COMPARISON OF GRIP STRENGTH IN PERSONS WITH CARPAL TUNNEL SYNDROME USING READY-MADE FABRIC AND CUSTOM-MADE ORTHOSES

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Abstract

The aim of the study was to find out whether custom-made wrist orthoses, which hold the wrist in a neutral position, offer better improvement of hand function than ready-made fabric orthoses with 30° dorsal flexion wrist position. The main points of interest were the comparisons between the strength of cylindrical, lateral and pinch grips. The results did not show any statistically important differences. To compare an influence of different orthoses on reducing of other symptoms of carpal tunnel syndrome or applicability in work activities can be further questions for our investigation.

NTRODUCTION

Carpal tunnel syndrome is a very frequent diagnosis in our every day practice. The prevalence of carpal tunnel syndrome symptoms in Sweden is 14.4%. Together with EMG confirmed diagnosis 4.9% (Atroshi et al., 1999). In Slovenia, there has been no similar research. Arnež (1999) compares the outcomes of the Swedish research and reports that the prevalence of the carpal tunnel syndrome in Slovene general population could be approximately from 200 000 to 288 000 persons. He estimates that in Slovenia there are from 40 000 to 57 000 persons with clinically and electro physiologically confirmed carpal tunnel syndrome.

The treatment of the carpal tunnel syndrome can be conservative or surgical. The conservative management of the carpal tunnel syndrome includes treatment with no steroid anti-inflammatory medications, treatment with steroid injections and orthotic treatment. When there is no success or in the case of the acute carpal tunnel syndrome with strong pains, surgical intervention is r ecommended (1).

Orthotic treatment improves the symptoms of carpal tunnel syndrome (2-5), but there has been no study on the influence of orthosis and its shape on the hand function.

The aim of the study was to find out whether custom-made wrist orthoses, which hold the wrist in a neutral position, offer better improvement of hand function than ready-made fabric orthoses with 30° dorsal flexion wrist position. The main points of interest were comparisons between the strength of cylindrical, lateral and pinch grips.

METHODS AND SUBJECTS

Methods

The grip strengths were measured with Grip force tracing system (6). The subjects were given custom-made orthoses from thermoplastic material. They were lent one of the three sizes (L, M and S) of ready-made fabric wrist orthoses (Sporlastic Manu-Hit).

Firstly, grip strengths of the unaffected hand were measured (cylindrical, lateral in pinch grips). The affected hand was first measured with the ready-made fabric orthoses with the wrist in 30° dorsal flexion, then with custom-made orthoses with the wrist in neutral position and finally without orthoses.

Subjects

The study included all the persons with EMG confirmed carpal tunnel syndrome treated at the outpatient` clinics at the Institute for Rehabilitation, Republic of Slovenia, from January 2007 to January 2008, who were willing to participate.

RESULTS

In the period from January 2007 to January 2008, 16 persons were treated. Three of them refused to participate in the study. The study group included 12 women and 1 man, 12 were right-handed and 1 was left-handed. In 11 subjects, the

dominant side was affected. The average age in the study group was 48.5 years.

The results did not show any statistically important differences. The compared means of grip forces did not deviate much between"custom made","fabric-ready"and "withoutorthoses"inthethree types of grip (Figure 1). The compared means of grip forces (between groups of different grips) show that the forces of cylindrical grip were the lowest with the custom-made orthoses, followed by without orthoses and the highest were with fabric- ready orthoses. The results in lateral grip and pinch grip forces were similar.

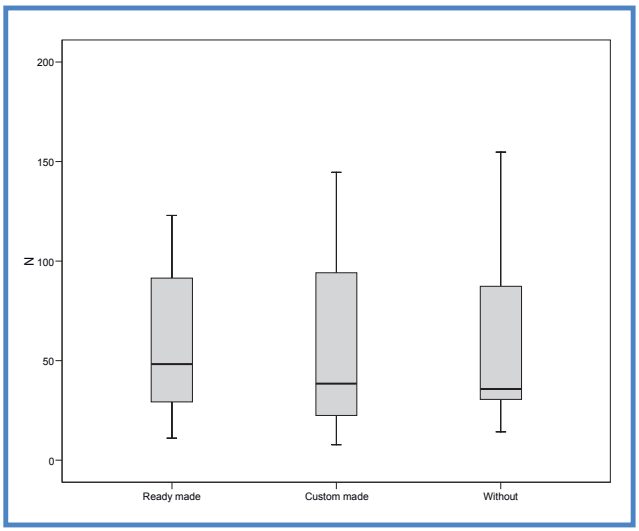

Figure 1: *Compared Means of grip forces between custom made, fabric-ready and without orthosis*

DISCUSION

In persons with carpal tunnel syndrome, wrist orthoses are prescribed with the aim of reducing acroparesthesias, accompanying pain and unreliability of grip as they support the wrist joint and restrict its motion while leaving the fingers and thumb free to move. Our rehabilitation team suggests that patients with carpal tunnel syndrome wear wrist orthoses in neutral position. The angle of wrist position varies considerably in literature, from 10° of flexion (7) to 30° of extension (7). Pressure studies comparing mild angles of deviation to neutral and carpal tunnel pressure (7) have suggested that the wrist angle that produced the lowest pressure is within 2 to 3° of flexion and 1 to 2° of ulnar deviation. In Slovenia, patients receive ready-made fabric or custom made wrist orthoses, depending on the severity of symptoms and the patients' profession. The users are usually suggested to wear the orthoses at night and in the case when they have symptoms while performing work activities also during the day if they can work with the orthoses.

Our hypothesis was that custom-made orthoses enabled better fixation and position of the wrist in persons with carpal tunnel syndrome, caused higher strength of cylindrical, lateral and pinch grips and improved hand function. The findings indicated that there were no differences between the orthoses, or in the case of cylindrical grips even showed positive effects of ready-made fabric orthoses. That result can be annotated to difficulties in gripping the device for measuring the strength of the cylindrical grip with custom-made orthoses which are rigid and slippery on the palm region.

None of the known ready-made fabric orthoses, assure neutral position of the wrist or suit to the person'shand. They are also not useful orstrong enough for every day work. According tovalid legislation in Slovenia, a nurse or even a merchant can provide commercially available orthoses to a person with carpal tunnel syndrome. However, we believe that they do not have sufficient and appropriate knowledge and that this problem needs to be addressed.

CONCLUSION

The study did not confirm the hypothesis, but it will be further developed. In addition, the future studies can compare the influence of different types of orthoses on reducing the other symptoms of the carpal tunnel syndrome or their applicability in work activities.

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