

THE EFFECT OF HAND REHABILITATION TREATMENT ON PATIENTS OPERATED FOR GANGLION CYST OF THE WRIST IN OWN MATERIAL

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Abstract. The aim of the study was to evaluate the effect of rehabilitation treatment to improve the treatment results of patients operated for ganglions of the wrist. We studied the hands of 77 patients with ganglions of the wrist. 43 women and 34 men aged between 16 and 98 years participated in the study. The open method was used in the surgical treatment to remove the wrist ganglions in all the patients. In the post-operative treatment 46 patients (group I) underwent hand rehabilitation treatment under the supervision of the authors and 31 patients (group II) did not undergo such a treatment. The examination was carried out on all the patients before surgery and at weeks 1 and 4 after surgery. The patients with ganglions of the wrist and pain, impaired hand mobility and impaired hand efficiency were qualified for the surgical treatment. In the rehabilitation treatment stretching exercises were performed as well as loosening and stabilizing the hand and teaching the patients the correct positioning of the upper limb during work and physical activity. The results were statistically analyzed using non-parametric tests such as the chi-square test, signs test and Mann-Whitney test. It was found that in patients after surgical removal of the wrist ganglion rehabilitation treatment has led to the resolution of pain syndromes, movement disorders and efficiency of hand.

Key words: rehabilitation treatment after surgical removal of the ganglion of the wrist

Introduction

Ganglions of the wrist occur around articular capsules and tendons in the form of nodules. These changes are cavities with thin walls made of connective tissue filled with liquid or gel-like substance. Ganglions occur in 50% to 70% of all soft tissue tumors of the hand. In about 70% of cases a ganglion occurs on the dorsal side of the wrist and in 18% to 20% of cases – on the volar side of the wrist. Dorsal wrist ganglia occur over scapholunate ligament and on the palmar side over the radiocarpal ligament or scaphotrapezial ligament (Angelides 1998; Dziak 1993; Lidder et al. 2009; Sawyer et al. 2012).

Ganglions of the wrist are more common in women than in men. They occur mostly in people between 20 and 40 years old, but can occur in children or the elderly (Angelides 1998; Lidder et al. 2009). The cause of ganglion is not exactly known, but it is believed that they are caused by a chronic microtrauma congestion, recurrent inflammation and wrist instability. These changes may occur during abnormal sport performance in rowers, canoeists, people lifting weights or exercising on instruments (Dziak 1993).

Ganglion of the wrist causes pain and restricted mobility and efficiency of the hand in daily life and during sports. A ganglion, compressing the surrounding nerves and vessels can cause dysesthesia, muscle paresis or impaired blood supply to the hand (Deskur 1996; Dziak 1993).

In patients with wrist nodulous changes the early diagnosis is of vital importance. The medical examinations confirming or excluding the diagnosis of the ganglions of the wrist are ultrasound examination, x-ray, computed tomography (CT), magnetic resonance imaging (MRI) or arthroscopy of the wrist joint.

Ganglions of the wrist with mild or moderate symptoms are treated conservatively. At rest, the ganglion may decrease or disappear but often reappears after some effort. This treatment is associated with high recurrences, even higher than 50% (Angelides 1998; Lidder et al. 2009).

In patients with wrist ganglion and pain, restricted mobility and efficiency of hand the best treatment is the surgical removal of the ganglion by use of open or arthroscopic method (Lidder et al. 2009). After the surgery complications may occur in the form of inflammation, bruising, swelling, scar hypertrophy, nerve damage and limited mobility of the joints. Ganglion on the palmar side of the hand often falls between branches of the radial artery, which during the operation can be easily damaged. After the surgery, the pain may persist in more than 20% of patients and the relapse in 20% to 50% of patients (Lidder et al. 2009; Kim et al. 2013).

Materials and methods

We studied 77 hands of patients treated for ganglion of the wrist. 43 women and 34 men aged between 16 and 98 years old took part in the study (Table. 1). Treatment and testing were carried out in SP Hospital in Nowogard by the authors. The patients with ganglions of the wrist and pain, impaired hand mobility and efficiency were qualified for the surgical treatment. The open method was used in the surgical treatment to remove the wrist ganglions. It consisted in making a small cut in the skin on the proximal portion of the wrist, isolating the cyst and the excision of the cyst with pedicle and the affected joint capsule wall and suturing. In the postoperative period the patients from group A underwent rehabilitation treatment. It was based on the use of stretching and loosening exercises for the contracted soft tissues, exercises improving muscle strength, exercises stimulating muscle and neural control and enhancing proprioception. The massage was also used in order to improve the nutrition and neuromobilization. Patients were taught the correct positioning of the upper limb during work and physical activity. Hand exercises were performed in terms of flexion, straightening in radial-carpal joint, ulnar and radial deviation, and conversion (pronation) and inversion (supination) of the hand. The exercises took 5 to 10 times a day for 30 to 60 seconds with 1 to 3 minute-long break. Rehabilitation treatment was carried out under the supervision of the authors (Deskur et al. 2014; Dziak 1993; Kużdżał 2009; Lidder et al. 2009; Skirven et al. 2011).

The patients underwent examinations before the surgery and at weeks 1 and 4 after the surgery. The occurrence of pain was based on a 10-point VAS scale (Visual Analog Scale), the range of hand motion in the radial-carpal joint was assessed using a goniometer and comparing with the mobility of the healthy hand. To assess

the physical fitness of hand patients' personal judgement was taken into account. Subjective hand performance was studied basing on the chart, as recommended by Swanson, which takes into account the activities carried out in everyday life (Deskur 1996).

The results were statistically analyzed using nonparametric tests: chi-square, signs, and the Mann-Whitney test. All the tests were analyzed at a significance level of $p = 0.05$ (StatSoft Statistica 10, 2011).

Results

We studied the hands of 77 patients treated operated for the ganglion of the wrist. There were 43 women (55.8%) and 34 men (44.2%). Of all the patients tested 48% were aged 31 to 50 years old (Table. 1).

Table 1. Number of patients treated for the ganglion of the wrist by gender and age

The age of patients	The number of patients treated (by gender)				Together	
	women		men			
	n	%	n	%	n	%
16-30	16	20.8	9	11.7	25	32.5
31-50	17	22.0	20	26.0	37	48.0
51-98	10	13.0	5	6.5	15	19.5
Together	43	55.8	34	44.2	77	100.0

After the postoperative period the rehabilitation treatment was carried out in 46 patients (group A) under the supervision of the authors and 31 patients (group B) did not undergo such a procedure. In the pre-surgery examination all the patients with wrist ganglion suffered from pain, restricted mobility and limited efficiency of hand. In group A in the weeks 1 and 4 after the surgery a significant increase in the number of patients with complete resolution of pain and full return to proper motor functions and efficiency of the hand has been shown (Table 2, Figure 1).

In group B after the first week after surgery there was a significant increase and after 4 weeks a small and statistically insignificant increase in the number of patients with complete resolution of pain and restored motor functions and efficiency of hand (Table 3, Figure 2).

Table 2. Number of patients in group A with a complete resolution of pain and return of motor function and efficiency of the hand in the examination after the 1st and 4th week after the surgery

Pain relief and return of the functions of the hand	A number of patients in group A tested at weeks 1 and 4 after surgery				Statistical differences p
	1 week		4 weeks		
	n	%	n	%	
Pain relief	29	63.0%	39	84.8%	0.004427*
Return of motor functions	25	54.3%	36	78.3%	0.002569*
Return of the efficiency	22	47.8%	35	76.1%	0.000874*

* Statistically significant difference.

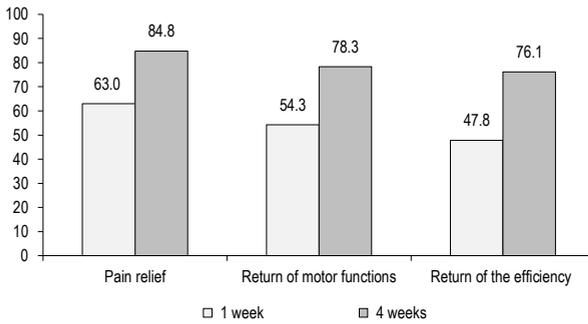


Figure 1. Number of patients in group A with complete resolution of pain and a return of motor functions and efficiency of the hand in studies at weeks 1 and 4 after surgery (%)

Table 3. Number of patients in group B with complete resolution of pain and return to motor function and efficiency of the hand in the examination after the 1st and the 4th week after surgery

Pain relief and return of motor functions of the hand	A number of patients in group B tested at weeks 1 and 4week after surgery				Statistical differences p
	1 week		4 weeks		
Pain relief	18	58.1%	21	67.7%	0.248213
Return of motor functions	17	54.8%	19	61.3%	0.479500
Return of efficiency	14	45.2%	18	58.1%	0.133614

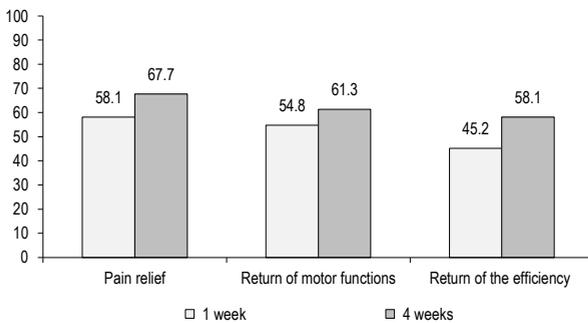


Figure 2. Number of patients in group B with complete resolution of pain and a return of motor functions and efficiency of the hand in studies at weeks 1 and 4 after surgery (%)

In the examination after 4 weeks after surgery in group A the number of patients with complete resolution of pain and the return of motor function was significantly higher than in group B, and the number of patients with full recovery of hand efficiency in group A was slightly higher than in group B (Table 4, Figure 3).

Table 4. The number of patients in group A and B, with complete resolution of pain and the return of motor function and efficiency of the hand in the study 4 weeks after surgery

Pain relief and return of motor functions of the hand	The number of patients in group A and B examined 4 weeks after surgery				Statistical differences p
	group A		group B		
Pain relief	39	84.8%	21	67.7%	0.000522*
Return of motor functions	36	78.3%	19	61.3%	0.022840*
Return of efficiency	35	76.1%	18	58.1%	0.186283

* Statistically significant difference.

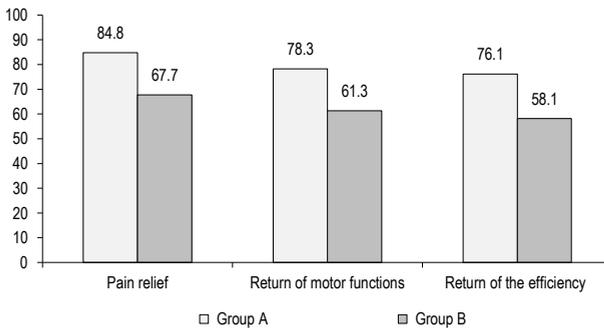


Figure 3. The number of patients in group A and B with complete resolution of pain, return of motor functions and efficiency of the hand in the examination 4 weeks after surgery (%)

Discussion

Ganglions of the wrist were more frequent in women (55.8%) than in men (44.2%) and in those aged 30 to 50 years (48%), which is consistent with other authors' studies (Angelides 1998; Lidder 2009). In patients at risk of wrist ganglions prophylaxis is important. Early identification of ganglion and exclusion of other changes allows to avoid many complications. No improvement after conservative treatment, recurrence, persistence of pain, impaired mobility and efficiency of the hand constitute an indication for surgical treatment (Angelides 1998; Dziak 1993; Craik et al. 2012; Lidder et al. 2009).

In all the patients after surgical removal of ganglions of the wrist a significant improvement in pain relief and restoration of mobility and efficiency of the hand was achieved which is confirmed by the results of other similar reports (Craik et al. 2012). In a final study, better results were achieved in patients who underwent a rehabilitation treatment after surgery. A significant improvement occurred particularly in the resolution of pain and restoration of hand mobility and in a lesser degree in the return of the efficiency of the hand. It should be believed that a longer period would allow the use of exercise to achieve even better outcomes. In case of ganglion of the wrist treatment complications in the postoperative period were observed only in isolated cases and those involved minor

inflammatory reactions which eventually disappeared (Angelides 1998; Craik et al. 2012; Deskur et al. 2014; Lidder et al. 2009).

Conclusions

1. Ganglions of the wrist most-frequently occur in women and persons aged between 31 to 50 years.
2. In patients with a ganglion of the wrist and pain, impaired motor function and efficiency of the hand surgical treatment is indicated.
3. The best outcomes after the surgical removal of ganglion of the wrist can be achieved through rehabilitation treatment of the hand under the supervision of a specialist team.

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