

# **Recovery after surgically treated distal radius fracture**

## **Aspects of evaluation and rehabilitation**

### **Akademisk avhandling**

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligen försvaras i R-aulan, Sahlgrenska Universitetssjukhuset, Mölndal

Fredagen den 9 december 2022, klockan 09:00

av

**Johanna Blomstrand**

Leg. Arbetsterapeut

Fakultetsopponent:

**Professor Simon Farnebo**

Institutionen för biomedicinska och kliniska vetenskaper, Linköpings Universitet, Sverige

### **Avhandlingen baseras på följande delarbeten**

- I. Blomstrand J, Kjellby Wendt G, Karlsson J, Wangdell J, Fagevik Olsén M. (2022) Pain, hand function, activity performance and apprehensiveness, in patients with surgically treated distal radius fractures. *Journal of Plastic Surgery and Hand surgery*, doi: 10.1080/2000656x.2022.2060992
- II. Blomstrand J, Karlsson J, Fagevik Olsén M, Kjellby Wendt G. (2021) The Michigan Hand Outcomes Questionnaire (MHQ-Swe) in patients with distal radius fractures – cross-cultural adaptation to Swedish, validation and reliability. *Journal of Orthopaedic Surgery and Research*, doi: 10.1186/s13018-021-02571-7
- III. Blomstrand J, Sellbrant I, Nellgård B, Karlsson J, Fagevik Olsén M, Kjellby Wendt G. Evaluation of a plaster cast or a removable brace as immobilisation following surgically treated distal radius fracture – a randomised controlled trial. *In manuscript*
- IV. Blomstrand J, Sellbrant I, Nellgård B, Karlsson J, Fagevik Olsén M, Kjellby Wendt G. Sense of coherence and its relationship to outcomes in patients with surgically treated distal radius fractures. *In manuscript*

**SAHLGRENSKA AKADEMIN**  
**INSTITUTIONEN FÖR KLINISKA VETENSKAPER**  
**AVDELNINGEN FÖR ORTOPEDI**



# Recovery after surgically treated distal radius fracture

## Aspects of evaluation and rehabilitation

**Johanna Blomstrand**

Department of Orthopaedics, Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, 2022

### ABSTRACT

**BACKGROUND** A distal radius fracture (DRF) is a common injury, occurring in both genders and during the entire life span, although it is most common in elderly women. An uncomplicated fracture is treated with a cast, but more complicated ones are treated surgically, most commonly with a volar plate, and the majority result in good clinical and radiological outcomes. Most patients normally regain the majority of their function and ability to perform activities within three to six months, but some experience pain and disability during a longer period of time. Even today, there is no consensus on treatment and rehabilitation.

**AIM** The overall aim of the thesis was to investigate various factors related to outcomes and rehabilitation after surgically treated distal radius fractures.

**METHODS** In Study I, patients' outcomes in terms of pain, function, activity performance and apprehensiveness to use the injured hand in daily activities were evaluated in a cross-sectional study up to three months after surgery. In Study II, the translation and cultural adaptation of the Michigan Hand Outcomes Questionnaire (MHQ) were performed and the questionnaire's psychometric properties in terms of validity and reliability were evaluated. In Study III, a randomised controlled study (RCT), the outcomes of patients randomly allocated to a cast or a brace after surgery were compared in terms of activity performance, pain and grip strength up to two years after surgery. In Study IV, also an RCT, the relationship between sense of coherence and impact of anaesthesia method on patient-reported outcomes were investigated.

**RESULTS** In Study I, measurements of pain, oedema, range of motion (ROM) in the wrist, grip strength and activity performance revealed significant improvements over time. At 12 weeks, the study participants had regained almost 70% of their grip strength and 74-96% of the ROM in the non-injured hand and patients reported minimal severity of pain and disability. The apprehensiveness about using the injured hand in activity increased at the time of the cast removal, where the proportion of patients estimating a high degree of apprehensiveness was significantly higher compared with three days postoperatively. Apprehensiveness was moderately correlated with activity performance on all visits. The study also revealed that, in over 70% of participants, the plaster cast had to be adjusted, replaced with a new cast or with a brace, during immobilisation, due to a poorly fitting plaster cast. In Study II, the MHQ was successfully translated and culturally adapted according to guidelines. The process revealed no major issues and the Swedish version of the MHQ showed good validity and reliability. In Study III, patients' pain, activity performance and grip strength after using a plaster cast or a brace after surgery, were compared. All the outcomes improved significantly during the study period and, at six weeks, the outcomes indicated minimal pain and disability. The analysis of equivalence indicated that the outcomes in the groups could be regarded as equivalent, implying that a brace is as good as a plaster cast in the respects mentioned above. In Study IV, sense of coherence correlated with pain and activity performance and there were no significant differences between the groups in terms of outcomes for pain or activity performance at any time point in the study, indicating that anaesthesia method has limited impact on these aspects.

**CONCLUSION** In terms of activity performance, patients improve over time during the first three months (Studies I, II, IV), but they continue to improve also after three months after surgery (Studies III and IV). The translated and culturally adapted MHQ-Swe is an appropriate and relevant patient-reported outcome measurement (PROM) questionnaire, with good validity and reliability, which can be used for patients with a surgically treated DRF (Study II). A prefabricated brace instead of a cast is a feasible method of immobilisation after a surgically treated DRF, in terms of the outcomes for pain, activity performance and grip strength (Study III). Personal factors, both apprehensiveness (Study I) and sense of coherence (Study IV), correlates with patient-reported outcome measurements, which supports the importance of considering personal factors in the recovery process after a fracture. The anaesthesia method seems to have limited influence on outcomes in terms of pain and activity performance both after three days and in a longer perspective in the rehabilitation (Study IV).

**KEYWORDS:** occupational therapy, hand rehabilitation, distal radius fracture, ADL, activity performance, apprehensiveness, sense of coherence, patient-reported outcome measurement, function