
ReAttach within Neurorehabilitation: A Case Report

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Case report

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Abstract

INTRODUCTION: Physiotherapists pay more and more attention to improving sensory integration when treating people with a brain injury. It is also more common for physiotherapists to pay attention to cognitive rehabilitation and psychosocial factors. ReAttach is a short-term multimodal intervention combining: a) sensory integration, b) cognitive rehabilitation and c) systemic work.

Recently ReAttach was introduced in the field of neuro-rehabilitation and therefore it is professionally applied by medics (physiotherapists, speech therapists and occupational therapists) and by neuropsychologists as well.

OBJECTIVE: The objective of this case-study is to evaluate the effectivity of ReAttach in a patient with CVA by applying the intervention which includes stimulation of sensory integration and cognitive rehabilitation. Can this patient with CVA benefit from ReAttach?

METHOD: Five ReAttach sessions were applied to a patient with CVA in both hemispheres. Also his wife received five ReAttach sessions as part of the systemic approach. Pre- and post- measurements on functional skills, balance, fatigue and global condition were conducted to evaluate results. Follow up after 2 months.

RESULTS: The results of this case-study suggest that by simultaneously stimulating sensory integration, cognitive rehabilitation and influencing environmental factors (ReAttach) a significant positive change can be achieved in a patient with CVA.

CONCLUSION: Although this result is promising, more research is needed to further investigate the effectivity of ReAttach in larger controlled samples in neuro-rehabilitation. This case-study must be interpreted as a first positive impression.

Key-words: *Neurorehabilitation, physiotherapy, brain injury, medic, systemic approach, cognitive rehabilitation*

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Introduction

Research has shown that it is recommended for physiotherapists to pay attention to cognitive rehabilitation (Veerbeek, 2014). In order to be able to treat patients with CVA adequately, the physical therapist must have knowledge of processes that take place during cognitive rehabilitation. Motor Imagery (MI) has been presented as a promising add-on therapy to physical exercises for post-acute stroke (Sharma, 2006; Braun 2017). Many patients with post-acute stroke suffer from severe somatosensory deficit. Research suggests that patients with severe somatosensory deficit might suffer from impaired MI (Braun, 2017; Liepert et al., 2016; Liepert et al., 2012). ReAttach improves multisensory processing and might reconnect impaired somatosensory circuits and simultaneously imagination can be trained (Weerkamp-Bartholomeus, 2018). It is interesting for medics to evaluate the combination of ReAttach multisensory processing with MI and physical exercises. ReAttach might be the missing link in the treatment of post-acute stroke patients with severe somatosensory deficit and poor MI abilities by its multimodal nature.

Case description

S, 76 years of age, is referred by the neurology nurse practitioner for physiotherapy after he has had a stroke in his right hemisphere. There is also a hemiparesis on the left side of his body due to a former CVA, as a result of which S is limited in his functioning. S would like to be able to walk outside for an hour and a half independently within six months and he wants to regain his independence in washing and dressing. He also wants to be able to actively contribute to the household (gardening and vacuum cleaning). When starting physiotherapy, S has passive coping strategies; he himself is unable to solve his problems and

therefore he is dependent on his environment. S is often lying on the sofa and does not take any initiative to engage in activities. His wife stimulates him to get up and to move. When she invites him to walk outside, he is willing to do so. At night S sleeps restlessly and he is tired when he gets up in the morning. His wife is very worried and doesn't dare to leave her husband alone. When S wants to walk up the stairs she accompanies him and when she and her husband walk outside she walks close to him. She wants her husband to walk with a rollator because she is afraid that he might fall. Mrs S is worried that she and her husband might become isolated due to the stroke her husband had. In the past, they often went out together to undertake social activities. Now that her husband can no longer drive a car, she rarely leaves the house. Mrs S has her driving licence, but has not dared to drive for many years. S and his wife have a daughter and two grandchildren, who live 10 km away. Because their daughter works, she can only offer limited support. S used to be the head teacher of a primary school. He played in a brass band as a percussionist and loves to go to the band's concerts. He also loves walking and gardening. S likes to visit his daughter and meet his grandchildren.

Clinical findings

S shows functional limitations in terms of one-and-a-half hours of independent outdoor walking without support, gardening, vacuum cleaning, washing, dressing and self-care and turning over in bed whilst lying under the blankets. His functional skills are measured by the PSK (Patient Specific Complaints questionnaire) (Neeleman-van der Steen, 2006). The PSK value is expressed in a scale from 0 (no effort at all) to 100 (impossible) Table 1 shows the results of the premeasurement. S is seriously tired. The MVI (multi-dimensional fatigue questionnaire) (Shops-Meeuwisse,

2013) shows that there is reduced activity, reduced motivation and mental fatigue (Table 2). Standard values are based on (Schwarz R, 2003). The colour in the column "Z-score" gives an impression of the size of the increased scores related to the reference group (healthy German adults). Green means that the score is average or lower than the reference group. Orange/yellow means that the score is moderately higher than the average of the reference group. Red means that the score is

remarkably higher than the average of the reference group. S's balance is measured by the Berg Balance Scale (BBS) (Berg, 1989) The BBS shows a score of 52/56. This means that independent walking with the support of a walking aid is safe. His overall condition is measured by means of the 6-minutes walking test (Butland, 1982). In 6 minutes S can walk 375 metres. The standard for men 70 - 79 years of age is 530 (482 - 578) metres.

Table 1
P.S.K pre-measurement

One and a half hour of independent outdoor walking without support	Gardening	Vacuum cleaning	Washing, dressing and self-care	Turning over in bed whilst lying under the blankets
100	100	100	75	50

Table 2
MVI pre-measurement

Domain	Domainscore	Z score	Age category > 60
General fatigue	12	0,5	69.6% of sent scores lower in this domain
Physical fatigue	14	0,9	80.5% of sent scores lower in this domain
Reduced activity	18	1,9	97.3% of sent scores lower in this domain
Reduced motivation	19	3,0	99.9% of sent scores lower in this domain
Mental fatigue	17	2,4	99.1% of sent scores lower in this domain

Multidisciplinary treatment plan

Because there are problems in several areas, several disciplines are involved, which work together within an interdisciplinary team, namely the physiotherapist, occupational therapist and speech therapist. In this case report, attention will be given to the role of ReAttach within this interdisciplinary treatment plan as a supportive intervention.

ReAttach

ReAttach is a multimodal intervention in which training of multiple sensory processing is combined with social cognitive training and cognitive bias modification including motor imagery (Weerkamp-Bartholomeus,

2015). For medics treating people with post stroke conditions, including physiotherapists, this intervention offers new possibilities within the therapeutic plan.

Alertness, attention and concentration

Important conditions for practising skills are optimal alertness, attention and concentration. During the session the therapist regulates the emotions and alertness level and there is joint attention and concentration. This allows the therapist to positively influence the conditions mentioned above.

Sensory integration

When (re)learning motor and cognitive skills, it is important that there is good sensory

integration. This means that one is able to process internal and external stimuli from the senses as well as thoughts and emotions into a meaningful and coherent concept. Because ReAttach improves sensory integration, the therapist also has a tool that creates and supports conditions for further rehabilitation.

Motor imagery / mental exercise

Research shows that mental exercise can be very effective in the rehabilitation of people who have had a stroke (Cranenburgh, 2014). During ReAttach, motor imagery can be used to prepare and facilitate the movements and skills through imagination during optimal sensory processing conditions.

Self-management

Furthermore, by applying ReAttach, the therapist has the opportunity to make a positive contribution to self-management in terms of pro-active coping (Weerkamp-Bartholomeus, 2018). Being able to monitor the consequences and being capable to deal with medical treatment is also part of self-management. Due to cost effectivity, medics need to stimulate autonomy and self-management as early as possibly during the treatment process. However, many patients with post stroke conditions have cognitive and/or behavioural problems, which means that optimal self-regulation and self-management is impaired. (Veerbeek, 2014). ReAttach focusses on improving the autonomy of patients by rewiring emotions and cognitive biases and therefore both patients and relatives learn to take the initiative to engage in activities and to actively engage in the rehabilitation process (Weerkamp-Bartholomeus, 2018). ReAttach actively focusses on dynamic expectations of treatment outcome to overcome too rigid or too limited environmental stimulations which might be an obstruction for the recovery of the patient with post stroke condition (Weerkamp-Bartholomeus, 2015).

ReAttach for S

Because there is mental fatigue, reduced initiative, a passive coping strategy and an involved but overprotective wife, it is decided to offer ReAttach to both S and his wife. This intervention, which consists of 5 sessions, implies the following aspects: Optimising the level of alertness, stimulating sensory integration, working towards a realistic self-concept, motor imagery: independently climbing stairs and outdoor walking without support, searching for people who can provide support, searching for opportunities to be mobile outdoors.

Treatment process

Because at the start of the first session S shows lowered arousal, he needs to initially increase his alertness. The therapist realises this by an active use of her voice and by starting a short conversation with S to gain his attention with something that fascinates him and gives him joy: music. The significant people are S, his partner, daughter and grandchildren. During the first session attention is paid to the self-concept. In a low arousal level S is instructed to search for as many pleasant memories as possible and of things he likes to do. His wife will also have a ReAttach session, working on the themes of “trust” and “finding people who can offer support”. The sessions that follow for S are all about having confidence in one's own capacities, doing activities for which S is motivated and imagining motor skills (motor imagery). All sessions focus on optimal alertness, improving sensory integration and retrieving information from the long term memory and associative memory through global searching orders. His wife wishes to overcome her fear of her husband walking independently and climbing stairs, as well as her fear of driving a car. Mrs S has her driving licence, but she has not been driving a car for years because of this fear. After the first session S tells us that he has slept well

for a few nights and feels fitter in the morning when he gets up. Climbing the stairs goes well and his wife entrusts him to do this without her support. It is still too much for her to let her husband walk outside alone; she is afraid that he will fall or walk too far and might get too tired. Mrs S tells that she is feeling more relaxed and that she has approached a friend who can go on outings together with her and her husband. Because it is still too far for S to come to the treatment centre, the ReAttach sessions take place at his home. Upon arrival for the third session, a small car is on the driveway: Mrs S has decided to take some driving lessons to get more familiar with driving again and she plans to go out together with her husband. The last session takes place 3 months after the initial session. Meanwhile, S walks every day for half an hour alone outside without any support. He has a regular route around the area, which he sometimes expands a bit, so he walks for 45 minutes. He can carry out self-care and activities in daily life (ADL) independently. Apart from the advice that S should not stand on a ladder to paint the overhang of his shed, no physiotherapeutic treatments at home are needed. From now on S will visit the treatment centre together with his wife, follow physiotherapy advice for his

condition and improve his balance. These interventions will also end after 3 months. After the ReAttach sessions are finished, measurements take place again for evaluation.

Results

All treatable quantities - functional skills, fatigue, balance and overall fitness - have improved. There is a decrease in fatigue. Remarkable compared to the initial measurement is a reduction in mental fatigue (table 3) and his balance has improved. The score of the Berg Balance Scale is 56 / 56 (table 5). This means that S can walk safely and independently, both indoors and outdoors without any support. His condition has increased. The score of the 6 Minutes Walking Test is 445 m. Significant improvement or deterioration = 20 metres. The standard for men between 70 and 79 years of age is 530 (482 - 578) metres (Butland, 1982). Follow-up measurements were carried out in the areas of functional skills (PSK) (table 5) balance (Berg Balance Scale) (table 4) and condition (6 minutes walking test) (table 6). No follow-up measurement was performed concerning fatigue.

Table 3
MVI pre- and post-measurement

Domain	Domain-score pre/post ReAttach	Z score pre/post ReAttach	Age category > 60 - % of sent scores lower in this domain pre /post ReAttach
General fatigue	12 / 10	0,5 / 0,0	69.6 / 48,9
Physical fatigue	14 / 11	0,9 / 0,2	80.5 / 56,5
Reduced activity	18 / 20	1,9 / 2,4	97.3 / 99,2
Reduced motivation	19 / 15	3,0 / 1,8	99.9 / 96,3
Mental fatigue	17 / 8	2,4 / -0,2	99.1 / 42,1

Table 4

Berg Balance Scale: pre-, post-measurement and measurement after 2 months

	Pre	Post	After 2 months
Berg Balance Scale	52 / 56	56 / 56	56/ 56

Table 5

P.S.K: pre-, post-measurement and measurement after 2 months

	Pre	Post	After 2 months
One and a half hours of independent outdoor walking without support	100	46	28
Gardening	100	32	19
Vacuüm cleaning	100	87	18
Washing, dressing and self-care	75	46	17
Turning over in bed whilst lying under the blankets	50	23	12

Table 6

6 Minutes Walking Test: Pre-, post-measurement and measurement after 2 months

	Pre-measurement	Post-measurement	After 2 months
6 Minutes Walking Test	375 metres	445 metres	410 metres

Discussion

The idea that a multimodal intervention can make a positive contribution within the care for people with post stroke conditions and that it can be applied by several disciplines is new.

There are aspects within the intervention that create a serious challenge for medics, such as social cognitive training and the systemic approach. In this case study we see that the improvement of S's alertness, initiative and motivation lead to an active coping strategy, in which S takes control of his life again. This situation creates positive conditions for working on the treatable quantities related to the wishes "to be able to walk outside independently for one and a half hours without support, to regain independence in washing and dressing and to actively contribute to the household again". Because S's wife also gained more confidence in the

functioning of her husband and discovered opportunities to undertake new activities together with him, the care process came developed positively for both.

Concerning improvements in functional skills, fatigue, balance and fitness, several factors play a role: first of all, there is plasticity of the nervous system. "In daily life, the patient with brain damage will eventually have a new repertoire of practical, communicative, cognitive and relational skills. This repertoire consists of a mixture of outwardly normal, but altered activities in the brain, of acquired compensations and is dealing with adjustments. This set of skills develops differently for each patient individually and continuously adapts, depending on the lifeline followed" (Cranenburgh, 2014).

Furthermore, ReAttach was not the only intervention applied during the care process.

S was also offered exercises and advice to improve his functional skills. This makes it difficult to distinguish which improvements have been made by ReAttach and which improvements have been made by the exercises and advice.

However, the question is whether it is important to make a distinction. The effectivity of any intervention on complex developmental problems such as post stroke conditions depends on the number of factors that can be influenced positively. It might be the strength of ReAttach that in this multimodal system approach so many factors can be influenced simultaneously: The aspects such as alertness, taking initiative, trust, seeing possibilities and taking control of one's own direction are prerequisites for the effective implementation of exercises and coherent signs of recovery.

This single study of course is a very limited one and therefore further research with larger numbers of patients in more controlled conditions (such as randomised clinical trials) are necessary to investigate the evidence for post stroke conditions in general.

Conclusion and recommendations

As a physiotherapist, I have been working in neurorehabilitation for thirty years. S is one of the first people post stroke with whom I applied ReAttach. The most surprising thing for me was the change of initiation by S and the reduction of his wife's anxiety. At the start of the intervention there seemed to be a 'systemic rigidity' due to the severe fatigue of S, his reduced initiative as well as the anxiety of S his wife, her fear of driving a car and her conviction that she and her husband could not do any more social activities. After a few sessions, there came more and more space and S's wife in particular saw increasing opportunities to be able to undertake social activities as she and

her husband both desired. Before I worked with ReAttach, as a physiotherapist, I wouldn't have known how to influence these factors, other than calling on the expertise of other disciplines.

Although I paid attention to someone's partner post stroke, and was able to provide him/her with treatment and practical support, I was previously unable to influence concern and stress in the partner. I believe that the care for people post stroke should be multidisciplinary. Because ReAttach is a multimodal intervention that, as described above, can create conditions for other forms of therapy within neurorehabilitation, I believe that this intervention can also be applied by other disciplines.

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Conflicts of interests

The author declares no conflict of interests.

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