparin versus aspirin in 1484 patients with acute ischaemic stroke. Severity was measured as the Scandinavian Neurological Stroke Scale (SNSS) at baseline and days 4, 7 and 10, and baseline OCSP clinical classification recorded: total anterior circulation infarct (TACI), partial anterior circulation infarct (PACI), lacunar infarct (LACI) and posterior circulation infarction (POCI). Recovery was calculated as change in SNSS from baseline at day 4 and 10. The relationship between stroke syndrome and SNSS at days 4 and 10, and outcome (modified Rankin Scale at 90 days) were assessed.
Results: Stroke severity was significantly different between TACI (most severe) and LACI (mildest) at all four time points ($p<0.001$), with no difference between PACI and POCI. The largest change in SNSS score occurred between baseline and day 4; improvement was least in TACI (median 2 units), compared to other groups (median 3 units) ($p<0.001$). If SNSS did not improve by day 4, then early recovery and late functional outcome tended to be limited irrespective of clinical syndrome (SNSS, baseline: 31, day 10: 32; mRS, day 90: 4); patients who recovered early tended to continue to improve and had better functional outcome irrespective of syndrome (SNSS, baseline: 35, day 10: 50; mRS, day 90: 2).

* Corresponding author. Nottingham University Hospitals NHS Trust, Clinical Sciences Building, City Hospital Campus, Nottingham NG5 1PB UK. Tel.: +44 115 8231765; fax: +44 115 8231767.
E-mail address: philip.bath@nottingham.ac.uk (P.M.W. Bath).

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Conclusions: Although functional outcome is related to baseline clinical syndrome (best with LACI, worst with TACI), patients who improve early have a more favourable functional outcome, irrespective of their OCSP syndrome. Hence, patients with a TACI syndrome may still achieve a reasonable outcome if early recovery occurs.

Keywords: Acute stroke; Ischaemic stroke; Recovery; Functional outcome; Clinical classification

1. Introduction

Baseline stroke severity, as assessed using measures such as Scandinavian Neurological Stroke Scale (SNSS) [1,2] or National Institute Health Stroke Scale (NIHSS), [3,4] is widely accepted as the strongest clinical predictor of outcome in stroke; severe stroke is associated with an increased risk of death, disability and length of hospital stay, and institutionalisation [3,5–9]. Similarly, severity, is also related to the early clinical course, with patients with severe stroke more likely to experience deterioration [10]. In addition, recovery is observed later in severe stroke [11] and it has been postulated that the extent of intrinsic cerebral damage is reflected not only by the degree of impairment, but also in the length of time to improvement after stroke [12].

The importance of clinical history and examination, for evaluating stroke patients is well recognised, [13] and stroke can be classified into four clinical syndromes, which have distinct natural histories: total anterior circulation syndrome (TACS), partial anterior circulation syndrome (PACS), lacunar syndrome (LACS) and posterior circulation syndrome (POCS). TACS is typically associated with greatest severity and worse outcome, PACS the highest risk of recurrence, whilst LACS has the mildest severity, and POCS the most favourable outcome [14]. Clinical classification is also predictive of the risk of deterioration, with TACS having the greatest risk and LACS the least; deterioration is associated with a worse prognosis [15].

The relationship between clinical classification and degree and timing of stroke recovery is less clear, and has been further examined here using data from the 'Tinzaparin in Acute Ischaemic Stroke Trial' (TAIST) [16].

2. Methods

2.1. Subjects

TAIST compared the safety and efficacy of tinzaparin (low molecular weight heparin) given at high dose (175 anti-Xa IU/kg/day), tinzaparin at medium dose (100 anti-Xa IU/kg/day), and aspirin (300 mg od), in patients with acute ischaemic stroke. Subjects were included within 48 h of stroke onset. Non-trial anti-platelets or anti-coagulants could not be given during the treatment period (10 days). Management of hypertension and other factors such as carotid stenosis was at the discretion of the local physician. All data were collected prospectively as part of the trial protocol.

2.2. Clinical stroke classification

Investigators prospectively recorded baseline clinical stroke syndrome as part of the trial protocol, and used the Oxford Community Stroke Project (OCSP) classification [14]. All patients had haemorrhagic stroke excluded on the basis of computed topographic (CT) head scan and therefore were classified as total anterior circulation infarct (TACI), partial anterior circulation infarct (PACI), lacunar infarct (LACI) and posterior circulation infarct (POCI).

2.3. Recovery

Severity/impairment was measured at four different time points: baseline, day 4, 7 and 10 using the Scandinavian Neurological Stroke Scale (SNSS), which ranges from 0 (most severe) to 58 (no deficit), with death recorded as −1. The rate of recovery was calculated as the change in SNSS at each time point. For comparison, patients were split into two groups: those who improved early (improvement ≥ 3 on SNSS between baseline and day 4); and those who did not; 3 points was chosen as this was the median change in SNSS at day 4. Day 4 was chosen as the largest change in SNSS occurred between baseline and day 4 and those with day 4 SNSS score missing were not categorised.

2.4. Outcomes

Outcome was assessed using the modified Rankin Scale and Barthel Index at day 90 and recorded by face-to-face interview. Discharge disposition was classified as patients own home or other (such as institution).

2.5. Events

Adverse events were recorded prospectively as part of the trial protocol including neurological deterioration (ND, a decrease in SNSS ≥ 5 points), recurrent stroke (RS, either ischaemic, haemorrhagic or unclassified), venous thromboembolism (deep vein thrombosis and/or pulmonary embolism), and extracranial bleeding. Other events, such as pneumonia, and cardiac events (myocardial syndrome, dysrhythmia) were also recorded. Event rates at day 4 were analysed pooled for clinical classification and then by early improvers and non-improvers. Whilst some patients had more than one adverse event, the categories ND, RS and HTI were considered exclusive.