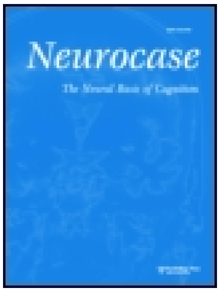
Author(s):	Losoi, Heidi; Kettunen, Jani E; Laihosalo, Mari; Ruuskanen, Eija-Inkeri; Dastidar, Prasun; Koivisto, Anna-Maija; Jehkonen, Mervi
Title:	Predictors of functional outcome after right hemisphere stroke in patients with or without thrombolytic treatment.
Year:	2011
Journal Title:	Neurocase
Vol and number:	18 : 5
Pages:	377-385
ISSN:	1355-4794
Discipline:	Neurology and psychiatry
School /Other Unit:	School of Medicine; School of Health Sciences; School of Social Sciences and Humanities
Item Type:	Journal Article
Language:	en
DOI:	http://dx.doi.org/10.1080/13554794.2011.608369
URN:	URN:NBN:fi:uta-201212311103
URL:	http://www.tandfonline.com/doi/pdf/10.1080/13554794.2011.608369



Neurocase
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/nncs20

Predictors of functional outcome after right hemisphere stroke in patients with or without thrombolytic treatment

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Available online: 06 Dec 2011

To cite this article: H. Losoi, J. E. Kettunen, M. Laihosalo, E.-I. Ruuskanen, P. Dastidar, A.-M. Koivisto & M. Jehkonen (2011): Predictors of functional outcome after right hemisphere stroke in patients with or without thrombolytic treatment, Neurocase, DOI:10.1080/13554794.2011.608369

To link to this article: http://dx.doi.org/10.1080/13554794.2011.608369

NEUROCASE
2011, i*First*, 1–9

Psychology Press
Taylor & Francis Group

Predictors of functional outcome after right hemisphere stroke in patients with or without thrombolytic treatment

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The purpose of this study was to assess the predictors of functional outcome after right hemisphere stroke at 6-month follow up in patients with or without thrombolytic treatment. Thrombolysis did not predict functional outcome in instrumental activities of daily living (IADL). Lower acute phase basic activities of daily living (ADL) measured by the Barthel Index was a statistically significant predictor of IADL when adjusted for age and education ($p = .015$) and had borderline significance ($p = .076$) as a predictor of functional outcome when adjusted for severity of stroke at admission. When stroke severity was taken into account also higher age became a statistically significant ($p = .039$) predictor of functional outcome. The acute phase neuropsychological symptoms predicted the functional outcome in unadjusted analyses but when adjusted for age, education, and severity of stroke no independent association was found.

Keywords: Functional outcome; Neuropsychological symptoms; Stroke; Thrombolysis.

Stroke is the third leading cause of death and the leading cause of neurological disability in Europe and in the United States (Murray & Lopaz, 1997). The treatment of stroke has developed in the recent years, notably due to the introduction of thrombolytic treatment. In thrombolytic treatment it is possible to decrease the brain damage caused by stroke by restoring the flow of blood to the area with the help of medication (Wardlaw, del Zoppo, Yamaguchi, & Berge, 2007).

A recent study by our study group (Ruuskanen et al., 2010) found that thrombolysis was a significant predictor of earlier discharge to home in patients with moderate/severe right hemisphere (RH) infarct, while cognitive functions had less predictive power. The results of our study group have also indicated that thrombolysis has a favorable effect on visuoperceptual functions in acute RH stroke (Laihosalo et al., forthcoming). Several other studies also suggest that thrombolysis improves the functional outcome of stroke patients concerning basic activities of daily living (ADL) (Kwiatkowski et al., 1999; Lindsberg et al., 2003; Lansberg, Schrooten, Bluhmki, Thijs, & Saver, 2009; The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group,

We thank MD, neurologist Jyrki Ollikainen from the Department of Neurosciences and Rehabilitation/Tampere University Hospital for carrying out the neurological examinations of the patients.

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http://www.psypress.com/neurocase http://dx.doi.org/10.1080/13554794.2011.608369

1995), which include activities like feeding, dressing, bathing, and toileting (Kelly-Hayes, Robertson, Broderick, Duncan, & Hershey, 1998). However more complex and instrumental activities of daily living (IADL) like shopping, using transportation, preparing meals, and maintaining a household are needed to maintain independence in the home and community (Kelly-Hayes et al., 1998). The association of thrombolytic treatment and neuropsychological symptoms with IADL outcome of stroke patients has not been widely researched. In the only study to date on that by Nys, van Zandvoort, Algra, Kappelle, and de Haan (2006) it was found that in 92 patients with first-ever symptomatic stroke thrombolytic treatment was associated with favorable ADL and IADL outcome at 6-month follow-up but not with better cognitive abilities. Their study included both RH and left hemisphere (LH) patients. In a recent study by Mishra, Lyden, Grotta, and Lees (2010) outcomes after thrombolysis were significantly better than in untreated comparators across baseline NIHSS 5 to 24.

Our study focused on RH stroke patients. RH stroke can have a significant effect on the patient's judgment skills, social skills, and relationships, everyday functioning and ability to work (Klonoff, Sheperd, O'Brien, Chiapello, & Hodak, 1990). For example, the syndrome of unilateral neglect which is a disabling condition characterized by reduced awareness of stimuli on one side of space is particularly common after RH stroke (Parton, Malhotra, & Husain, 2004) the reported incidence ranging from 13 to 83% (Bowen, McKenna, & Tallis, 1999). Unilateral neglect may disrupt many aspects of daily living (Azouvi et al., 1996), and is reportedly related to poor outcome (Gillen, Tennen, & McKee, 2005; Jehkonen, 2002b; Jehkonen, Laihosalo, & Kettunen, 2006).

Functional abilities are associated with patients' cognitive status (Kelly et al., 2003). Cognitive abilities such as orientation, executive function, left neglect, and anosognosia have been shown to be associated with the functional outcome of stroke patients (Jehkonen et al., 2000; Pedersen, Jorgensen, Nakayama, Raaschou, & Olsen, 1996; Pohjasvaara et al., 2002). Nys et al. (2007) also found a relation between several neuropsychological disorders and ADL. They showed that perceptual and attentional dysfunctions are independent predictors of functional impairment at follow-up (6–10 months post-stroke) (Nys et al., 2005). Age (Hankey, Jamrozik, Broadhurst, Forbes, & Anderson, 2002) and socioeconomic status (Cox, McKevitt, Rudd, & Wolfe, 2006; Jakovljević et al., 2001) are also known to be associated with stroke outcome.

The Frenchay Activities Index (FAI; Holbrook & Skilbeck, 1983) is commonly used to assess the IADL functions in stroke studies and is a demonstrably valid method in this population (Piercy, Carter, Mant, & Wade, 2000; Post & de Witte, 2003). According to Appelros (2007) FAI gives useful information about IADL that cannot be obtained from basic ADL scales, such as the Barthel Index (BI). Earlier studies (Appelros, 2007; Holbrook & Skilbeck, 1983) have reported an apparent relation between age and FAI. The impact of stroke on FAI has been found to be substantial (Schuling, de Haans, Limburg, & Groenier, 1993). According to Schuling et al. (1993) FAI has proved to be a homogenous scale demonstrating substantial validity and no ceiling effect. Schepers, Ketelaar, Visser-Meily, Dekker, and Lindeman (2006) found that FAI had a ceiling effect but they presumed this was caused by the fact that they excluded the patients who were still in a rehabilitation centre at 6 months post-stroke.

The aim of this study was to assess whether there is a difference in IADL functional outcome between RH stroke patients with or without thrombolytic treatment. The study further aimed to ascertain whether the neuropsychological symptoms in the acute phase predict the functional outcome at 6-month follow-up.

METHODS

We screened 1458 consecutive patients admitted to Tampere University Hospital as emergency cases. Exclusion criteria were as follows: LH stroke ($n = 276$), brain stem or cerebellar stroke ($n = 57$), transient ischemic attack ($n = 200$), cerebral hemorrhage ($n = 139$), other neurological diagnosis ($n = 137$), previous stroke ($n = 185$), significant findings in CT not related to acute stroke ($n = 92$), traumatic brain injury ($n = 6$), substance abuse ($n = 21$), psychiatric disorder ($n = 20$), age over 80 years ($n = 144$), left-handedness ($n = 5$), and native language other than Finnish ($n = 4$). In addition, 95 RH infarct patients could not participate in neuropsychological examination due to insufficient co-operation or reduced consciousness. The study population thus consisted of 77 consecutive patients with an acute first-ever RH stroke. From the 77 patients 9 were excluded from further analysis due to the lack of control phase data. This left us with 68 patients at 6-month follow-up. At 6-month follow-up neuropsychological examination similar to the one at the acute phase was carried out to the patients. But since this study aimed to ascertain whether the neuropsychological performance in acute phase predicts the outcome in 6-month follow-up, only the data about the patients' functional outcome in follow-up is in the scope of this study. Patients were treated according to normal hospital policy and did not participate in any specific neuropsychological rehabilitation program as part of the study. They were examined between July 2005 and July 2008. The infarct was verified by a computerized tomography (CT). The volume of the infarct could be calculated from CT for 39 patients. All patients gave their informed consent. The Ethical Committee of the hospital district approved the study protocol. Neuropsychological and neurological examinations were performed within 10 days after stroke (median = 3; range = 1–10).

The presence of visual neglect was determined with the Behavioural Inattention Test (BIT; Jehkonen, 2002a; Wilson, Cockburn, & Halligan, 1987). Hemianopia and neglect were scored as absent (= 0) or present (= 1). Visual neglect was scored as present if the sum score of six conventional subtests of the BIT was $\leq$129. Visuoconstructive ability was assessed using the Block Design subtest of the Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1992) verbal reasoning with the Similarities subtest of WAIS-R, and visual reasoning with the Picture Completion subtest of WAIS-R. Verbal memory was assessed with the Logical Memory subtest and visual memory with the Visual Reproduction subtest of the Wechsler Memory Scale-Revised (WMS-R; Wechsler, 1996).

Functional outcome was measured using the Frenchay Activities Index (FAI; Holbrook & Skilbeck, 1983), which includes questions related to housework, leisure activities, social activities and gainful work. The FAI was modified by removing Item 12 (gardening) since it was irrelevant for many patients. The sum score of FAI thus ranged from 14 to 56. The resulting sum score of FAI was first categorized into inactive (14–25; 2 patients), moderately active (26–33; 9 patients), and active/highly active (34–56; 57 patients), similarly to the study by Pettersen, Dahl, and Wyller (2002). The first two groups were then combined because of the small number of patients in them. The outcome variable was the FAI score categorized as follows: inactive/moderately active (1; FAI score 14–33) and active/highly active (0; FAI score 34–56).

The severity of stroke (NIHSS; the National Institutes of Health Stroke Scale, range: 0–34) (Goldstein, Bertels, & Davis, 1989) at the time of admission to the emergency department was obtained from the medical records. A neurological examination on the hospital ward was performed after thrombolysis on the same day as the neuropsychological examination or within one day of it. The neurologist evaluated the neurological status (NIHSS) and basic ADL using Barthel Index (BI; range: 0–100) (Mahoney & Barthel, 1965). We considered that there was clinical improvement in NIHSS if any improvement between NIHSS at admission and NIHSS on the ward occurred. Hemiparesis was scored by a neurologist using a scale of 0 (= normal motor functioning) to 4 (= severe hemiparesis) for leg and arm. The hemiparesis score used in this study was the sum score of leg and arm, ranging from 0 to 8.

The dependent variable was the categorized FAI score: inactive/moderately active (1), which is considered as poor functional outcome and active/highly active (0). The predictors were thrombolysis, severity of stroke at time of admission to the stroke unit, ADL functioning at the acute phase, patient's age (years), gender, years of education, hemiparesis, hemianopia, visual neglect, and difficulties in visuoconstructive, verbal and visual reasoning, and verbal and visual memory.

Statistical analysis

Differences in predictors between the patient groups according to thrombolysis (patients having thrombolytic treatment and those without thrombolytic treatment) and functional outcome (inactive/moderately active vs. active/highly active) were evaluated using χ^2-test for categorical variables and Mann–Whitney U-test for continuous variables with skewed distributions.

Logistic regression analysis was carried out to ascertain which of the variables were the best predictors for the inactive/moderately active functional outcome group. First all predictors were entered into the logistic regression models separately (univariate analyses). Then adjusted analyses for age and education were done separately for each predictor. Finally, all predictors were also separately adjusted to age and the severity of stroke at the time of admission to the stroke unit. We chose to use separate models for each predictor because of our fairly small sample size which prevented the reliable use of more sophisticated multivariate models.

p-Values $\leq .05$ were considered statistically significant. Because of small sample size, attention was paid also to *p*-values from .05 to .1, and these are defined as having borderline significance.

RESULTS

The clinical characteristics of the RH patient groups having thrombolytic treatment and those without thrombolytic treatment at the acute phase are presented in Table 1. There were no statistically significant differences between the patient groups in clinical characteristics but we found a borderline significance in stroke severity indicating that stroke was more severe at the time of admission to the stroke unit in patients receiving thrombolytic treatment compared to those without thrombolytic treatment. Clinical improvement from admission to the ward in NIHSS was more often found in the patients who received the thrombolytic treatment (77.8%) than those without (54.5%) but the difference was not statistically significant ($p = .183$).

The sum score of FAI at 6-month follow-up ranged from 20 to 53 (median = 43; range: 20–53). Eleven patients were classified as inactive/moderately active (= poor functional outcome), and 57 patients as active/highly active. The clinical characteristics of these patient groups at the acute phase are presented in Table 2. The inactive/moderately active group had statistically significantly less education than the active/highly active group. Difference between groups in age and hemianopia had borderline significance indicating that the patients in the inactive/moderately active group were older and had more often hemianopia.

A comparison of the patient groups' neuropsychological variables is presented in Table 3. The patient groups differed significantly in visuoconstructive ability. The difference between groups in visual neglect and verbal reasoning had borderline significance indicating that the patients in inactive/moderately active group had more often visual neglect and poorer verbal reasoning abilities.

Table 4 presents the results of univariate and adjusted logistic regression analyses. Thrombolysis did not predict the functional outcome of these

TABLE 1

Clinical characteristics of the patient groups having thrombolytic treatment and those without thrombolytic treatment at the acute phase

Descriptive variables	*Thrombolytic* *($n = 38$) Md (Q_1; Q_3)*	*Non-thrombolytic* *($n = 36$) Md (Q_1; Q_3)*	*p-Value*
Gender (F/M): *n*	16/14	27/11	0.132
Age	59.00 (52.25: 70.25)	62.00 (57.00: 71.00)	0.182
Years of education	10.00 (8.38: 11.13)	9.50 (8.00: 11.25)	0.794
Volume of the infarct (CT)[a]	7.43 (0.44: 20.25)	8.14 (1.77: 31.93)	0.507
NIHSS at admission	6.00 (3.75: 8.25)	3.50 (2.00: 7.00)	0.057
NIHSS on the ward[b]	1.00 (0.00: 4.00)	2.00 (1.00: 5.00)	0.183
Clinical Improvement (Yes) from admission to the ward (NIHSS): *n* (%)[b]	21 (77.8)	18 (54.5)	0.164
BI[c]	95 (60: 100)	100 (85: 100)	0.290
FAI	49.50 (41.00: 52.00)	46.00 (40.00: 51.50)	0.544
Hemianopia: present (%)[b]	4 (14.8)	3 (9.1)	0.492
Hemiparesis[b]	0 (0:1)	1 (0:1)	0.309

Note: Values are given as median (Md) and lower (Q_1) and upper (Q_3) quartile unless otherwise stated.
NIHSS, National Institutes of Health Stroke Scale (range: 0–34; 0 = no defect; 34 = severe stroke); BI, Barthel Index (range: 0–100; 0 = dependent; 100 = independent); FAI, Frenchay Activities Index (range: 14–56).
[a]Twenty-nine cases missing. [b]Eight cases missing. [c]Ten cases missing.

TABLE 2
Clinical characteristics of the patient groups according to functional outcome

Descriptive variables	*Inactive/Moderately active (n = 11) Md (Q1; Q3)*	*Active/Highly active (n = 57) Md (Q1; Q3)*	*p-Value*
Gender (F/M): *n*	2/9	23/34	0.163
Age	69.0 (59.0; 73.0)	61.0 (55.0; 70.0)	0.067
Years of education	8 (7.0; 9.0)	10 (9.0; 11.8)	0.004
Thrombolysis: *n* (%)	5 (45.5)	26 (45.7)	0.922
Volume of the infarct (CT)	10.16 (1.19: 18.42)	6.94 (1.67: 20.15)	0.931
NIHSS at admission	6 (3; 10)	4 (2.5; 7)	0.348
NIHSS on the ward[b]	2 (0; 8)	2 (0; 4)	0.345
Clinical Improvement (Yes) from admission to the ward (NIHSS): *n* (%)[b]	7 (63.6)	32 (65.3)	0.916
BI[c]	65 (35; 100)	100 (75; 100)	0.149
Hemianopia: present *n* (%)[b]	3 (27.3)	4 (8.2)	0.074
Hemiparesis[b]	1 (0:2)	0 (0:1)	0.625

Note: Values are given as median (Md) and lower (Q_1) and upper (Q_3) quartile unless otherwise stated.
NIHSS, National Institutes of Health Stroke Scale (range: 0–34; 0 = no defect; 34 = severe stroke); BI, Barthel Index (range: 0–100; 0 = dependent; 100 = independent).
[a]Twenty-nine cases missing. [b]Eight cases missing. [c]Ten cases missing.

TABLE 3
Neuropsychological variables of the patient groups according to functional outcome

Neuropsychological variables	*Inactive/Moderately active (n = 11) Md (Q1; Q3)*	*Active/Highly active (n = 57) Md (Q1; Q3)*	*p-Value*
Visual neglect: present *n* (%)[a]	4 (36.4)	8 (14.3)	0.081
Visual reasoning[a]	11.0 (5.0: 17.0)	14.0 (10.0: 17.0)	0.144
Visuoconstructive ability	12.0 (6.0: 17.0)	21.0 (12.0: 27.5)	0.029
Verbal reasoning	25.0 (19.0: 26.0)	26.0 (23.0: 28.0)	0.087
Visual memory (imm.)	26.0 (20.0: 34.0)	33.0 (27.0: 36.5)	0.104
Visual memory (del.)	12.0 (0.0: 26.0)	19.0 (7.5: 28.5)	0.300
Verbal memory (imm.)	19.0 (16.0: 24.0)	22.0 (18.0: 27.5)	0.169
Verbal memory (del.)	18.0 (14.0: 22.0)	19.0 (13.0: 24.5)	0.537

Note: Values are given as median (Md) and lower (Q_1) and upper (Q_3) quartile unless otherwise stated.
NIHSS, National Institutes of Health Stroke Scale (range: 0–34; 0 = no defect; 34 = severe stroke); BI, Barthel Index (range: 0–100; 0 = dependent; 100 = independent).
[a]One case missing.

TABLE 4
Single and adjusted predictors for poor functional outcome (FAI) at 6-month follow-up

		Univariate analysis			*Adjusted analysis (age & education)*			*Adjusted analysis (age & stroke severity)*	
Variable	*OR*	*95% CI for OR*	*p-Value*	*OR*	*95% CI for OR*	*p-Value*	*OR*	*95% CI for OR*	*p-Value*
Age	1.07	0.99–1.16	0.072	1.04	0.96–1.13	0.303	1.08	1.00–1.17	0.039
Sex (male)	3.04	0.60–15.40	0.178	2.37	0.42–13.42	0.329	3.09	0.56–17.04	0.195
Thrombolysis	0.99	0.27–3.63	0.992	1.26	0.31–5.07	0.748	1.12	0.27–4.60	0.877
Years of education	0.67	0.47–0.96	0.031	0.74	0.52–1.07	0.106	0.78	0.55–1.12	0.179
NIHSS at admission	1.12	0.96–1.31	0.158	1.14	0.95–1.38	0.170	1.17	0.90–1.51	0.248
NIHSS at ward[a]	1.16	0.97–1.38	0.104	1.17	0.93–1.48	0.184	1.09	0.84–1.42	0.522
Clinical Improvement from admission to ward (NIHSS)[a]	0.93	0.24–3.63	0.916	1.35	0.29–5.91	0.730	0.94	0.20–4.41	0.935
Volume of the infarct[b]	0.99	0.95–1.02	0.502	0.98	0.94–1.02	0.346	0.97	0.92–1.02	0.186
BI[c]	0.97	0.94–1.00	0.019	0.96	0.92–0.99	0.015	0.97	0.94–1.00	0.076
Hemianopia[a]	4.22	0.79–22.53	0.092	5.56	0.60–51.49	0.131	6.12	0.69–54.53	0.105
Hemiparesis[a]	1.17	0.61–2.22	0.635	1.07	0.49–2.35	0.870	0.97	0.41–2.32	0.947
Visual neglect[d]	3.43	0.81–14.45	0.093	2.82	0.60–13.43	0.191	2.18	0.38–12.58	0.384
Visual reasoning[d]	0.89	0.78–1.02	0.083	0.96	0.82–1.12	0.587	0.96	0.82–1.12	0.616
Visuoconstructive ability	0.93	0.86–1.00	0.042	0.96	0.88–1.04	0.298	0.95	0.88–1.03	0.199
Verbal reasoning	0.87	0.77–0.99	0.035	0.90	0.78–1.03	0.129	0.90	0.78–1.03	0.113
Visual memory (imm.)	0.94	0.86–1.02	0.110	0.96	0.87–1.05	0.378	0.95	0.87–1.05	0.316
Visual memory (del.)	0.97	0.92–1.03	0.284	1.01	0.94–1.08	0.889	1.00	0.93–1.06	0.905
Verbal memory (imm.)	0.94	0.84–1.04	0.244	0.98	0.86–1.11	0.743	0.96	0.84–1.09	0.483
Verbal memory (del.)	0.97	0.89–1.05	0.424	1.02	0.92–1.13	0.775	1.00	0.90–1.10	0.939

Note: OR, Odds ratio; CI, Confidence interval; FAI, Frenchay Activities Index; NIHSS, National Institutes of Health Stroke Scale; BI, Barthel Index; imm., immediate; del., delayed.
[a]Eight cases missing. [b]Twenty-nine cases missing. [c]Ten cases missing. [d]One case missing.

patients, even when adjusted for age and education or age and severity of stroke at the time of admission. The statistically significant single (unadjusted) predictors for the inactive/moderately active group of poor functional outcome (FAI) were fewer years of formal education, lower BI score at the acute phase and difficulties in visuoconstructive and verbal reasoning. The single predictors with borderline significance for poor functional outcome were higher age, more frequent visual neglect, hemianopia and difficulties in visual reasoning.

When each predictor was separately adjusted for age and education only lower BI at the acute phase remained a statistically significant predictor of poor functional outcome. When each predictor was adjusted to age and the severity of stroke at admission to the stroke unit lower BI had borderline significance as a predictor of poor functional outcome. Adjusted to stroke severity higher age became a statistically significant predictor of poor functional outcome. Based on the results of 39 patients volume of the infarct was not a statistically significant predictor of functional outcome but when interpreting the results it has to be taken into account that there is a considerable amount of missing data.

DISCUSSION

We studied 68 consecutive RH stroke patients and aimed to assess whether there is a difference in IADL outcome between RH stroke patients receiving or not receiving thrombolytic treatment. The study also aimed to ascertain how neuropsychological symptoms in the acute phase predict functional outcome at 6-month follow-up. Thrombolysis has previously been reported to improve the ADL outcome of stroke patients (Kwiatkowski et al., 1999; Lansberg et al., 2009; Lindsberg et al., 2003; Nys et al., 2006). However, the association of thrombolytic treatment and neuropsychological symptoms with IADL outcome of stroke patients has not been widely researched.

Earlier studies (Appelros, 2007; Holbrook, & Skilbeck, 1983) have reported an apparent relation between age and FAI. In the study by Appelros (2007) patients' ages ranged from 34 to 96 years. In our study, we excluded patients over 80 years old, which may have undermined the association between age and functional outcome. Based on the results of 39 patients volume of the infarct was not a statistically significant predictor of poor functional outcome but when interpreting the results it has to be taken into account that there is a considerable amount of missing data.

In this study, neuropsychological symptoms were in unadjusted analyses predictors of poor functional outcome, which concurs with the findings of several studies (Jehkonen et al., 2000; Nys et al., 2005; Pedersen et al., 1996; Pohjasvaara et al., 2002). When adjusted to age, education and stroke severity neuropsychological symptoms did not reach statistical significance as predictors of functional outcome. We assume that this might be due to our fairly small sample size. Using the same functional outcome measure (FAI) as in this study, Jehkonen et al. (2000) found that neglect is an important predictor of poor functional outcome. In our study, visual neglect also had borderline significance as a predictor of poor functional outcome. Visual neglect was more common at the acute phase in patients whose functional outcome at follow-up was categorized as inactive/moderately active (36%) than in patients who were active/highly active (14%). Neglect was found in 12 patients (18%) in our study population, which is less than in earlier studies (Bowen et al., 1999). The low frequency of neglect patients might have undermined the results. The other neuropsychological variable having borderline significance as a predictor of poor functional outcome was a difficulty in visual reasoning, and the best neuropsychological predictors of poor functional outcome in unadjusted analyses of this study were verbal reasoning and visuoconstructive difficulties. Visuoconstructive defect has previously been reported to have a significant independent predictive value for poor functional outcome (Jehkonen et al., 2000). We assume that verbal reasoning as a predictor of functional outcome is most likely explained by its connection to education.

We found there was no difference in functional outcome (FAI) between RH stroke patients with or without thrombolytic treatment. However, in a recent study by our study group (Ruuskanen et al., 2010) it was found that thrombolysis was a significant predictor of earlier discharge to home in patients with moderate/severe RH infarct. Considering those results, it can be hypothesized that our IADL functional outcome measure (FAI) was not sensitive enough to separate the functional outcome of this patient group although in basic ADL functions measured by hospitalization time significant connection to thrombolysis was found.

Our finding about thrombolysis not being a statistically significant predictor of functional outcome does not corroborate the study by Nys et al. (2006), which included both RH and LH stroke patients, whereas our study focused on RH stroke patients. This has to also be considered when interpreting the clinical significance of our results. Focusing on a homogeneous group of patients, however, is also strength of this study.

We found that in this sample of patients, there were no statistically significant differences in basic and clinical variables between the thrombolytic and non-thrombolytic patient groups. However, we found that there was borderline significance in stroke severity indicating that those treated with thrombolytic treatment had more severe stroke at the time of admission to the stroke unit. This is in line with the results of a recent study by Mishra et al. (2010). This also concurs with previous findings suggesting that patients with more severe strokes arrive earlier at emergency departments (Nys et al., 2005), and thus have a better chance of receiving thrombolytic treatment. Based on these results baseline stroke severity is an important factor which should be taken into account in future studies evaluating the significance of thrombolysis. In our study a small sample size prevented us from matching the patients according to severity of stroke, but the results were adjusted to baseline NIHSS.

Furthermore, our study population consisted of 68 consecutive patients with acute first-ever RH infarct, all of whom underwent a detailed neuropsychological examination. It should be considered as a limitation of our study that some of the patients had to be excluded because of our inclusion criteria requiring adequate co-operation in neuropsychological examination. This weakens the generalizability of our results on the whole clinical spectrum of RH stroke patients. Our inclusion criteria also produced a ceiling effect to FAI preventing the use of more sophisticated statistical analyses although the FAI is demonstrated to be a reliable and valid method for assessing the functional outcome of stroke patients (Piercy et al., 2000; Post & de Witte, 2003).

Our finding about the BI being a significant predictor of functional outcome emphasizes the importance of evaluating also the basic activities of ADL in acute phase. Our finding about thrombolysis not being a statistically significant predictor of instrumental functional outcome (IADL), although it has been shown to be a significant predictor of earlier discharge to home in patients with moderate/severe RH infarct (Ruuskanen et al., 2010), suggests that also in future studies functional outcome should be evaluated taking into account both ADL and IADL outcome. Since our findings differ from those of Nys et al. (2006), further research is needed with larger RH and LH stroke patient groups.

Original manuscript received 10 December 2010
Revised manuscript accepted 11 May 2011
First published online 8 December 2011

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