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Reflex sympathetic dystrophy

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SUMMARY

Reflex Sympathetic Dystrophy: A study in the perspective of rehabilitation medicine.

This thesis describes patients with reflex sympathetic dystrophy (RSD) of the upper extremity. RSD is a chronic and disabling disease. The clinical picture of RSD is characterized by a combination of the triad autonomic, motor and sensory changes. At our Department of Rehabilitation, with special interest in hand injuries, RSD is a syndrome which is frequently seen. Knowledge about and insight in this syndrome is needed to treat and inform patients well. Because there was and is a lot of discussion whether RSD is a somatic or psychosomatic syndrome, we performed two studies concerning this question. We also analyzed the medical treatment in the early stage of RSD because in the beginning of our study, a new treatment was proposed. We performed a randomized clinical trial whether the new treatment with hydroxyl radical scavengers, would be better than our usual treatment with Ismelin blocks. Little is known about interacting aspects in the development of RSD therefore we additionally analyzed in the same trial these possible interacting aspects such as psychological dysfunction and social life events. We performed a long-term follow-up study in order to analyze functional outcome after RSD. Functional outcome encloses impairments, disability, vocational outcome, general health status, and handicap. It is supposed by the World Health Organization that there is a sequence between disease, impairment, disability, and handicap; therefore, we analyzed the relationship between disease-impairment-disability, and handicap in RSD patients. These studies were followed by two studies to investigate the sources of variation in measurements in medical examinations in RSD patients. Finally two patients are described with a poor end-result: an amputation of the affected upper extremity. The aims of this thesis are discussed in **chapter 1**.

Chapter 2 describes the results of a randomized clinical trial concerning early treatment and psychological aspects of a series of 26 patients who had RSD of the hand and in which treatment was started within three months after the diagnosis. Ismelin blocks were a very often used therapy in RSD in the eighties but a probable better therapy in the first stage of the RSD, proposed by RJA Goris was also investigated. Thirteen patients were treated with Regional Intravenous Ismelin blocks and 13 with a hydroxyl radical scavenger, dimethylsulfoxide (DMSO). After nine weeks the increase of range of motion and the decrease of pain was significantly better in the group treated with DMSO as compared to the group treated with RIS blocks. With DMSO, the patient can treat him- or herself and the costs are lower than the treatment with Ismelin. This chapter also reviews briefly the psychological aspects associated with RSD and describes the psychological aspects of a group of 24 RSD patients compared with a control group of 42 patients who underwent elective hand surgery. The female RSD patients

were more depressed and emotional unstable. Eighty percent of all RSD patients had a recent life event; the control group 20%. Based on the results, it was concluded that there is a multi-causal relation to getting RSD. Depression, emotional disturbances, anxiety and/or social life events, together with a trauma, can increase the risk of RSD.

The objective of the study described in **chapter 3** was to determine to what extent stressful life events and psychological dysfunction play a role in the pathogenesis of RSD. This was a comparative study between the RSD group and the control group, described in chapter 2. Stressful life events and psychological dysfunction evaluation were performed by a life event rating list and the Symptom Checklist-90 (SCL-90). The RSD group consisted of 24 patients with a history of upper extremity RSD, less than 3 months. The control group consisted of 42 hand pathology patients waiting for elective hand surgery. Eighty percent of the RSD patients had a recent life event; the control group 20%. Male RSD patients were more anxious than male controls. Female RSD patients were more depressed, inadequate and were emotionally less stable than female controls. In multivariate analysis no significant differences were found between the groups with respect to gender, age and age-gender interactions. Of the SCL-90 dimensions only insomnia correlated with the experienced stressful life events. It is concluded that stressful life events are common in the RSD group, indicating that there is a multi-conditional model of RSD. The experience of a stressful life event besides trauma or surgery is a risk factor in such a multi-conditional model.

The objective of the long term follow-up study described in **chapter 4a** was to identify impairments resulting from RSD of the upper extremity and to analyze the relationship between impairment and disability in RSD patients. The study group consisted of a referred sample of 65 RSD patients with clinical signs of the upper extremity. RSD appeared after fractures of the wrist or hand in 29 patients (44.6%) or after a carpal tunnel release in 9 patients (13.8%). The mean interval between the diagnosis RSD and the follow-up was 5.5 years (sd = 0.76; range = 3-9 years). The main outcome measurements were the impairments measured by standard physical examination. Activity of Daily Life (ADL) and pain were assessed using a Visual Analogue Scale (VAS). Pain was assessed direct before and after the physical examination and the pain perceived in the week before examination was assessed. Significant differences in impairments were found between the affected and the non-affected side ($p < 0.05$). According to the AMA-guides the impairments found, should not result in disabilities. Significant correlations were found between VAS-ADL and VAS-Pain in the last week prior to evaluation ($r = 0.65$) and between VAS-ADL and full fist grip strength ($r = -0.55$). Pain was the most disabling factor. It was found that an early diagnosis and early treatment, did not lead to less impairments or disabilities as was suggested in literature.

The objective of the long term follow-up study described in **chapter 4b** was to identify the general health status, long-term vocational outcome and psychosocial aspects such as social life events (SLE), around the inciting event of RSD and to identify the psychological history of 65 patients, 5.5 years (sd = 0.76; range = 3-9 years) after RSD of the upper extremity. General health status and long term vocational outcome were assessed by means of a general health questionnaire (RAND-36) and a structured interview, respectively. SLE, (life change unit > 35), was present in 32 patients (49%). A psychological (or psychiatric) history was present in 22 patients (34%). In total, 60% of the patients had a SLE and/or a psychological history. The pain scores of the RAND-36 of the RSD patients were significantly higher than a RAND control group. In total 17 patients (26%) had to change profession due to RSD. Nearly 30% of the patients had to stop their work for more than one year. The results show a high co-incidence between RSD and interacting psychosocial disorders and this co-incidence may play a role in intensifying and prolonging the symptomatology of RSD.

The objective of the long-term follow-up study described in **chapter 5** is to determine the relationship between impairments, disability, and handicap in upper extremity RSD patients. Sixty five patients, five and half year after RSD of the upper extremity were studied. The main outcome measures were: range of motion, moving two point discrimination, muscle strength of the hand and pain. Disability was assessed with the Groningen Activity Restriction Scale (GARS) and handicap was assessed with 3 subscales, social functioning, role limitations due to physical problems and role limitations due to emotional problems, of the RAND-36. After RSD of the upper extremity, 61.5% of the patients is limited to some extent in ADL and/or Instrumental Activities of Daily Life (IADL). Pain and restrictions in forward flexion of the shoulder, thumb opposition and grip strength are the most important impairments limiting ADL and IADL. Patients with limitations in ADL and IADL are significantly more handicapped than patients without limitations. Pain is the most important factor contributing to handicap. We found a weak to moderate relationship between impairments and disability and between disability and handicap in RSD patients. Pain is the most important factor leading to disability and handicap.

Chapter 6a concerns a study which identifies different sources of variation in measurement results of upper extremity range of motion and estimates the smallest detectable difference (SDD) between measurements. Twenty-nine RSD patients were measured repeatedly. Two observers each measured in two sessions the range of motion, using a two armed goniometer and an inclinometer. The measurement results were analyzed using an analysis of variance according to the generalizability theory. The results indicate that observer and patient-observer interactions are important sources of variation. The random error was the most important source of variation. The SDD was smallest for elbow flexion non-affected side, 7.1° and largest for

shoulder external rotation affected side, 28.7°. Clinically our results indicate that range of motion measurement in RSD patients are subject to considerable variation and indicate that results of medical examinations in order to assess disability on the basis of range of motion measurements are also subject to considerable variation.

In **chapter 6b** the same patients, as described in chapter 6a, were assessed. In this study the three different grip strengths are measured in 29 upper extremity RSD patients. Again we used the generalizability theory to assess the extent of the disagreement or differences (errors of the measurements) within or between observers and interactions between observer-session and repetition of the measurements. The aims of our study were to identify the different sources of variation in grip strength and to analyze the smallest detectable differences (SDD) and to determine the reliability of upper extremity grip strength tests in RSD patients. The most important sources of variation of measurement errors were observer, patient-observer interactions and patient-session-observer interaction and the random error. We found that the generalizability theory is a good tool for estimating the sources of measurement error. Clinical examinations for muscle strength measurements as a part of a total clinical examination for example a disability payment or worker's compensation in case of RSD patients should be done in more than one session and with more than one repetition.

In **chapters 7a and 7b** two case reports are described. In both clinical notes the end-result for the RSD patient was poor, namely an amputation of the upper extremity. These clinical notes are added to this thesis to indicate that there is a difference between outcome on group level and on the individual level and to indicate that in some cases the diagnosis RSD is difficult and remains questionable, as well as the treatment.

In **chapter 8**, the general discussion, the results of the different studies are discussed. It is concluded that RSD tends to become a chronic pain syndrome, in which psychosocial factors play a role. Further it is concluded that DMSO is a good treatment in the early stage of RSD. In "chronic" RSD, pain and loss of full fist grip strength are the most evident impairments. RSD is a disabling disease in which pain is the most disabling factor. At last it is found that in medical examinations, the interaction patient-observer, is responsible for a considerable variation in measuring impairments such as range of motion or grip strength.