

ENDOPROSTHESIS OF RHEUMATIC HANDS AND FOLLOW REHABILITATION CARE

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Abstract

Hand injury is one of the worst impairments from a functional point of view. In our work we have chosen the issue of the hands of rheumatism. Hands of rheumatism after repeated inflammatory processes affect various deformities. These deformities have been caused caused to the destruction of ligaments and joints and the following instability of the small joints of the hands appears. This led orthopedists and surgeons to various arthroplasties, arthrodesis to total joint replacements. Then total metacarpophalangeal (MCP) endoprotheses (TEP) have become a possibility of rheumosurgical treatment. In our work, we obtained a sample of five men and women aged 40-70 years after implantation of TEP MCP joints. Their early treatment after surgery took place in the National Institute of Rheumatic Diseases in Piešťany. An indication of the operation was ulnar deviations with instability and degenerative changes in MCP joints. Post-operative care in such patients has its own specificities when we look at the overall condition of the patient and manage the current state. Pain and frequent inflammatory processes accompany rheumatic patients in everyday life. It reflects in the psychic and affects the overall condition of the patient and therefore rehabilitation co-operation. In spite of everything, the postoperative status is a priority and requires a physiotherapist's unique approach. Appropriate selection of procedures and patient collaboration will reduce pain, increase muscle strength, keep or improve the range of movement and thus improve self-care or self-sufficiency of the patient.

Keywords: Deformity. Inflammation. TEP. Pain.

1 Introduction

Rheumatic diseases are a major medical problem in the world. They belong to the most widespread diseases affecting humanity, regardless of age and gender. At present, more than one hundred types of rheumatic diseases affecting joints and connective tissue are known. Rheumatic diseases may be inflammatory, degenerative, autoimmune, infectious or of a metabolic nature. Pathological processes cause joint deformation. They generally begin as mono or oligoarticular disabilities. In the treatment of rheumatism, we try to maintain the functional state of the hand and thus self-sufficiency as long as possible. An important part of therapy is active collaboration between a doctor, patient and physiotherapist. The worst impairment from a functional point of view is the disability of hands. Movement is one of the basic manifestations of the living organism. Human movement is a complex, dynamic process that results from the collaboration of all body systems [1]. No less complicated action is hand movement. It requires great coordination of the muscles of the hand and the forearms to make the movement as gentle as possible. By muscle testing, we can roughly evaluate the function of the main muscle groups or individual muscles on the hand, but it is not possible to accurately evaluate and test hand function.

This is dependent on the perfect coordination of the acral or distal muscle groups that control fingers and hand with proximal muscles. They secure the location and position of the arm, forearms to hand during a movement [2]. The hand as a whole has a grip function. We can test hand function by evaluating skill, writing, drawing, or grip assessment. According to Kapanji, we recognize a grip (grip with a terminal thumb and index finger), tweezers grip (grip with subterminal opposition of thumb and forefinger), claw grip (grip with lateral thumb against the thumb of the forefinger), grip with the whole hand (palm grip with thumb lock) grip between palm and fingers – so called digitopalm grip and finger grip interdigital [2].

To maintain the functionality of hands, a handhold is also important. This is in rheumatic patients altered by the deformities that cause inflammatory processes. The most common deformities in rheumatism are deformity of the swan, buttonhole, ulnar deviations of the fingers and wrists, rheumatic hand, hammer fingers, claw hand, keyboard flap, to subluxation of small hand joints and Z-deformity of the thumb.

Even when looking at the hands of rheumatic patient, is clear that the grasping ability of the hand is distorted. The basic hand position required before fully functional grip (wrist in mild extension and light ulnar duct, fingers in moderate semiflexion and thumb in middle opposition) is not possible. This is the reason why rheumatological rehabilitation has several specifics and traits [3]. The development of rheumosurgical and rehabilitative knowledge and techniques is important.

The most commonly performed rheumosurgical operations leading to the restoration of the tendon function include reinserction, repositioning and arm anastomosis, suture, grafting, tenolysis, wrist arthroplasty, carpal tunnel syndrome release, plastic repair surgery and transposition of the tendons.

Arthroplasty relieve pain, correct deformities and maintain movement. In the absence of a tendon repair, we try to maintain a limited function by tenodose or total wrist endoprosthesis, total metacarpophalangeal and proximal interphalangeal joint replacement by Swans joint replacement, small joints correction surgery, arthrodesis of distal

interphalangeal joints (DIP) and proximal interphalangeal joint (PIP) [4]. Swansson plastic prostheses are mostly used for joints of hand. Then the joint slit disappears and movement is possible by plastic bending [5].

2 Goal

The aim of our contribution is to summarize the issue of the deformities of the hands of rheumatic origin and to approach the possibilities of surgical treatment. In complex rehabilitation care, we reviewed five case studies to monitor hand function, self-care, and frequency of pain.

3 Research Sample

The group studied consisted of five patients with a basic diagnosis of rheumatoid arthritis. Men and women were aged between 40 and 70 years old. The patient group had a replacement of the MCP joints in seven hands. All of them were operated at the orthopaedic department of the NsP Piešťany. Regular comprehensive rehabilitation treatment before and after the surgery was done every year in NURCH.

4 Methodology

Subjective perception of pain, pre-post and postoperative mobility, self-care, and comfort after surgery were investigated by a questionnaire of our own design. The questionnaire consisted of seven questions. The muscular force was objectively evaluated using a manual dynamometer. Motion ranges in the joints were measured by a goniometer using an internationally recognized SFTR method. Three types of grip have been selected for functional hand testing: grip with terminal thumb and forefinger grip, grip with thumb and forefinger grip (finger grip), and palm grip with thumb lock (grip with all hands). Gripping was evaluated as a percentage when possible, when 0% is a middle position and 100% is a full grasp. Measurements were performed prior to surgery, patient acceptance for rehabilitation after surgery, and before patient release after three weeks of rehabilitation. We expected that after three weeks of physiotherapy, the values of hand functionality and mobility range will be monitored higher, and pain intensity will be lower. All this makes the quality will be lower. All this makes the quality of life of patients better. Thanks to the repeated hospitalizations in NURCH Piešťany for the purpose of rehabilitation, we were able to obtain information about the patients under observation before and after surgery. During rehabilitation, active and passive exercises were preferred, and a removable splint was applied to the patient for the night. This rehabilitation plan is recommended by Dobiaš [6] in the treatment of patients after replacing MCP joints in rheumatic patients. At the end of the three-week postoperative stay, we could only predict the change in hand deformity, function, and strength. The actual result will appear after five to seven weeks after surgery, when healing of the surgical structures occurs.

5 Research Results

Motion range: The ulnar deviation values were measured 15-45° before the operation. After insertion of the MCP implants, the joint position was repositioned at 0-5°. By measuring the range of active motion in MCP II. in the sagittal plane the extensional deficit was improved by 10-25° and the flexion by 10-70°. In MCP III, the extended deficit was reduced by 5-60° and the flexion by 5-15°. MCP IV. There was an improvement in the extension of 10-70° and flexion by 10-30°. The malignant MCP joint was in two cases prior to surgery in a 90° flexion position, in both cases 10° was adjusted to adjust the extensional deficit by 80°. A precise analysis of the variations in the mobility of individual joints in individual patients is shown in Table 1.

Table 1 Changes in SFTR and Gripping Power after Operations

			power of grip (mmHg)	SFTR (measured in degrees)			
				MCP II	MCP III	MCP IV	MCP V
Case 1	R hand	before	30	0-40-90	0-70-80	0-40-80	0-90-90
		after	60	0-30-90	0-60-80	0-50-80	0-80-90
Case 2	R hand	before	40	0-70-90	0-80-100	0-90-100	0-90-90
		after.	60	0-30-80	0-20-90	0-20-90	0-10-90
	L hand	before	60	0-50-90	0-40-90	0-20-80	0-15-90
		after	80	0-30-90	0-20-90	0-10-90	0-10-90
Case 3	R hand	before	30	0-20-90	0-20-80	0-5-70	0-0-90
		after	70	0-10-80	0-15-85	0-5-80	0-0-90
	L hand	before	20	0-20-45	0-20-75	0-5-60	0-10-80
		after	70	0-0-80	0-0-85	0-0-90	0-0-90
Case 4	L hand	before	30	0-30-40	0-20-75	0-20-80	0-10-90
		after	70	0-10-110	0-10-90	0-10-100	0-10-80
Case 5	L hand	before	30	0-30-80	0-20-90	0-0-75	0-0-90
		after.	60	0-5-90	0-10-90	0-5-90	0-0-90

Pain: Another followed parameter was pain. Prior to surgery, patients reported daily hand pains, rated them on a pain scale from 1 to 10 level 7 on average. In 60 % of the operated hands, we were able to see a reduction in the pain of the hand in the post-operative rehabilitation period. The average pain intensity after rehabilitation was classified as level 4, which means a decrease of three degrees compared to the preoperative period

Muscle Strength: Muscle force measured by hand dynamometer improved by 50-100 %, in one case even more when the patient's force before surgery had a value of 20mmHg, and after the surgery it reached up to 70mmHg. These values, however, are far from reaching the values of a healthy hand, but for the patient, such improvements are also great success and help. A precise analysis of changes in muscle strength measured by the dynamometer is recorded in Table 1.

Functional ability: By correcting deformity and improving muscle strength, patients were able to improve hand grip, fingers gaining better skills in fine motor patterns. The stiff and tweezed grip improved. As they describe themselves, they have improved their pen and spoon hold. The overall increase in self-sufficiency was a good motivation. The change in the position of the individual MCP joints before and after surgery in one of our patients is illustrated in Figures 1 and 2. The patient first underwent surgery on her left hand, later on the right. The ability to perform a palm grip after surgery in this patient is shown in Figure 3.

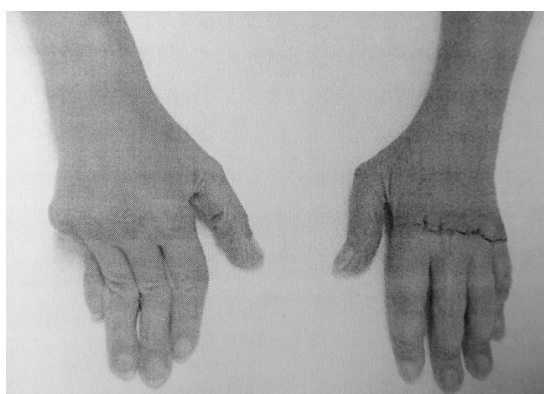


Fig. 1 Status of TCP MCP of left-hand joints and planned MCP right-hand exchange (author's photo-documentation)

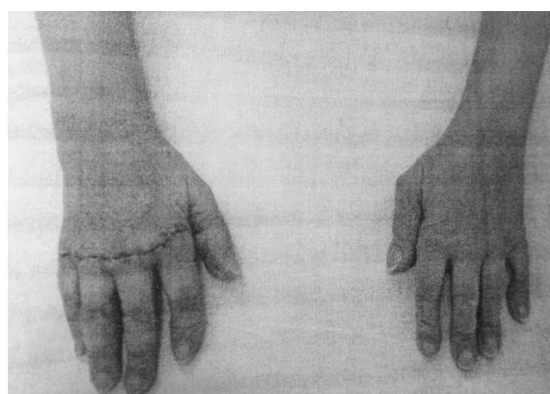


Fig. 2 Condition after TEP MCP joints of both hands (author's photodocumentation)

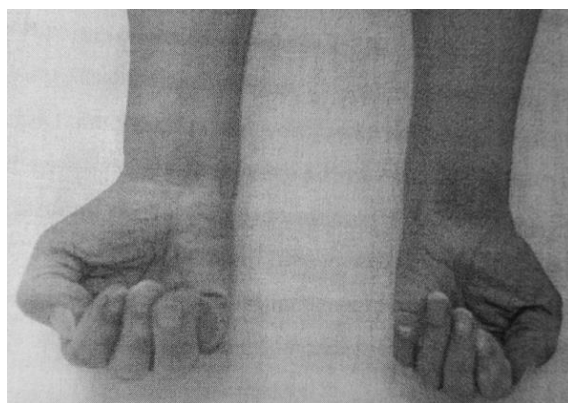


Fig. 3 Possibility to perform palm grip after surgery (author's photo-documentation)

Patient Satisfaction: On a question of satisfaction with surgery and whether they would undergo surgery again, patients have responded yes. Only one patient was not satisfied with the procedure and the result was 100% satisfactory. Dungal [7] states that poor patient motivation may be a contraindication to surgical treatment.

6 Discussion

Bálint et al. [5] reported that functional results after implantation of TEP MCP joints are usually not good, but inflammation and pain will generally disappear. Their claims are also part of us. In the postoperative period, we experienced a decrease in inflammatory activity and pain. Hand function was improved in the postoperative period. During the hospitalization, each patient was given individual rehabilitation care according to the degree of inflammatory activity, preserved functionality and strength of the proximal joints. With individual manual resistances we tried to increase muscle strength in preserved function groups of extensions and finger flexors and the newly created - repositioned position of MCP joints. Such rehabilitation has the biggest effect in our opinion.

Patients were instructed how to proceed further in home care and rehabilitation. In spite of all efforts in two patients, during the inflammatory relapses, the tendons were destroyed and ulcerated in the MCP joints, thereby degrading the comfort of self-service on all sites. Two patients underwent reoperation. One of our patients' decision to undergo a surgical procedure was pitiful. This view shared with us two years after the joints were exchanged.

We believe that her opinion stemmed from excessive enthusiasm and expectation from the procedure. Probably because she was our youngest observe patient with this surgery, she expected 100% muscle strength and hand function. However, we are never able to ensure this in rheumatological rehabilitation. Positive treatment was assessed by a patient who was very positively evaluating the cosmetic effect of surgery and the overall outcome of rehabilitation treatment in her teacher's profession.

We believe that the success of surgical procedures depends on the patient's approach to post-operative rehabilitation and its regular continuation in the home environment.

Patients themselves admit neglect of home rehabilitation care for a variety of reasons, including the inability to self-exercise for polyarticular disability, and the need for assistance in routine tasks as well as exercise. The reality of outpatient clinics is considered insignificant by many rheumatism. Especially because of the lack of time to treat the rheumatism for his polyarticular disability. Patients who may like to look for private rehabilitation facilities, spa care, or at least ask for a personal assistant from the social services department [8]. He will help them in the performance of normal daily activities, which are difficult to perform with rheumatic diseases with multiple disabilities and especially with functionally affected hands.

7 Conclusion

Our results indicate that implants significantly correlate ulna abnormalities, extensive deficits, improve the overall appearance of the hand, ensure a better range of movement, and thus improve hand grip. Over the years, however, the range of motion and the destruction of implants are again worse. This is evidenced by the case of one patient we have taken at the time of reoperation after eight years after the first operation due to implant release and worsening of the joints. Despite today's digital and pre-technical times, our hands are still our means of subsistence, which allows us to eat or to create something. The long-term outcome of the surgery is greatly affected by rheumatic activity, therefore it is necessary to cooperate orthopedic, rheumatologist, and physiotherapist.

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