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WRIST IMMOBILIZATION AFTER CARPAL TUNNEL RELEASE

A prospective study

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ABSTRACT - This prospective study evaluates the possible advantages of wrist imobilization after open carpal tunnel release comparing the results of two weeks immobilization and no immobilization. Fifty two patients with idiopathic carpal tunnel syndrome were randomly selected in two groups after open carpal tunnel release. In one group (A, n=26) the patients wore a neutral-position wrist splint continuosly for two weeks. In the other group (B, n=26) no wrist immobilization was used. Clinical assessment was done preoperatively and at 2 weeks follow-up and included the two-point discrimination test at the second finger and two questionnaires as an outcome measurement of symptoms severity and intensity. All the patients presented improvement in the postoperative evaluations in the three analyzed parameters. There was no significant difference between the two groups for any of the outcome measurements at the final follow-up. We conclude that wrist immobilization in the immediate post-operative period have no advantages when compared with no immobilization in the end result of carpal tunnel release.

KEY WORDS: carpal tunnel syndrome, surgical decompression, wrist imobilization.

Avaliação prospectiva da imobilização do pulso após descompressão cirúrgica do nervo mediano no túnel do carpo

RESUMO - Neste estudo prospectivo avaliamos se há vantagens na imobilização pós-operatória do pulso após a cirurgia para o tratamento da síndrome do túnel do carpo comparando este tratamento com a ausência de imobilização. Cinqüenta e dois pacientes portadores de síndrome do túnel do carpo idiopática foram randomizados em dois grupos após a cirurgia. Em um grupo (grupo A, n=26) os pacientes utilizaram uma tala em posição neutra para imobilização do pulso por duas semanas. No outro grupo (B, n=26), nenhum tipo de imobilização foi adotada. A avaliação foi realizada antes da cirurgia e repetida após duas semanas e incluiu a mensuração da sensibilidade discriminatória no segundo dedo e dois questionários que avaliaram a gravidade e intensidade dos sintomas. Em todos os pacientes houve melhora nos parâmetros avaliados. Não houve diferença estatisticamente significativa entre os dois grupos considerando os parâmetros avaliados. Concluímos que a imobilização do pulso no período pós-operatório imediato não apresenta vantagens quando comparada com a ausência de imobilização após a descompressão cirúrgica do nervo mediano no punho.

PALAVRAS-CHAVE: síndrome do túnel do carpo, descompressão cirúrgica, imobilização, pulso.

Carpal tunnel syndrome (CTS) is the most common peripheral entrapment mononeuropathy and is manifested by characteristic signs and symptoms resulting from median nerve compression at the wrist and/or palm[1]. Diagnosis is essentially clinical and often patient history alone is indicative of CTS. The electrophysiologic studies confirm the diagnosis. The treatment can be conservative, with corticosteroid infiltration, use of symptomatic drugs and/or wrist splinting[2].

The surgical treatment is indicated when nonoperative management fails, when symptoms are presented for more than one year and when there is a neurological deficit (motor or sensory).

In spite of been used by many surgeons[3], wrist immobilization after open surgery has been less well studied than surgical treatment effects[4-6]. This study was developed with the purpose of comparing parameters results in two patients groups, submitted or not to wrist immobilization after open carpal tunnel release.

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METHOD

The research protocol of this study was approved by the local Ethics Committee. Appropriate informed consent was obtained both verbally and in writing form from each study subject prior to surgery. The diagnosis of CTS was based on symptoms and findings on physical examination. Clinical examination included the presence of typical sensory symptoms, Tinel sign, Phalen's and Durkan's tests, sensory testing by two-point discrimination, muscle testing and examination of thenar atrophy. All patients had electrophysiological confirmation of CTS. Entry criteria for the study included all patients with idiopathic CTS admitted at the Peripheral Nerve Unit at Hospital Santa Marcelina. Exclusion criteria included inability to complete a self-administered questionnaire; a previous carpal tunnel release; occurrence of medical conditions associated with increased incidence of CTS like diabetes mellitus and hypothyroidism; wrist trauma or surgery; musculoskeletal, metabolic or autoimmune disorders; presence of space-occupying lesions at the wrist, identified before surgery or at intra-operative period; pregnancy.

The conservative treatment was adopted for six weeks and included wrist splinting at neutral angle and use of non-steroid anti-inflamatory drugs, if pain was the symptom. The surgical treatment was adopted in patients with no response to conservative treatment and in all cases presented with impairment of sensibility and/or motor deficit.

All patients included in the study had open carpal tunnel release without upper-arm tourniquet under local anesthesia by the senior author. A standard 3-cm incision was made in the palm along a line projected proximally from the interspace between the middle and ring finger, paralleling the thenar crease without transgressing the wrist flexion crease. After the retinaculum section, the manipulation of the median nerve was limited to the inspection to discard any additional extrinsic compression. Neither epineurotomy nor internal neurolysis were performed. The wound was closed with interrupted 5.0 nylon sutures. All patients received the same immediate postoperative care. Each wrist was immobilized in a soft dressing and light compressive bandage for 48 hours and, after that, two groups with 26 patients were formed according to the treatment adopted. In one group, called group A, the wrist was splinting in a neutral position for two weeks. In another group, the group B, after the withdrawal of the soft dressing it wasn't used any kind of immobilization and patients were encouraged to move their hands and fingers freely. No other treatment, including anti-inflammatory drugs, was used. The evaluations were performed pre-operatively and repeated fourteen days after the surgery in a blind fashion. All of the subjects were examined by one author. Each patient completed the first section of a validated questionnaire described by Levine et al.[7] (Severity Symptom Score - SSS). This tool, named Boston questionnaire (BQ), is a self-reported questionnaire designed to evaluate the outcome specifically in CTS and has been found to be reproducible, internally consistent and responsive to clinical change[7,8]. In the first section of this scale, the symptom score is determined from 11 questions regarding different attributes of pain, tingling and numbness with each answer scoring between 1 (no symptom) and 5 (very severe symptoms). A translated version of this questionnaire to portuguese was used in our study[9]. This version was previosly validated by Campos et al.[9]. The intensity of symptoms (tingling, burning pain and numbness) was evaluated by another scale (Symptom Intensity Scale - SIS). This was done by asking the subjects to rate each symptom on an interval scale from 0 to 4, with zero indicating "no sympton" and 4 indicating "intolerable sympton". For both questionnaires the results were expressed as a mean score for the answered questions.

Static two-point discrimination was measured using a two-point discriminator (North Coast Medical Inc., California, USA) applied to palmar surface of the second finger distal phalange. As well as in the evaluation through the described scales, the two-point discrimination was evaluated pre and post-operatively.

We compared preoperative and postoperative scores of each evaluation, calculating three indices through the formula (preoperative value - postoperative value/preoperative value). The indices were named symptom severity index (SSI), sympton intensity index (SII) and discrimination index (DI), according to each evaluated parameter.

Statistical analyses were performed by using Bioestat for Windows program (version 2.0; Ayres M, Belém, Brazil). Paired *t* tests were performed and the level of significance was set at $p<0.05$.

RESULTS

Fifty-two patients fullfilled the inclusion criteria during the study period. We had two exclusions in this study, one patient with classical symptoms who presented with a persistent median artery with large diameter at surgery and a patient who presented postoperative wound infection; this resolved with a 14-day course of oral antibiotic therapy. There were no median nerve lesion, wound dehiscence or tendon injuries.

The ages of the patients ranged from 26 to 74 years and averaged 49.8 years. There were fourty-six women (88.5 percent) and the right hand was involved in 63.5 percent of the cases. Seven patients had bilateral involvement and underwent surgical procedures on separate time for each hand. The average duration of symptoms at presentation was 29.31 months (range, 6 to 72 months).

A positive Tinel's sign was found in 44 patients (84.5%), in 21 patients in the group A and in 23 patients in group B. A positive Phalen's test was identified in 49 patients (94.3%), in 24 patients in group A and in 25 in group B. A positive Durkan's test was found in 51 patients, in 25 patients in group A and in all patients in group B.

The severity and intensity of symptoms decreased

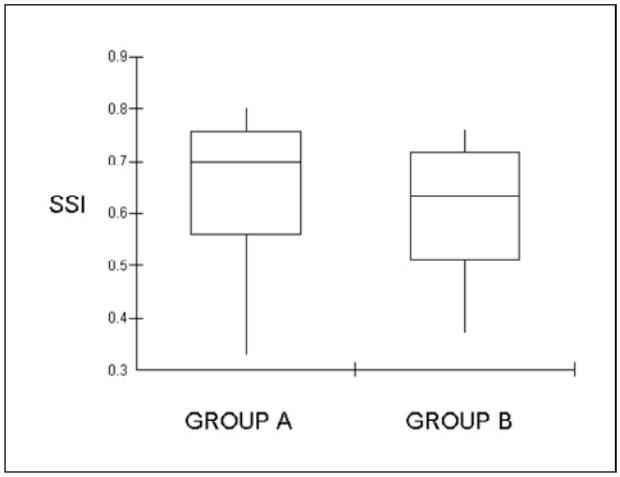

Figure. Boxplot showing the distribution of symptom severity index by immobilization group (A) and non-immobilization group (B). SSI, symptom severity index.

following surgery in all the patients. Pre-operatively, the average of SSS was 33.38±7.33 in the group A and 31.77±7.56 in the group B. Post-operatively, the average of SSS was 11.38±4.57 in the group A and 12.33±4.77 in the group B. The SSI was 0.64±0.15 in the group A and 0.61±0.12 in the group B (Table). No significant changes in SSI were observed comparing the group A and group B (p=0.059, Figure).

The average of SIS was 8.65±2.10 in the group A and 8.23±2.23 in the group B at pre-operative period and was 0.77±1.31 in the group A and 1.54±1.96 in the group B at post-operative period. The SII was 0.91±0.15 in the group A and 0.80± 0.27 in the group B (Table). No significant difference was observed in SII between the two groups (p=0.386).

The average 2-point discrimination score improved from 5.85±2.80 mm before surgery to 3.69±1.19 mm after surgery in group A and from 7.92±3.12 mm before surgery to 5.12±2.53 mm after surgery in group B. The DI was 0.27±0.27 in group A and 0.29±0.28 in group B. There was no statistically significant difference between the 2 groups when DI was compared (p=0.756).

DISCUSSION

Carpal tunnel syndrome is the most commom entrapment neuropathy and often occurs after the age of 30 years, with women been affected three to six times more than men[10,11]. A large proportion of patients fail to respond to conservative treatment and, in this population, carpal tunnel decompression with division of the transverse carpal ligament has been a highly successful procedure[12]. While the patient satisfaction is usually high with the surgery, potential

Table. Main parameters used to compare immobilization and non-immobilization treatment following open carpal tunnel release.

	SSI	SII	DI
Group A	0.64±0.15	0.91±0.15	0.27±0.27
Group B	0.61±0.12	0.80±0.27	0.29±0.28
p value	0.059	0.386	0.756

SSI, symptom severity index; SII, sympton intensity index; DI, discrimination index.

complications do exist and includes pain and scar disconfort, wound dehiscence, bowstringing of the flexor tendons and inclusion of the median nerve within the postoperative scar[13-15].

To minimise these complications, most surgeons immobilize patients' wrists for 1 to 4 weeks following open carpal tunnel surgery[3]. On the other hand, some authors recommend precocious mobilization of wrist and fingers after the surgery in order to enable the free longitudinal nerve movement in the surgical bed, what should avoid possible adherences from neighboring structures[16].

Few studies in literature have investigated the effects of immobilization following the open carpal tunnel release[4-6]. Bury et al. compared 2-weeks of postoperative wrist splinting versus a bulky dressing after 43 open carpal tunnel releases[4]. In this study, there were no statiscally significant differences between the two groups. The evaluation included subjective parameters of patient satisfaction and objective parameters of grip and lateral pinch strength, complication rates, and digital and wrist range of motion[4]. Cook et al. compared postoperative 2-weeks splinting with early range-of-motion treatment in a serie with 50 patients[5]. They found that there was an earlier return in grip and key pinch strength and significantly better results, considering a subjective pain scale, in the nonsplinted group. Finally, Finsen et al. reported no signifficant differences between post-operative immobilization and non-immobilization after open carpal tunnel release in 82 wrists[6]. The splint was used for 4 weeks and the authors evaluated pain and scar disconfort through a visual analogue scale and the grip and keypinch strength. In general, the published studies do not show sufficient evidence to justify routine wrist immobilization following open carpal tunnel release. In the current study there was no difference also between two patients groups considering the use or not of postoperative immobilization. The use of wrist immobilization fol-

lowing open carpal tunnel release had not been previously studied using a validated outcome questionnaire.

It is important to remind that the related studies, including ours, evaluated only patients with idiopathic CTS. In this patient subpopulation, the adverse effects of surgery on the flexor tendon mechanics such as bowstringing of the tendons are known but they are very rare and seldom lead to serious problems[17,18]. It is not clear if the non-immobilization treatment can affect the recovery after surgery in patients where there is an associated rheumatologic conditions like basal joint arthritis[19]. Additional studies are necessary to evaluate if similar results are observed in this kind of patient.

In conclusion, if we consider the evaluated parameters, our results suggest that the wrist immobilizaton after open carpal tunnel release is not necessary in idiopathic CTS.

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