Cognitive aftermath of ischemic stroke
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Summary

The present longitudinal study is concerned with cognitive functioning after first-ever unilateral ischemic stroke. We focused on the cognitive domains speed of information processing, learning, and reasoning. Moreover, functional, behavioural and emotional stroke outcome was investigated. A community-based patient group and socio-demographic matched control subjects were assessed twice with a one-year time interval. For the patients the first examination took place at three months post stroke.

With respect to speed of information processing (chapter 3) the results show that stroke may cause a decrease in mental speed. Still, this effect was not as general and outspoken as the data showing slowness of information processing after traumatic brain injury. Subjectively, mental slowness is a major cognitive complaint in both left and right hemisphere patients (Visser-Keizer, Meyboom-de Jong, Deelman, Berg, & Gerritsen, 2002). Objectively, there appeared to be a slowing of basic decision times in the right hemisphere stroke patients. This slowness was sensitive to the visual field in which the stimuli were presented: decisions about contralesional stimuli were slower than decisions about ipsilesional stimuli. The left hemisphere patients, on the other hand, did not show a basic slowness at all, not even when the visuomotor task became quantitatively more complex. Only when the task became cognitively more demanding decision time increased significantly. Contrary to our expectations, the complexity effect, as defined by Miller (1970) and Van Zomeren & Deelman (1976) could not explain our results.

The next study showed explicit, but no implicit memory impairments according to our hypothesis (chapter 4). These impairments did not improve between the subacute and chronic stage post-stroke. To examine verbal and non-verbal explicit memory a new test, the Couples test, was constructed. The Couples test is a paired-associate learning test in which subjects have to memorise pairs of names (verbal subtest) or faces (non-verbal subtest). The results show that although patients were unable to remember as many items as the control subjects, the learning curves were parallel for the Names subtest and the Rey Auditory Verbal Learning Test. The Faces subtest was the only test that revealed a significantly steeper learning curve in the control group compared to the stroke patients. Moreover, no significant loss of information from memory in either the patients or the control subjects was demonstrated in the delayed recall. So, although the patients were unable to remember as many items as the control subjects, they were capable of learning and retaining this information for at least 25 minutes. The data further suggest that, although older patients obtained the lowest memory scores, the impact of stroke on memory function was stronger in younger patients. The traditional distinction between left and right hemisphere patients with respect to impairments in respectively verbal and non-verbal memory could not be confirmed.
Reasoning abilities too appeared to be decreased compared to the control subjects, and remained stable until at least 15 months post-stroke (chapter 5). Reasoning, like memory, was independent of the side of the lesion. Aphasia and neglect, on the other hand, were related to the reasoning capacities more strongly even than memory impairment was. Moreover, slower visuomotor speed of information processing appeared to be related to decreased reasoning performance in the patient group, but not in the control subjects. Impaired reasoning capacity was significantly associated with a lower level of daily activities as measured with the Frenchay Activity Index. Moreover, we showed that in this group reasoning was a more important predictor than a paretic arm or leg for the level of complex daily activities.

It appeared that about a quarter of the patients in this study had suffered asymptomatic brain lesions of ischemic nature, silent brain infarctions and/or white matter lesions, prior to the clinical stroke (chapter 6). These asymptomatic brain lesions had no significant impact on objective or subjective cognitive functioning at three months post stroke. However, at 15 months post-stroke patients with asymptomatic brain lesions had slower basic visuomotor decision times than those without, and improvement of reasoning between three and 15 months post-stroke was to some extent compromised by the presence of asymptomatic brain lesions. Subjectively experienced cognitive changes showed a trend toward more cognitive complaints in the patient group with asymptomatic lesions, but just failed to reach significance. It was concluded that asymptomatic brain lesions are indeed asymptomatic with respect to both objective and subjective cognitive functioning, but long-term outcome may to some extent be compromised by asymptomatic brain lesions preceding stroke.

To assess depressive mood both an observer-rated (Post Stroke Depression Rating Scale: PSDRS) and a self-rating scale (Hospital Anxiety and Depression Rating Scale: HADS) were used (chapter 7). Cognitive functioning appeared to be related to depressive mood when subjective cognitive changes according to the patients were considered. Objective cognitive test scores and partners’ reports, on the other hand, could not confirm this relation. There was an exception though: observer-rated depressive mood appeared to be related to speed of information processing at both times of measurement, and reasoning at 15 months post stroke. Considering the lack of significant relations between (course of) cognitive test performance and (course of) depressive mood after stroke it is suggested that these are two entities that can independently occur after stroke. Still, like proposed by Gainotti and co-workers (1997, 2002), post stroke depression can be a reaction to the experienced changes, among which the perceived cognitive changes.

Life satisfaction was found to deteriorate from time before stroke to three months post-stroke, and stayed at this lower level until at least fifteen months post-stroke (Chapter 8). Still, most patients remained relatively well satisfied with life. In comparison with control subjects, only male stroke patients reported a significantly lower level of life satisfaction. Life satisfaction in the total patient
group in the chronic phase was predicted by activity level, and by memory functioning and reasoning abilities in the subacute stage. The lower life satisfaction of male patients was explained by the relatively greater sensitivity of male activities after stroke. Greater restoration of activity level in stroke patients between three and fifteen months post onset was associated with better reasoning performance and faster mental speed at three months post-stroke.

Overall this study showed that stroke can cause various cognitive impairments that are significantly related to so-called ‘quality of life’. At the group level these disorders were, however, not as outspoken compared to the control group as was expected. Moreover, remarkably few lateralisation effects due to the side of stroke were found. Aphasia and neglect on the other hand were significantly associated with decreased test performance. With respect to course of cognitive functioning is was concluded that little improvement of function takes place after the subacute stage until at least 15 months post-onset. In the last chapter (Chapter 9) these results are discussed. Clinical implications and ideas for future research are suggested, thereby focussing on the improvement of neuropsychological care for stroke patients, especially for those patients who recovered seemingly well. Moreover, the importance of careful neuropsychological diagnosis using methods that are suitable for this patient group is (again) emphasised.