Charles University

Faculty of Physical Education and Sport

Department of Physiotherapy

RHEUMATOID ARTHRITIS

Bachelor Thesis

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Abstract

Title: Rheumatoid Arthritis

Thesis Aim: In this thesis I will discuss about rheumatoid arthritis and show my results after five therapeutic sessions with a patient who had this diagnose.

Clinical findings: The patient is 59 year old man who worked in the railway as a supervisor and shifter. He is now retired. He was diagnosed with rheumatoid arthritis in 1998. Due to worsening of his condition he was hospitalized at Revmatologicky Ustav at Albertov the 5th of February this year. His main complaint was pain in right shoulder, lumbar area of back and hands. According to the examination marked restricted ROM was detected in the right shoulder. Restricted ROM was also found in some head and neck movements.

The most important muscle imbalances were detected between the deep neck flexors and the short neck extensors and between shoulder protractors and retractors. Anterior tilting of pelvis was found due to dysbalance between hip extensors and the short hip flexors. The patient's right shoulder was also more elevated then the left one. TrPs in muscles were found, e.g. right upper trapezius and suboccipitals. Muscle shortness was also found in several muscles.

Methods: The therapy included five sessions with the patient during two weeks. PIR techniques were performed at every session for the relaxation of hypertonic muscles, stretching techniques to elongate shortened muscles, ROM exercises for the joints, aerobic training for enhancing general condition, and strengthening exercises for the weak muscles. An autotherapy plan was also proposed to the patient.

Results: after the five session's improvement were detected in the final kinesiological examination. Weak muscles were stronger, shortened muscles were elongated, ROM in right shoulder joint was better, and hypertonic muscles were relaxed.

The result of the rehabilitation, discussions of rheumatoid arthritis and literature approaches for the examination and therapy of rheumatoid arthritis are discussed.

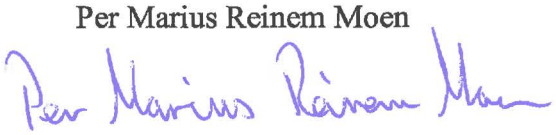
Key words: Rheumatoid arthritis, restricted ROM, and muscle imbalances.

Declaration

I declare that this Bachelor Thesis is based on my own individual work during my two weeks of clinical practice which took place at the Revmatologicky Ůstav at Albertov, Prague between the 4th and 15th of February 2008. All information used is presented in the reference list at the end.

Prague

Per Marius Reinem Moen



Acknowledgement

I want to thank my supervisor, Mgr. Mirca Jalovcova, for her time and advice during the process of writing the bachelor thesis. Furthermore I would like to thank the teachers at Charles University who has contributed to a strong learning environment.

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1. Preface

I was assigned with a patient with primary diagnose rheumatoid arthritis 2nd stage at my clinical practise at Revmatologicky Ustav at Albertov, Prague. My supervisor at the institute was Petra Cermacova. During my practice, from 04.02.08 to 15.02.08, I had all together five therapy sessions with the patient.

In my thesis there is first a general description of rheumatoid arthritis, followed by a special description including the anamnesis, examination, treatment and effectiveness of the treatment of the patient.

2. GENERAL PART

2.1 RHEUMATOID ARTHRITIS

2.1.1 Biology and physiology of the joint

The principal function of almost all joints is movement, but the joint is also a specialized structure which provides stability. When the body is moving, the cartilage of the joints is exposed to shearing - and compression forces which can be many times the weight of the body. The joint is well adapted to resist these kinds of stress. [9]

There are two basic types of articulation: synovial or diathrodial joints, which are articulations with free movement and synovial lining cells bordering the joint cavity; and synarthroses, at which very little movement occurs.[17]

The synovial, or diathrodial joints are by far the most common type of articulation. These are the joints that are actively driven by muscles and tendons, are stabilized by tendons, are cushioned by hyaline cartilage, and are both nourished and lubricated by synovial tissue. The bony surfaces of these joints are covered with thin layers of articular cartilage, and the cartilaginous surfaces of these joints slide past each other during movement. Diarthrodial are the joints most frequently affected by rheumatic disorders.[17] In the synarthroses movement is very small. When growth is complete, articulations are no longer required and bony union occurs throughout the skull. Other forms of these barely movable joints are the strong, fibrous "syndesmoses", such as that lining the distal tibia and fibula, and the "gomphoses" that seat the teeth in their bony sockets.[17]

The blood supply to a joint arises from blood vessels that enter the subchondral bone at or near the attachment of the joint capsule and form an arterial circle around the joint. The synovial membrane has a rich blood supply, and constituents of plasma diffuse rapidly between these vessels and the joint cavity. Because many of the capillaries are near the surface of the synovium, blood may escape into the synovial fluid afte relatively minor injuries. Healing and repair of the synovial membrane usually are rapid and complete. Normal joints have both afferent and efferent innervations. Fast-conducting, myelinated A-fibers innervating the joint capsule are important for proprioception and detection of joint movement. The proprioceptors function reflexively to adjust the tension of the muscles that support the joint and are particularly important in maintaining muscular support for the joint. Loss of proprioception and reflex control of muscular support leads to destructive changes in

the joint. Slow-conducting, unmyelinated C-fibers transmit diffuse pain sensation and regulate synovial microvascular function.[17]

Muscles and tendons. When muscles act, the force of their contraction drives the joint members together. In fact, the mechanical advantage of most muscles is so poor that much more energy goes into joint compression than is spent in useful work. The positive aspect of this expenditure lies in the stability conferred when interlocking joint members are driven together. Unlike ligaments, muscles change their length as they contract or relax thus their tendons provide a stabilizing factor even in the direction of joint motion. Since all tendons are strong ties that cross joints, they all may be considered to be factors promoting joint stability.[2] The joint capsule consists of two layers: an outer fibrous layer and the inner membrane, the synovium. The synovium surround the tendons that pass through the joints and the free margins of other intra-articular structures, such as ligaments and menisci. The synovium secretes a slippery fluid called synovial fluid. This fluid acts as a lubricant and facilitates the movement of the articulating surfaces of the joint. [17]

Ligaments consist of dense, connective tissue. They usually run from one bone to its partner and form a tough but flexible limit to inappropriate joint motions. The collateral ligaments of interphalangeal joints, for instance, remain taught throughout flexion and extension and thereby prevent abduction and adduction. Since ligaments are purely passive restraints, they do their jobs without an energy cost.[17]

The synovium allows disconnection between adjacent moving structures. When disconnection is overtaken by connecting fibrous tissue (as in frozen shoulder), mobility is lost. The synovial lining can be classified in terms of sub-adjacent connective tissue. The detailed mechanical properties of subintima also contribute to mobility. Fatty areas provide isotropic, elastically deformable packing for large spaces between incongruent cartilage surfaces. Areolar areas may stretch, crimp, roll, or slide. Other synovial functions include the provision of nutrients to chondrocytes and the control of synovial-fluid volume and composition.[12]

Lubrication is essential for the protection of joint structures from friction and shear stresses associated with movement under loading. But articular surfaces are also protected by other mechanisms not involving lubrication. During impact loading, muscles and bone absorb the great majority of force and energy, leaving only a small amount to be absorbed by cartilage

itself. Finely tuned neuromuscular reflexes are essential for this system to work effectively. Small failure in these reflex arcs may lead to insufficient attenuation of impact loading, resulting in degenerative changes in joints and subchondral tissue. [9]

Articular cartilage is a specialized connective tissue that covers the weight-bearing surfaces of articulating (diarthrodial/ synovial) joints. The principal for the cartilage layer is to reduce friction in the joint and absorb the shock associated with locomotion. More than 70 % of articular cartilage is water. Normal articular cartilage is white and translucent. It is an avascular tissue nourished by diffusion from the vasculature of the subchondral bone and, to a lesser degree, from the synovial fluid.[12]

The many bursae in the human body facilitate gliding of one tissue over another, much as a tendon sheath facilitates movement of its tendon. Bursae are closed sacs, lined sparsely mesenchymal cells similar to synovial cells, but are generally less well vascularized than synovium. [12]

Bone is a composite tissue consisting of mineral, matrix, cells, and water. The mineral is an analog of the naturally occurring crystalline calcium phosphate, hydroxyapatite. In addition to serving as a source of calcium, magnesium, and phosphate ions, the mineral crystals in bone provide strength and rigidity to the matrix upon which they are deposited. This strength and rigidity provides protection to internal organs and also serves a mechanical function, facilitating mobility. During infantry the bone matrix is soft. But in full maturation the bone matrix is dense and tough and better adapted to external forces.[12]

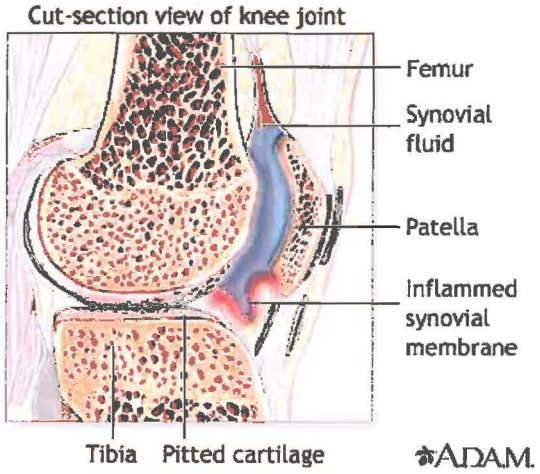
2.1.2 History and definition of rheumatoid arthritis

The word arthritis is derived from the Greek word *arthron* (joint) and suffix *-itis* (inflammation). [19] RA appears to have been described in paintings more than a century before the first detailed medical description of the condition in 1800 by medical doctor Landre-Beauvais. [3] The characteristics of this disease Landre-Beauvais concluded was swollen periarticular tissue, bone decay or fusion, and disorganized cartilage. Furthermore he concluded that is more common in women than in men, particularly those lower down the social "ladder" rank. The description he stated was spasmodic, with a spontaneous painful

polyarticular involvement. Compared to gout, he concluded that the painful polyarticular involvement in rheumatoid arthritis to be less violent and long lasting.[9]
Landre-Beauvais established the clinical picture of rheumatoid arthritis and distinguished it from other illnesses, especially gout.[9]

2.1.3 Pathogenesis and etiology

RA is a chronic autoimmune disease in which the body's immune system attacks healthy tissue lining the joints. The chronic inflammation of RA begins in the synovium. What exactly triggers the inflammatory reaction is unknown. The result of this event is that synovial and other cells produce cytokines, other chemical mediators, and proteolytic enzymes, which together can destroy all the components of the joint. The synovial tissue also begins to proliferate, causing the normally smooth synovium to form pannus, a rough, grainy tissue that grows into the joint cavity and erodes cartilage (see picture 1). If the tendons become inflamed, they may shorten and immobilize the joint, which can cause bone fusion and loss of mobility. If the tendons rupture, the joint may become loose or floppy. RA can affect connective tissue in other parts of the body. Inflammatory skin nodules at pressure points, such as the elbow, can appear gradually or suddenly, and may be tender and sometimes inflamed. Occasionally, surgery is needed if these nodules become infected or are bothersome during activity. At times, they may also disappear spontaneously.[19]



Picture 1. Knee joint.[20]

Stages:

Stage 1:

- Represents synovitis: synovial membrane becomes hyperemic and edematous with foci of infiltrating small lymphocytes
- Joint effussions w/ high cell count (5,000 to 60,000 per mm3)
- X-rays will as yet show no destructive changes, but soft tissue swelling or Osteoporosis may be seen[19]

Stage 2:

- Inflammed synovial tissue now proliferates and begins to grow into joint cavity across articular cartilage, which it gradually destroys
- Narrowing of joint due to loss of articular cartilage[19]

Stage 3:

- Pannus of synovium
- Eroded articular cartilage and exposed sub-chondral bone
- X-rays will show extensive cartilage loss, erosions around the margins of joint, and deformities may have become apparent[19]

Stage 4:

- End stage disease
- End inflammatory process is subsiding
- Fibrous or bony ankylosing of joint will end its functional life
- Subcutaneous nodules associated w/ severe disease[19]

Scientists don't know what causes RA, but they are investigating many hypotheses. The disorder runs in families, is more common among women, and may initially resemble some forms of infectious diseases, such as viral arthritis.[19]

Genetic factors: Scientists have long believed that some insult (perhaps a microbe or an environmental toxin) triggers RA in genetically susceptible people. Today geneticists believe that HLA genes may provide the link. HLA-DR genes, of which several dozen have now been identified, are instrumental in identifying and disposing of foreign antigens. Researchers reported in 1978 that 70% of people with RA had molecules of certain DR4 subsets on their lymphocytes, while only 28% of healthy subjects had such molecules. Subsequently, several other genes in the HLA family have been implicated as well. [19]

Infectious agents: Scientists have searched for evidence that individuals with RA might harbor certain bacteria known to cause other types of arthritis, such as Mycoplasma (which causes pneumonia or genital infections) or Chlamydia (one of several sexually transmitted organisms that can cause Reiter's syndrome). Evidence is still not found. A more likely role for bacteria would be through an immune system error: Lymphocytes might produce antibodies against a bacterial product that also react against a connective tissue protein. Other researchers believe that a virus is the most likely culprit. This form of arthritis attacks multiple joints and is usually symmetrical—it affects joints similarly on both sides of the body, particularly the finger joints, base of the thumbs, wrists, elbows, knees, ankles, or feet. It nearly always involves the wrists and the middle and large knuckles, but seldom the joints nearest the fingertips. At times, joint pain may be constant, even without movement. Morning stiffness that lasts for an hour or longer is a hallmark of the disease and one of the main ways doctors gauge the severity of inflammation. The course of RA is unpredictable. Early on, the symptoms frequently abate or even disappear, only to flare up weeks or months later. Occasionally complete remission occurs, usually within the first year. But for some people the process is destructive, ending in severe disability within a few years.[19]

2.1.4 Classification and epidemiology

Findings of the descriptive frequency of RA indicate a population prevalence of 0.5% to 1% and a highly variable annual incidence (12-1200 per 100,000 population) depending on gender, race/ethnicity, and calendar year. It is more common in women than in men.[18]

The American College of Rheumatology 1987 has identified seven diagnostic criteria for RA. These criteria have a sensitivity and specifity of approximately 90%. Of the following seven criteria at least four must be met: [12]

- Morning stiffness in and around joints lasting 1 hour or more before maximal improvement (must have been present for at least 6 weeks).
- Soft tissue swelling (arthritis) of three or more joint areas. (R or L: MCP, PIP, wrist, elbow, knee, ankle, MTP), (must have been present for at least 6 weeks).
- Swelling (arthritis) of the proximal interphalangeal, metacarpophalangeal, or wrist joints (must have been present for at least 6 weeks).
- Symmetrical arthritis (must have been present for at least 6 weeks).

- Subcutaneous nodules.
- Positive test for rheumatoid factor, in <5% normal population.
- Radiographic erosions and/or periarticular osteopenia in hand and/or wrist joints.[12]

2.1.5 Systemic effects

RA most often affects the joints, but it is a disease that can harm the entire body. It can affect many organs and body systems besides the joints. Vasculitis (inflammation of blood vessels) can compromise circulation to the hands, feet, and nerves. People with RA often develop eye conditions, including keratoconjunctivitis sicca, or dry eye, which causes redness, burning, itching, reduced tearing, and sensitivity to light. Other complications include respiratory, cardiovascular, gastrointestinal, infectious, neurological and hematological disorders. In rare cases, the ligaments that tether the uppermost vertebrae (which support the skull) are damaged, allowing the vertebrae to slip out of alignment and pinch the spinal cord. At advanced stages, RA can limit a person's ability to carry out normal daily activities such as dressing, bathing, and walking. Research shows that people with RA have a greater increased risk of death compared with age- and sex-matched controls without RA from the same community.[6]

2.1.6 Manifestations in specific joints.

Principles of the role of synovitis in joint destruction are applicable to all joints. However, certain aspects are pertinent to specific joints.[12]

Cervical Spine: Although RA of the thoracic and lumbar spine is exceptionally rare, cervical spine involvement is common. The inflammatory process involves diarthrodial joints and is neither palpable nor visible to the examiner. Neck stiffness through the entire arc of motion is primarily found, and restricted ROM may also develop. Tenosynovitis of transverse ligament may produce significant instability of C1-C2.[12]

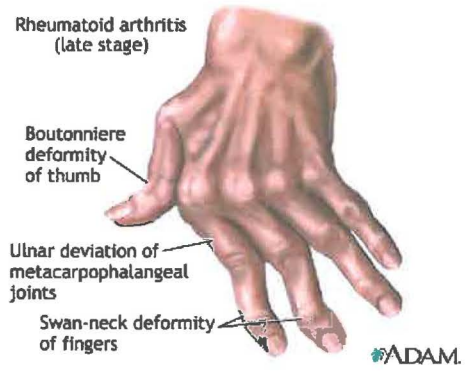
Shoulder: Because the shoulder capsule lies beneath the muscular rotator cuff, an effusion is difficult to detect on physical examination. The presence of swelling is often not detected. Less motion in the joint is typically observed – Frozen shoulder syndrome. The symptoms are often worse at night.[12]

Elbow: The elbow is one of the easiest of all joints in which to detect inflammation. Because this joint is superficial, synovitis is evident by palpating fullness and thickening in the radiohumeral joint.[12]

- Flexion deformity is common.
- Ulnar nerve neuropathies may develop.[12]

Hand/Wrist/Fingers: The wrists are affected in virtually all people with RA.[12]

- Metacarpalphalangeal (MCP) and proximal phalangeal (PIP) involvement is common, but the distal interphalangeal (DIP) joints usually are spared.
- Ulnar deviation of MCP
- Radial deviation at wrists
- "Z" deformity of thumb
- Tendon Ruptures - most common Extensor Pollicus Longus
- Rheumatoid Nodules along tendon sheaths
- Swan-neck deformities
- Nodular thickening along flexor tendons of the palms
- Boutonniere deformities[12]



Picture 2. The hand. [21]

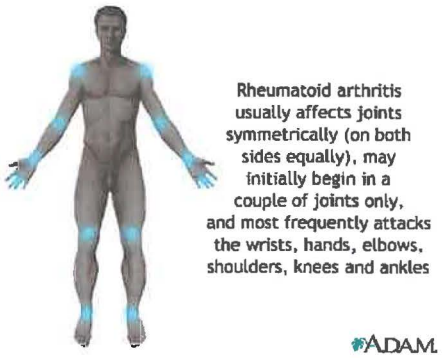
Knee: Effusions and synovial thickening of the knee usually are detected easily on examination.[12]

- Flexion with valgus and external rotation tibia, posterior subluxation of tibia
- Baker's cyst
- Effusion and synovial thickening[12]

Hip: Although hip involvement is common in RA, early manifestations of hip disease often are not apparent by history or physical exam. Typically, the dysfunction is first noticed when the patient has difficultly putting on shoes and socks on the affected side.[12]

Foot and ankle: Because lower-extremity joints are weight-bearing structures, involvement of the foot and ankle causes greater dysfunction and pain than occur in upper-extremity joints.[12]

- Lateral deviation of 1st toe
- Claw or hammer toes
- Pronation and eversion of foot
- Tarsal tunnel involvement resulting in burning paresthesia
- Lower extremity involvement leads to greater dysfunction and pain due to weight bearing role
- Widening of forefoot (Metatarsophalangeal) joints
- Dropping of metatarsal(MT) heads
- Distal displacement of MT fat pads[12]



Picture 3. The body.[22]

2.1.7 Examination of a patient with RA provided by the physician

A. Imaging tests for rheumatoid arthritis

Because rheumatoid arthritis often involves the hands and feet, the doctor may provide imaging tests to check the joints for bone erosions.[19]

- Plain radiography may in the early stages of RA, show only soft tissue swelling or joint effusion. As the disease progresses, however, radiographic abnormalities usually appear. Plain radiographs are useful in helping to establish prognosis, assessing joint damage longitudinally, and when surgery is appropriate. Characteristic radiographic findings in RA include soft tissue swelling, juxtaarticular osteopenia, concentric or symmetric loss of articular cartilage with diminution of the joint spaces, and last, bony erosions.[19]

- MRI may demonstrate erosions much earlier than conventional radiographs and provides superior detail in the description of articular and periarticular structures.[1]
  But its use is controversial because it may detect cysts or other bone changes that resemble erosions, and thus could lead to unnecessary treatment. In addition, MRI is expensive, and routine use could drive up the cost of caring for people with rheumatoid arthritis dramatically.[19]

- High-resolution US have become a more widely used modality for the assessment of patients with RA. US can detect bony erosions in RA patients with far greater sensitivity than plain x-rays and comparable to that of MRI. In addition, synovial fluid and thickened synovial tissue can be readily detected, particularly in the joints of the hand. With the use of power color Doppler technology, which assesses blood flow, US can quantify disease activity within the synovium.[1]

B. Laboratory tests

- Rheumatoid factor: About 70%–80% of people with RA have an abnormal antibody called the rheumatoid factor in their blood. If rheumatoid factor is detected in the blood, this doesn't necessarily mean that the patient has rheumatoid arthritis. About 10% of people who do not have rheumatoid arthritis will test positive for rheumatoid factor. Such people may either be perfectly healthy or suffering from another disorder such as systemic lupus erythematodus. Also, some people with RA will test negative for rheumatoid factor. Thus the additional blood tests should be done to look for causes of joint pain.[1]

- The CCP antibodies test measures the presence of an antibody associated with rheumatoid arthritis discovered only in the past decade. Although it is new, the anti-CCP test is gradually becoming more common. Some small early studies have shown that the anti-CCP test can reliably help to diagnose RA in three types of people: those with early-stage disease for whom uncertainty remains about diagnosis, those with mild symptoms who test negative for rheumatoid factor, and those who test positive for rheumatoid factor but may suffer from some other condition. Researchers do not yet know whether the anti-CCP test is useful in other circumstances, or whether the anti-CCP test offers much benefit beyond standard clinical tests.[1]

- ESR: The erythrocyte sedimentation rate (ESR) provides a measure of body-wide inflammation: The higher the rate, the greater the likelihood that you are suffering from inflammation, which could be caused by RA. This test can also help determine how serious your condition is.[1]

- CRP: The C-reactive protein (CRP) test also measures inflammation, but tends to change more rapidly than the ESR; minor elevations have also been associated with an increased risk of cardiovascular disease. In assessing inflammation due to RA, this test offers no clear advantages over the ESR.[1]

- Synovial fluid analysis: The synovial fluid in RA is usually yellowish, turbulent, or cloudy and, due do its inflammatory nature, has a low viscosity and poor stringing effect. Cell counts are usually inflammatory, with leukocyte counts ranging from 2,000 to 75,000 cells/mm^3. differential counts on rheumatoid synovial fluid show a predominace of neutophils (usually >70%). As rheumatoid patients has a greater risk for infectious arthritis, patients presenting with an acute monarticular flare or chronic recalcitrant monarthritis should undergo synovial fluid aspiration and analysis to exclude acute bacterial infections or chronic fungal or mycobacterial infections.[1] Polarized microscopic examinations for crystal analysis should be negative as there is a negative association between gout and RA.[1]

C. Arthroscopy

- Arthroscopy (also called arthroscopic surgery) is a minimally invasive surgical procedure in which an examination and sometimes treatment of damage of the interior of a joint is performed using an arthroscope, a type of endoscope that is inserted into the joint through a small incision. Arthroscopic procedures can be performed either to evaluate or to treat many orthopaedic conditions including torn floating cartilage, torn surface cartilage, ACL reconstruction, and trimming damaged cartilage. The advantage of arthroscopy over traditional open surgery is that the joint does not have to be opened up fully. Instead, only two small incisions are made - one for the arthroscope and one for the surgical instruments. This reduces recovery time and may increase the rate of surgical success due to less trauma to the connective tissue.[16]

2.1.8 Conservative and non-conservative therapy provided by the physician

Conservative:

Non-steroidal anti-rheumatic drugs reduce the signs and symptoms of established inflammation but do not in themselves eliminate the underlying causes of the inflammation. Their effects on pain, swelling, heat, erythema, and loss of function begin promptly after their absorption into the blood and become fully evident within a few weeks. Drug withdrawal is quickly followed by exacerbation of signs and symptoms of inflammation. The drugs have no effect on the course of the basic disease process and do not protect against tissue or joint injury; thus, damage to joints continues to occur during the administration of non-steroidal anti-rheumatic agents to patients with chronic inflammatory arthritis. [(1)(9)]

These drugs are usually referred to as non-steroidal anti-inflammatory drugs (NSAID's); examples include aspirin and the non-acetylated salicylates, phenylbutazone, indomethacin, ibuprofen, fenoprofen, ketoprofen, flurbiprofen, naproxen, tolmetin, sulindac, meclofenamate, diclofenac, ketorolac, etodolac, diflunisal, nabumetone, oxaprozin, and piroxicam. [(1)(9)]

Given the widespread use of NSAIDs and their substantial pharmacological activity, the occurrence of adverse reactions is inevitable. In general, the NSAIDs share a common spectrum of clinical toxicities, although the frequency of particular side effects varies with the compound. Both adverse effects and beneficial effects tend to be dose-related, necessitating careful evaluation of risk/benefit ratios. Important toxicities occur in the gastrointestinal (GI) tract, central nervous system, hematopoietic system, kidney, skin, and liver. [(1)(9)]

Chronopharmacologic studies suggest that in many patients the adverse effects of NSAIDs

can be minimized, and their efficacy optimized, by adjusting the time of day when drug doses are administered. [1][9]

Corticosteroids are potent suppressors of inflammation, and they are effective in managing the pain and functional limitations of people with active inflammatory joint disease. However, most studies, and 50 years of experience with their use, attest to the inadequacy of corticosteroids as the ole therapy for RA. It is desirable, but often not possible, to avoid continuous corticosteroid therapy in people with RA. Adverse effects may be alterations of fat distribution. It may also influence glucose, protein and electrolyte metabolism, and hepatic enzyme function resulting in a tendency toward hyperglycemia and insulin resistance, protein catabolism in muscle and bone, sodium retention and potassium loss. Because of the well-appreciated side effects of thee drugs, long-term use generally should be avoided.[12]

DMARDs: These drugs differ greatly in their mechanisms of action. These actions are well-understood for some agents, including such biologic response modifiers as the TNF-a antagonist, but less understood for others, such as gold or hydroxychloroquine. DMARDs also vary greatly in their chemical structure, toxicity, and indications for use. An effective DMARDs should prevent joint erosions an damage, and control the active synovitis and constitutional features of the disease. There is increasing evidence that some DMARDs can achieve these goals in short-term clinical trials, and some, in longer-term observational follow-up. However, there is no evidence that any available DMARDs can heal erosions, reverse joint deformities, or "cure".[12]

Non-conservative:

The surgical management of patients with inflammatory arthritis should be viewed as part of a continuum of treatment, as opposed to an isolated event in the disease process.[12]

In general, the goals of surgical intervention are to achieve pain relief and to maintain or improve function. With regard to function this can range from maintaining or improving the patient's ambulation to surgery directed at improving the patient's ability to perform activities of daily living, such as dressing and feeding.[12]

The team comprises of many professionals; the orthopedic surgeon, nurses, rheumatologists, social workers, therapists and the patient. The team involved with any one patient may grow and alter as a variety of specialist skills may be required at different times throughout the disease course. The patient is the most important member of the team. Patients know what

problems they are having and how these problems are affecting their lives. Actively involving the patients in their care ensures that the team will be able to provide short-and long term treatment plans that will be relevant to the patient's needs and personal beliefs. The integration of patients into the care team in this way has been shown to improve outcomes and compliance to the treatment plan suggested.[2]

The most common surgical procedures for rheumatoid arthritis are arthroscopy, synovectomy (removal of the inflamed tissue that lines the joint), and arthroplasty (joint repair, including joint replacement). The choice depends, in part, on which joints are involved and whether the patient has any other medical problems. Total joint replacement, most commonly for severe hip or knee arthritis, is a major operation and carries the associated risks. [19]

The most common surgical interventions occur in the following joints:

- The cervical spine
- The hand and wrist joints
- The ankle and foot
- The hip-and knee joint.
- The elbow-and shoulder joint.[4]

The role of physiotherapy in the postoperative management of patients has not been clearly defied. In the absence of controlled prospective studies, there is an acceptance based on personal experience. The requirements for such therapy appear to vary from joint to joint.[10] Regardless of the lack of scientific evidence, essentially all surgeons with experience in the field of joint replacement surgery are convinced that the active participation of both the patient and the physiotherapist in a post-operative exercise program will improve muscle strength, increase motion, and educate the patient in activities of daily living and in the proper protection of operated and unoperated joints.[(4)(10)]

2.1.9 Examination of a patient with RA provided by the physiotherapist

The general aim of the examination of the joints is to detect abnormalities in structure and function. The common signs of articular disease are swelling, enlargement, tenderness, limitation of motion, crepitation, deformity, and instability.[9]

- Swelling: An inflamed synovial membrane often produces mild joint swelling. People may describe a sensation of tightness or fullness inside the joint, or it may feel tender. It can be described as the joint is feeling "boggy" or soft to the touch. Marked swelling usually indicates excessive joint fluid, a sign of inflammation or perhaps bleeding into the joint.[9]

- Enlargement of a joint is not the same as swelling. Bony enlargement without joint swelling feels hard to the touch and is not usually tender. This finding is typical of osteoarthritis, although it may also occur in people who have no joint pain and as a consequence of other joint disease, such as rheumatoid arthritis.[9]

- Tenderness is an unusual sensitivity to touch or pressure. Localization of tenderness by palpation may also help to determine whether the pathologic site is intra-articular or periarticular, such as in a fat pad, tendon attachment, ligament, bursa, or muscle or in the skin. It is also useful to palpate noninvolved structures to help assess the significance of tenderness.[9]

- Limitation of motion is a common manifestation of articular disease, thus it is important to know the normal type and range of motion of each joint. Comparison with an unaffected joint of the opposite extremity helps in the evaluation of individual variations. In patients with joint disease, passive range of motion is often greater than the active type, possible because of pain, weakness, or the state of the periarticular structures. Stressing passive joint motion at the extremes of flexion and extension may also help in assessing joint tenderness.[9]

- Crepitation is a palpable or audible grating or crunching sensation produced by motion. It may or may not be accompanied by pain. Crepitation occurs when roughened articular or extra-articular surfaces are rubbed together by active motion or by mnual compression.

Crepitation from within a joint should be differentiated from cracking sounds caued by the slipping of ligaments or tendons over bony surfaces during motion.[9]

- Deformity: Deformity is the malalignement of joints and may be manifested by bony enlargement, articular subluxation, contracture, or ankylosis in nonanatomic positions. Deformed joints do not function normally, frequently restrict activities, and may be associated with pain, especially when put to stressful use.[9]

- Instability: Joint instability is present when the joint has greater than normal movement in any plane. "subluxation" refers to partial displacement of the articular surfaces in a joint with some suface-to-surface contact. Instability is best determined when the physiotherapist supports the joint between two hands and stresses the adjacent bones in directions in which the normal joint does not move.[9]

2.1.10 Conservative therapy provided by the physiotherapist

A. Rest

General: Since 1990 there have been radical changes from previous approaches to exercise in rheumatic diseases. Before 1975, patients with rheumatic diseases were advised to rest, and their only exercises were range-of-motion exercises.[8]

Rest plays an important role in the treatment of patients with rheumatoid arthritis, because active inflammatory joint disease may be reduces in complete rest. But today prolonged rest is not recommended due to its negative effects on the cardiovascular, musculoskeletal, nervous, and integumentary system. A muscle at complete rest may loose as much as 3% of its strength in one day. It is better to have a certain, limited period a day of rest, or to rest specific joints.[8]

Local: Orthisis derives from the Greek expression "making straight. Orthotics decrease the force which is passing through the painful weight-bearing joints, it supports the joints, align, prevent or correct deformities of a body part, and improve the movement pattern. Orthesis is sometimes used to denote an orthosis; brace is synonymous with orthosis. A splint is a temporary orthosis. Some of the other common terms that denote particular orthotic designs include slings, corset, pressure garment, and cuff. If the inflammation is not treated, orthosis can not prevent deformity, but these devises may allow the inflamed joint to fuse in the position which is the most functional for the patient.[5]

In acute stages:

- Patient education
- Cold applications
- Local and general rest
- Splints
- ROM exercises[5]

In chronic stages:

- Walking and standing re-education
- Passive movements
- Active assisted movements
- Active movements
- Relaxation tecniques[5]

Physicians are responsible for authorizing the orthotic description, while physiotherapists have the major responsibility of evaluating the patient's balance, joint excursions, motor power, skin condition, and current and potential function, as well as teaching the patient how to don and doff the orthosis, use it correctly, and maintain it.[5]

B. Exercise

Inflammatory diseases of muscles, connective tissue, and joints can result in decreased range of motion, athrophy of muscles, and bone density. Another factor restricting the movement is accumulation of fluid within the joint. If the joint is immobilized, the joint capsule will tighten, and shortening of muscles and tendons may also occur.[10] Exercises may vary in performance, intensity, and duration. It can be used as therapy to increase joint range of motion, endurance, strength, and coordination and, as a result, joint stability.[10] Exercises may be prescribed for specific joints to maintain or improve range of motion, for specific muscles to maintain or improve strength, or for part of a program to maintain or improve cardiovascular fitness and endurance.[19] It is important to notice that the patient must not overdo activities. Stiffness, pain and fatigue all increase if the exercise is not balanced properly with rest. Pain indicates that something is wrong. If the patient is not aware of what is "too much", the physiotherapist can give him advise to learn to stop before reaching that point.[19]

Therapeutic exercises may be broadly classified into three groups:

- Range of motion
- Strengthening (isometric, isokinetic, isotonic)
- Endurance[10]

Inflamed joints should be exercised on daily basis. Furthermore the exercises are categorized into two groups; active and passive. The effects of exercise on metabolic, physiologic, or mechanical factors are crucial to our understanding of the mechanisms through which exercise produces benefit.[10] I Traditionally, isometric (static) exercise, which results in moderate strength gains, has been used to treat patients with inflammatory rheumatoid arthritis, due to fears dynamic exercise may exacerbate pain and disease activity, and damage delicate periarticular tissues. Some recent studies have showed that dynamic exercise therapy is efficacious for patients with rheumatoid arthritis, with no exacerbation of clinical disease activity or acceleration of joint destruction following exercise. But there are few clinical trials which analyze the biochemical effect of dynamic exercise in rheumatoid arthritis.[6]

Suitable free time activities for people with rheumatoid arthritis may be:

- Swimming: Exercise in water is an excellent way to increase the muscle strength, relax sore muscles, improve joint stability and ease its stiffness. The buoyancy of water is also less stressful on the body's joints.[7]

- Walking: walking enhance muscle strength and flexibility. It improves bone health and reduces the risk of osteoporosis.[7]

- Cycling: because it's less stressful on the joints, cycling can, both indoor and outdoor, provide a good exercise option.[7]

- Yoga: Yoga can provide pain relief, relax stiff muscles and ease sore joints. Yoga with its controlled movements, pressures, stretches and deep breathing relaxation, can also provide needed range of motion exercise. Use caution when disease activity is flaring and avoid excess torque or pressure on the joints.[7]

C. Physical modalities

Generally, the effectiveness of physical modalities in RA is difficult to evaluate because of lack of well-designed studies. Nevertheless, some of these treatments are attractive to the patients. The aim of these modalities is to lessen the inflammation and pain. They should be focused on specific goals and time-limited. Common methods of superficial heating include hot water bottles, hot packs, hydrocollator packs, paraffin wax, heating pads, heated pools and whirpools and infrared lamps. Superficial heat may help reducing symptoms, and there is no reason to avoid use if the patient benefits from it. Methods of cooling include ice packs, ice massage, cold packs and fluorotherapy. Patients should be encouraged to try cold treatments, especially when joints are acutely inflamed, as cooling may decrease the destructive inflammatory process, by raising the pain threshold and thus produce local analgesia, and lower spasticity and the muscle spasms by directly influence the muscle spindle. (4)(10)

Electrotherapy: Transcutaneous electrical nerve stimulation (TENS) is a method of electrical stimulation which primarily aims to provide a degree of pain relief (symptomatic) by specifically exciting sensory nerves and thereby stimulating either the pain gate mechanism and/or the opioid system. The different methods of applying TENS relate to these different physiological mechanisms. The technique is non invasive and has few side effects when compared with drug therapy. The most common complaint is an allergic type skin reaction (about 2-3% of patients) and this is almost always due to the material of the electrodes, the conductive gel or the tape employed to hold the electrodes in place.[4]

2.1.11 Other therapies

Diet: Today there is no diet known to improve the symptoms of rheumatoid arthritis, and there are no proven dietary supplements that are clearly effective over a long period of time.[19]

Acupuncture: Many people undergo acupuncture to help relive pain due to rheumatoid arthritis. Acupuncture seems to work by releasing endorphins, a natural morphine-like chemical in the nervous system. Some people with rheumatoid arthritis find that acupuncture relieve their symptoms, but results from studies have been inconsistent.
There is no proof that acupuncture reduces inflammation in joints.[19]

3. SPECIAL PART

3.1 METHODS

My clinical practice at Revmatologicky Ustav at Albertov, Prague, took place between the 4th and 15th of February 2008. I was assigned with a patient with primary diagnose rheumatoid arthritis 2nd stage. My patient was not hospitalized at the department long enough to have more therapy sessions with me, thus only five sessions. During the five sessions with my patient I used ROM exercises, PIR, PFS, ergometer bicycle, and thera-band directed towards the goal of improving my patient's conditions. Every session lasted one hour and where taking place in the clinic's physiotherapy department.

3.2. ANAMNESIS

Patient M.P. Male. 59 years old.

Present medical diagnosis:

- Primary: Rheumatoid arthritis, 2nd stage.
- Degenerative changes in hands.
- Periarthritis humeroscapularis
- Thrombophlebitis of left lower extremity.

Personal anamnesis:

- Has had the typical childhood diseases
- Hypertension
- Was diagnosed in 1998 with rheumatoid arthritis.
- In March 2006 he was hospitalized in the department of rheumatology at Albertov because the disease became worse.
- In July/August 2006 he was hospitalized again because the rheumatoid arthritis got worse. There was pain and stiffness in the right shoulder. Medication was slightly changed, and the patient's condition got better.
- In February 2007 he was operated in the left foot due to rupture of ligaments after an accident. 1 month later he was diagnosed with thrombophlebitis of left foot as a result of the operation.

- In February 2008 the patient was hospitalized at Albertov Rheumatology department due to worsening of his condition.

Family anamnesis:

- Father died of ilium disease by the age of 74.
- Mother died of complication after fracture of neck of the femur.
- Brother died of myocardial infarction by the age of 37.
- He has two healthy daughters.

Social anamnesis:

- Have a wife and two daughters.
- Live in an apartment on the 1st floor.

Working anamnesis:

- He worked in the railway as a supervisor and shifter.

Allergy anamnesis:

- No allergies

Pharmacological anamnesis:

- Prednison 10 mg from the year 1988 till 2000.
- Methotrexat 2,5 mg. 10 pills every Friday.
- Acidum folicum. 1 pill every Saturday.
- Halicid 20 mg. Every morning.
- Zorem 10 mg. 1 pill every morning.
- Renpres 6 mg. 1 pill every morning.
- Moxostad 0,2 mg. 1 pill every morning.
- Furom 40 mg. 1 pill every morning.
- Medrol 4 mg. 2 pills every morning. Started the summer 2007.

Abuses:

- Smoked 40 cigarettes a day for 31 years.
- Stopped smoking when he was 44 years old.
- Alcohol consumption occasionally.
- Drinks one or two cups of coffee a day.
- No drugs.

Previous injuries/other diseases

- Not specified.

Previous physiotherapy:

- Not specified.

Status present:

- There are swelling and pain in the small joints of the hands. His right shoulder is painful and stiff. He has pain in the lumbar spine. He has morning stiffness, but it gets better throughout the day.
- BMI: 25

3.3 Initial kinesiological examination

3.3.1 Postural evaluation in standing

Sole weight baring	Symmetrical
Transversal sole Arch	Normal
Longitudinal sole Arch	Flat left and right
Calf contour	Symmetrical
Patella	External rotation: positive Internal rotation: negative
Thigh contour	symmetrical in both sides(medial-lateral)
Anterior superior iliac spine	Symmetrical
Umbilicus	No deviations
Sternum	Middle line
Nipples	Symmetrical
Clavicles	Symmetrical
Shoulder position	The right shoulder is more elevated than the left side Dominant hand : right part os anamnesis
SCM	Normal
Head position	Normal

Table 1 Anterior view

Heel form and position	Symmetrical
Achille's tendon contour	Symmetrical
Achille's tendon thickness	Symmetrical
Calf contour	Symmetrical
Popliteal lines	Symmetrical
Thigh contour	Symmetrical in both sides(medial-lateral)
Subgluteal lines	Right is slight lower
Posterior superior illiac spine	Right is slight lower
Ilium crests	Right is slight lower
Trunk outlines	Right is slight concave

Spinous processes	Symmetrical
Inferior scapula angles	Both external rotated
Scapulas medial margin	abducted bilateral
Scapula alata	Positive
Shoulder position	More elevation on the right
Auricles	Symmetrical

Table 2 Posterior view

Knee joint position	Symmetrical
Position of pelvis	Anterior tilt
Lumbar part of spine	Hyperlordosis
Thoracic part of spine	Hyperkyphosis of the upper part
Shoulder position	Slight protraction, bilateral
Cervical part of spine	Hyperextension
Head position	Forward

Table 3 Side view

Conclusion of postural evaluation

The findings in the anterior view, e.g. the elevation of the right shoulder, lead me to test the length of upper m. trapezius and m. levator scapulae, and thereby palpate them for higher tension and possible trigger points.

The posterior view showed winging scapulae. This lead me to test the strength of m. m. trapezius middle part, rhomboideus and serratus anterior.

According to the side view and the presence of hyperextended lumbar spine, muscle strength test for rectus abdominis and external oblique will be accomplished. Hamstrings will be tested for muscle length and muscle strength due to the anterior tilt of pelvis. M. Iliopsoas and lower back muscles will be tested for shortness. Further on the forward position of the head and the increased flexion of the thoracic spine lead me to test the muscle strength for neck flexors and the upper back erector spinae. Length test for upper part of m. trapezius, m. levator scapulae and the suboccipital muscles will also be implemented due to the forward head position. Palpation of these muscles will be done to examine of there is any tension and trigger points.

Due to the protraction of both shoulders I will test for muscle shortness of pectoralis minor and palpation of it to detect any potential tension and trigger points. No deformities were found.

3.3.2 Anthropometrical measurements

Height: 180 cm

Weight: 83 kg

Distances of spine: see table 4

Thomayer's distance	3,0 cm
Shober's distance	3,0 cm
Stibor's distance	7,0 cm
Lateroflexion	18 cm bilaterally
Otto's distance	4,0 cm
Flesh De Forestier	Normal
Cepoj's distance	2,5 cm

Table 4 Distances of spine

Conclusion of anthropometrical measurements

According to Stibor there is normal mobility of the thoracic and lumbar spine, but more of the movement is coming from the thoracic part. The Shober test showed less mobility of the lumbar spine, which indicates shortened muscles and/or some blockade in this area. The result of the lateroflexion test indicates shortened quadratus lumborum. Cepoj's test showed shortened neck extensors, which led me to examine the joint play and muscles of the cervical and cervicothoracic junction. Otto's, Thomayer, Flesh De Forestier showed normal values, but the performance of Thomayer showed more movement in the thoracic part than in the lumbar spine.

3.3.3. Gait evaluation

Stance phase: The heel strike, foot flat, mid stance and push off are normal

Swing phase: The initial, mid and terminal swing is normal

Pelvis synkinesis: Present

Pelvis shift: Present. Laterally horizontal movement towards the weight bearing leg in the swing phase

Trunk movement: Present

Arm synkinesis: the arms are swinging less than normal in both sides but with good rhythm, some winging of scapula.

Conclusion of gait evaluation

The patient has a good rhythm while walking. The swing and stance phase were normal. During the swing phase of the arms the scapulae showed winging, assumedly due to weakness of the m. serratus anterior. Further on the right shoulder was elevated, which is an indication for shortened or hypertensed upper m. trapezius.

3.3.4 Examination of basic moving patterns

The examination of basic moving patterns were provided according to *Vladimir Janda*

Push up: positive

Pathological sign: During this test winging and rotating of the scapula occurs (scapula alata).

Head flexion: positive

Pathological sign: the patient is not able to fully bend the head properly. There is a tendency to move the jaw forward in the beginning of the movement, which is an indication of short suboccipitals muscles, strong SCM muscles and weak deep neck flexors.

Shoulder abduction: positive in right side

Pathological sign: The movement starts with m. supraspinatous but elevation of shoulders begins at 35 degrees. This early elevation shows the overload of m. upper trapezius.

Trunk curl up: positive

Pathological sign: it is less curling movement in the cervical spine, and while the movement is performed there is hip flexion and anterior tilting of the pelvis.

Extension in hip joint: negative.

The motion starts with the activation of m. m. gluteus maximus, then hamstrings and finally the extensors of the back.

Hip abduction: negative

There is pure abduction bilaterally. The movement starts with m. m gluteus medius/minimus, then tensor fascia lata and finally the quadratus lumborum.

Conclusion of examination of basic moving patterns

Winging and rotation of the scapulae while performing push up, which indicates that the serratus anterior doesn't function properly. Middle and lower m. trapezius and m. rhomboideus are not in an adequate condition according to the push up. During trunk curl up and neck flexion there is assumable short neck extensors. The trunk curl up test also showed shortening of hip flexors and possible weak muscles of the abdomen. The shoulder abduction test showed an altered pattern of scapulohumeral movement in the right shoulder. The testing of extension and abduction in hip joint are both negative.

3.3.5 Palpation examination

Examination of joints: Swelling and slight tenderness is found in the small joints of the hands. No swelling or enlargements are detected in other parts of the body. While palpating the right shoulder joint in active and passive movement a crunching sensation is felt. The right shoulder joint is also tender when pressing at it.

Skin drag examination: While examining the skin drag in the cervical and lumbar area, I found hyperalgesic zones (soreness) in the area of suboccipitals and lower back erector spinae muscles. Hyperalgesic zones (soreness) was also found in the area of upper trapezius right side.

Examination of fascia: The examination of the dorsal fascia showed restriction in caudocranial direction in the cervical and lumbar area, and in the area around the right upper shoulder, which needs stretching.

Connective tissue: Normal.

Palpation examination of muscles: the posterior muscles were mostly examined in the prone position due to its relaxing effect on these muscles. The patient was lying in supine position when examining m. m. pectoralis minor/major, m. scalene, m. SCM, suboccipital muscles, abdominal muscles and m. ilipsoas.

Left		Right
Normal tonus	Trapezius upper part	Hyper tonus, TrP
	Trapezius middle part	Normal tonus
	Trapezius lower part	Normal tonus
Normal tonus	Levator scapulae	Hypertonus
Hypertonus	Rhomboids	Hypertonus
Normal tonus	Subscapularis	Normal tonus
Normal tonus	Supraspinatus	Hypertonus
Normal tonus	Deltoideus	Normal tonus
Normal tonus	Infraspinatus	Normal tonus
Normal tonus	Teres minor	Normal tonus
Hypertonus	Scalenes	Hypertonus
Hypertonus	SCM	Hypertonus
Hypertonus, TrP	Suboccipitals	Hypertonus, TrP
Normal tonus	Pectoralis major	Normal tonus
Hypertonus	Pectoralis minor	Hypertonus
Normal tonus	Gluteus maximus	Normal tonus
Hypertonus	Iliopsoas	Hypertonus
Normal tonus	Internal oblique	Normal tonus
Normal tonus	External oblique	Normal tonus
Hypotonus	Rectus abdominis	Hypotonus
Normal tonus	Transverse abdominis	Normal tonus

Hypertonus	Erector spinae lumbar area	Hypertonus
Normal tonus	Latissimus dorsi	Normal tonus

Table 5 Palpation of muscles

Conclusion of palpation examination

Swelling and slight tenderness is found in the small joints of the hands. No swelling or enlargements are detected in other parts of the body. While palpating the right shoulder joint in active and passive movement a crunching sensation is felt. The right shoulder joint is also tender when pressing at it.

The skin drag examination showed hyperalgesic zones (soreness) in the area of suboccipitals, right upper trapezius and lower back erector spinae muscles. The fascia in these areas also showed restriction. During deeper palpation hyper tonus was found in these areas. TrPs were found in the upper part of right trapezius. No spasms in these hyperalgesic zones were detected.

During palpation of other muscle structures of the back hypertonus were found in the right levator scapula, rhomboids at both sides and lower back erector spinae. Hypertonus were also found on supraspinatus right side, right SCM, scalenes, pectoralis minor on both sides, and iliopsoas bilaterally. All of these hyper tonic muscles will need to be relaxed during the treatment. Rectus abdominis showed hypo tonus, which will need fascilitation.

3.3.6 ROM examination

Goniometry of active and passive movements

Left	Head	Right
A:40 P:42	Lateroflexion	A:45 P:46
A:80 P:82	Rotation	A:80 P:82

Head extension	A:40 P:42
Head flexion	A:32 P: 33

Table 6 Head ROM

Left	Shoulder joint	Right
A:180 P:183	Flexion	A:160 P:162
A:45 P:47	Extension	A:38 P:40
A:180 P:181	Abduction	A:150 P:154
A:90 P:90	External rotation	A:90 P:90
A:70 P:72	Internal rotation	A:70 P:71

Table 8 Shoulder ROM

Left	Wrist	Right
A:70 P:72	Extension	A:70 P:72
A:80 P:80	Flexion	A:80 P:80
A:45 P:45	Ulnar duction	A:45 P:45
A:20 P:20	Radial duction	A:20 P:21

Table 9 Wrist ROM

Joint	**Thumb**	**Left**	**Right**
CMC	Flexion	P: 15 A: 15	P: 15 A: 15
	Extension	P: 20 A: 20	P: 20 A: 20
	Abduction	P: 60 A: 60	P: 60 A: 60
	Adduction / Opposition	P: Good A: Good	P: Good A: Good

MCP	Flexion	P: 50 A: 50	P: 50 A: 50
	Extension	P: 0 A: 0	P: 0 A: 0
IP	Flexion	P: 80 A: 80	P: 80 A: 80
	Extension	P: 0 A: 0	P: 0 A: 0

Table 10 Thumb ROM

Joint:	**2nd – 5th Digits**	**Left**	**Right**
MCP	Flexion	2 A:85P:90 3 A:90P:90 4 A:85P:90 5 A:85P:90	2 A:85P:90 3 A:85P:90 4 A:90P:90 5 A:85P:90
	Extension	2 A:0P:0 3 A:0P:0 4 A:0P:0 5 A:0P:0	2 A:0P:0 3 A:0P:0 4 A:0P:0 5 A:0P:0
	Abduction	2 A:20P:20 3 A:20P:20 4 A:20P:20 5 A:20P:20	2A:20P:20 3A:20P:20 4A:20P:20 5A:20P:20
PIP	Flexion	2 A:100P:100 3 A:95 P:100 4 A:100P:100 5 A:95 P:100	2A:95 P100 3A:100P:100 4A:95 P:100 5A:100P:100
	Extension	2 A:0P:0 3 A:0P:0 4 A:0P:0 5 A:0P:0	2 A:0P:0 3 A:0P:0 4 A:0P:0 5 A:0P:0
DIP	Flexion	2 A:70P:70 3 A:70P:70 4 A:70P:70 5 A:65P:70	2 A:65P:70 3 A:70P:70 4 A:70P:70 5 A:70P:70
	Extension	2 A:0P:0	2 A:0P:0

		3 A:0P:0 4 A:0P:0 5 A:0P:0	3 A:0P:0 4 A:0P:0 5 A:0P:0

Table 11 Finger ROM

Conclusion of ROM

The testing of the head's ROM showed restricted head flexion and restricted lateral flexion to the left. Extension and rotation had normal values.

The ROM of the right shoulder showed marked restricted movement in the direction of flexion and abduction. Movement into extension is slightly restricted, while lateral and medial rotation was normal. The pain is increasing while the movement is done. The left shoulder had normal values. The testing of the joints of the thumb showed normal values. For the hand there were detected some decreased ROM in flexion of his MCP joints and PIP joints.

3.3.7 Neurological examination

Upper extremities

Touch	Normal bilaterally
Dermatography	Normal bilaterally
Tactile	Normal bilaterally

Table 12 Superficial sensation

Sensation of position	Normal
Sensation of movement	Normal
Vibration	Normal bilaterally

Table 13 Deep sensation

Flexion of fingers reflex	Normal
Biceps brachii reflex	Normal
Triceps brachii reflex	Normal
Brachioradialis reflex	Normal

Table 14 Tendon reflexes

Lower extremity

Touch	Normal bilaterally
Dermatography	Normal bilaterally
Tactile	Normal bilaterally

Table 15 Superficial sensation

Sensation of position	Normal
Sensation of movement	Normal
Vibration	Normal bilaterally

Table 16 Deep sensation

Patellar tendon reflex	Normal
Achilles tendon reflex	Normal
Plantar reflex	Normal

Table 17 Tendon reflexes

Conclusion of neurological examination

The results from the neurological examination are negative, thus no neurological problems.

3.3.8 Muscle strength tests (according to *Kendall*)

Left		**Right**
	Trapezius	
8	Upper fibers	10
8	Middle fibers	8
8	Lower fibers	8
7	Serratus anterior	7
7	Rhomboids	7
10	SCM	10
8	Scalenus	8
8	External oblique	8
8	Rectus abdominis	8

8	Hamstrings	8
8	Erector spinae Upper part	8
10	Supraspinatus	10
10	Opponensis pollicis	10
9	Abductor pollicis brevis	9
10	Abductor digiti minimi	10
9	Extensor pollicis longus	9
10	Adductor pollocis	10
10	Flexor pollicis longus	10
10	Palmar interossei	10
10	Dorsal interossei	10
10	Lumbricals	10

Table 18 Muscle strength tests

Conclusion of muscle strength test

According to the tests there were findings of muscle weakness of rhomboids both sides, upper part of m. m. erector spinae, upper - middle and lower trapezius, except the upper fibers on right side, and serratus anterior bilaterally. SCMs showed normal values, while scalenii, rectus abdominis, external oblique and hamstrings had less strength than normal. Abductor pollicis brevis and extensor pollicis longus had less strength than normal.

3.3.9 Muscle length tests (according to *Vladimir Janda*)

Left		Right
0	Trapezius upper part	2
0	Levator scapulae	2
2	Pectoralis minor	2
2	Erector spinae Lower part	2
0	Scalenii	0
2	Suboccipitals	2

2	Iliposoas	2
0	Hamstrings	0
1	Quadratus lumborum	1
1	SCM	1
0	Adductor pollocis	0
0	Palmar interossei	0
0	Dorsal interossei	0
0	Lumbricals	0

Table 19 Muscle length tests

Conclusion of muscle length test

The tests detected shortening of the right upper trapezius and levator scapula, SCM bilaterally, pectoralis minor bilaterally, suboccipitals, quadratus lumborum both sides and erector spinae in the lumbar area. The test for iliopsoas showed shortening, while hamstring and scalenii had normal length. Adductor pollicis, lumbricals, palmar and dorsal interossei had normal length.

3.3.10 Breathing examination

Inspiration: The breath begins in the low back and move upward to the mid back. The rib cage is elevated and its diameter is increasing transversally, and sternum moves a little upward. The patient's shoulders are slightly elevated. The scalene muscles work normally.

Expiration: during a controlled, forces and prolonged expiration examination, no faults were detected. His rectus abdominis and transversal muscles are used well.

Conclusion of breathing examination

The examination of breathing pattern showed a predomination of abdominal breathing over the chest breathing during inspiration. The expiration phase works well.

3.3.11 Joint play examination

The joint play examination were performed according to *Karel Lewit*

Co-C1 joint	No restriction
C-Th crossing	No restriction
Acromio-clavicular joint	No restriction bilaterally
Sterno-clavicular joint	No restriction bilaterally
Shoulder joint	No restriction – right side not examined because of pain
Scapulo-thoracic joint	No restriction bilaterally
Ribs	No restriction bilaterally
Thoracic part of spine	No restriction bilaterally
Lumbar part of spine	Not examined because of pain
Th-L crossing	No restriction
SI-joint	Not examined because of pain
Elbow	No restriction in any direction
Wrist	No restriction in any direction
Hand	No restriction in any direction

Table 20 Joint play examination

Conclusion of joint play examination

No restriction was found in the examination of the joints. No joint play in the lumbar part of spine and right shoulder due to pain In the examination of the joints of the hand the patient complained about some slight pain while examining the metacarpal phalangeal joints of both hand.

3.3.12 Conclusion and discussion of initial kinesiological examination

The strength testing was accomplished according to Kendall. The most prevalent findings were weakness of serratus anterior and rhomboids bilaterally, upper part of erector spinae, and upper – middle and lower trapezius except the upper fibers on right side. Scalenii, rectus abdominis, external oblique and hamstrings had less strength than normal. Abductor pollicis brevis and extensor pollicis longus had less strength than normal.

The muscle length tests were accomplished according to *Vladimir Janda.* There were findings of shortness of right upper trapezius and levator scapula, SCM bilaterally, pectoralis minor bilaterally, suboccipitals, quadratus lumborum both sides, iliopsoas bilaterally and erector spinae in the lumbar area.
The neurological examination was negative.

The joint play examination showed no restriction. Because of pain in right shoulder and lumbar spine no examination was accomplished.

The most prevalent findings in gait examination were winging of scapula during swing phase and elevated upper trapezius, which indicates shortness.
The anthropometrical measurements: the Stibor's test showed was normal, but showed more movement in the thoracic part of spine. Shober's test showed less mobility of the lumbar spine, which is an indication of shortened muscles and/ or blockades. Lateral flexion was restricted, assumedly due to shortness of quadratus lumborum. Cepoj's test indicated shortness of neck extensors. Thomayer's test was normal, but more of the movement came from the thoracic part than in the lumbar spine.

The examination of basic moving pattern showed positive result for push-up, which indicates that serratus anterior, middle-and lower trapezius doesn't function adequately. The trunk curl-up was positive, hip flexors is shortened, and abdominal muscles are assumedly not in a proper condition. The shoulder abduction test showed an altered pattern of scapulohumeral movement in right shoulder.

Swelling and slight tenderness were found in the small joints of the hands. No swelling or enlargements are detected in other parts of the body. While palpating the right shoulder joint in active and passive movement a crunching sensation is felt. The right shoulder joint is also

tender when pressing at it. The skin drag examination showed hyperalgesic zones (soreness) in the area of suboccipitals, right upper trapezius and lower back erector spinae muscles. The fascia in these areas also showed restriction. During deeper palpation hyper tonus was found in these areas. TrPs were found in the upper part of right trapezius.
During palpation of other muscle structures of the back hyper tonus were found in the right levator scapula, rhomboids at both sides and lower back erector spinae. Hyper tonus were also found on supraspinatus right side, right SCM, scalenes, pectoralis minor on both sides, and iliopsoas bilaterally. Rectus abdominis showed hypo tonus, which will need facilitation.

The examination of range of motion restricted head flexion and lateral flexion the left. The right shoulder had marked restriction in flexion and abduction. In the hand there were detected some decreased ROM in flexion of the MCP joints and PIP joints.

The therapy must be planned according to these findings. If the faults and imbalances in posture are enhanced, it may improve the condition in the patient's right shoulder and lumbar area of spine.

3.4 Short-term and long-term rehabilitation plan

Short-term:

- Decrease of pain and stiffness around neck and shoulder and in lumbar area of back
- Relaxation of hyper tonic muscles and TrP's
- Stretch the shortened muscles
- Increase the muscle strength of weak muscles
- Increase the restricted range of motion
- Instruction of patient how to correctly provide the auto-therapy exercises.

Long-term:

- Maintain and improve the range of motion in ADL.
- Maintain and improve the muscle power in ADL.
- Improve posture
- Improve the aerobic condition

3.5 Rehabilitation

First session (06.02.2008)

- Full kinesiological evaluation
- Soft tissue techniques for release of dorsal, cervical and lumbar fascia and the underlying structures.
- Soft tissue techniques for release of pain in hands.
- PIR of m.trapezius upper part and m.levator scapulae on right side, m.SCM, m.scalenes, m. supraspinatus right side (during the palpation of muscles there were hypertonus in supraspinatus), suboccipital muscles, m. rhomboideus both sides, m. erector spinae lumbar part and quadratus lumborum bilaterally.
- PFS for pectoralis minor and hip flexors.
- Active exercises to increase range of motion in right shoulder.
- Active exercises to maintain the range of motion in hands, knees, feet, and hips.
- Exercise with thera-band for strengthening of m.rhomboidei, m.trapezius upper, middle and lower part (except upper part right side), m.serratus anterior and hamstrings

- Exercises for enhancing strength of rectus abdominis, external oblique and thoracic part of erector spinae.
- Instruction of patient in the auto-therapy program:
    - Auto-therapy PIR of m. trapezius upper part and m. levator scapulae on right side, m. suboccipitals, m. supraspinatus right side, m.rhomoideus and quadratus lumborum.
    - Auto-therapy stretching of m.pectoralis minor, hip flexors
    - Strength training by use of thera-band.
    - Strength training for rectus abdominis, external oblique and thoracic part of erector spinae by use of body weight.
    - ROM exercises for hands, feet, knees and shoulders.
- Results: the patient is a bit tired, but feels ok.

Second session (07.02.2008)

- Control auto-therapy training
- Soft tissue techniques for release of dorsal, cervical and lumbar fascia and the underlying structures.
- Soft tissue techniques for release of pain in hands.
- PIR of m.trapezius upper part and m.levator scapulae on right side, m.SCM, m.scalenes, m. supraspinatus right side, suboccipital muscles, m. rhomboideus both sides, m. erector spinae lumbar part and quadratus lumborum bilaterally.
- PFS for pectoralis minor and hip flexors.
- Active exercises to increase range of motion in right shoulder.
- Active exercises to maintain the range of motion in hands, knees, feet, and hips.
- Exercise with thera-band for strengthening of m.rhomboidei, m.trapezius upper, middle and lower part (except upper part right side), m.serratus anterior and hamstrings
- Exercises for enhancing strength of rectus abdominis, external oblique and thoracic part of erector spinae.
- Klapp exercises to enhance the stabilization of the scapula (facilitation of m.serratus anterior)

- Active exercises of head in all directions, with special attention to performance of head flexion using the deep neck flexors and not m.SCM. It is performed on a fit ball with correction of sitting.
- 10 minutes on an ergometer bicycle.
- The patient is instructed to correctly provide the auto-therapy program, i.e. the exercises which were taught in the first session including the clapp exercises learned in the 2nd session.
- Results: the patient is doing well, and learns quickly. The muscles which are relaxed improves slightly.

Third session (08.02.2008)

- Control auto-therapy training
- Soft tissue techniques for release of dorsal, cervical and lumbar fascia and the underlying structures.
- Soft tissue techniques for release of pain in hands.
- PIR of m.trapezius upper part and m.levator scapulae on right side, m.SCM, m.scalenes, m. supraspinatus right side, suboccipital muscles, m. rhomboideus both sides, m. erector spinae lumbar part and quadratus lumborum bilaterally.
- PFS for pectoralis minor and hip flexors.
- Active exercises to increase range of motion in right shoulder.
- Active exercises to maintain the range of motion in hands, knees, feet, and hips.
- Exercise with thera-band for strengthening of m.rhomboidei, m.trapezius upper, middle and lower part (except upper part right side), m.serratus anterior and hamstrings
- Exercises for enhancing strength of rectus abdominis, external oblique and thoracic part of erector spinae.
- Klapp exercises to enhance the stabilization of the scapula (facilitation of m.serratus anterior)
- Active exercises of head in all directions, with special attention to performance of head flexion using the deep neck flexors and not m.SCM. It is performed on a fit ball with correction of sitting.
- 10 minutes on ergometer bicycle.

- The patient is instructed to correctly provide the auto-therapy program, i.e. the exercises which were taught in the first session including the clapp exercises learned in the 2nd session.
- Results: the patient feels a bit tired after the treatment. The weak muscles are a bit improved, and the muscles which are relaxed improve. The TrP's in right upper trapezius is gone.

Fourth session (11.02.2008)

- Control auto-therapy training
- Soft tissue techniques for release of dorsal, cervical and lumbar fascia and the underlying structures.
- Soft tissue techniques for release of pain in hands.
- PIR of m.trapezius upper part and m.levator scapulae on right side, m.SCM, m.scalenes, m. supraspinatus right side, suboccipital muscles, m. rhomboideus both sides, m. erector spinae lumbar part and quadratus lumborum bilaterally.
- PFS for pectoralis minor and hip flexors.
- Active exercises to increase range of motion in right shoulder.
- Active exercises to maintain the range of motion in hands, knees, feet, and hips.
- Exercise with thera-band for strengthening of m.rhomboideus, m.trapezius upper, middle and lower part (except upper part right side), m.serratus anterior and hamstrings
- Exercises for enhancing strength of rectus abdominis, external oblique and thoracic part of erector spinae.
- Klapp exercises to enhance the stabilization of the scapula (facilitation of m.serratus anterior)
- Active exercises of head in all directions, with special attention to performance of head flexion using the deep neck flexors and not m.SCM. It is performed on a fit ball with correction of sitting.
- 10 minutes on ergometer bicycle.
- Results: patient is doing well. Muscle strength is better, and the muscles which are relaxed better.

Fifth session (12.02.2008)

- Full evaluation of the treatment
- Soft tissue techniques for release of dorsal, cervical and lumbar fascia and the underlying structures.
- Soft tissue techniques for release of pain in hands.
- PIR of m.trapezius upper part and m.levator scapulae on right side, m.SCM, m.scalenes, m. supraspinatus right side, suboccipital muscles, m. rhomboideus both sides, m. erector spinae lumbar part and quadratus lumborum bilaterally.
- PFS for pectoralis minor and hip flexors.
- Active exercises to increase range of motion in right shoulder.
- Active exercises to maintain the range of motion in hands, knees, feet, and hips.
- Exercise with thera-band for strengthening of m.rhomboidei, m.trapezius upper, middle and lower part (except upper part right side), m.serratus anterior and hamstrings
- Exercises for enhancing strength of rectus abdominis, external oblique and thoracic part of erector spinae.
- Klapp exercises to enhance the stabilization of the scapula (facilitation of m.serratus anterior)
- Active exercises of head in all directions, with special attention to performance of head flexion using the deep neck flexors and not m.SCM. It is performed on a fit ball with correction of sitting.
- 10 minutes on ergometer bicycle.
- The patient is instructed for the auto therapy; in how to enhance the loading when exercising.
- Results: the patient feels ok. The muscle strength is improved, and the muscles which are relaxed are better. The TrP's found in rhomboids are gone. The serratus anterior is stronger.

3.6 Final kinesiological examination

3.6.1 Postural evaluation in standing

Sole weight baring	Symmetrical
Transversal sole Arch	Normal
Longitudinal sole Arch	Flat left and right
Calf contour	Symmetrical
Patella	External rotation: positive Internal rotation: negative
Thigh contour	symmetrical in both sides(medial-lateral)
Anterior superior iliac spine	Symmetrical
Umbilicus	No deviations
Sternum	Middle line
Nipples	Symmetrical
Clavicles	Symmetrical
Shoulder position	**The right shoulder is still elevated but less than before**
SCM	Normal
Head position	Normal

Table 21 Anterior view

Heel form and position	Symmetrical
Achille's tendon contour	Symmetrical
Achille's tendon thickness	Symmetrical
Calf contour	Symmetrical
Popliteal lines	Symmetrical
Thigh contour	Symmetrical in both sides(medial-lateral)
Subgluteal lines	Right is slight lower
Posterior superior illiac spine	Right is slight lower
Ilium crests	Right is slight lower
Trunk outlines	Right is slight concave
Spinous processes	Symmetrical

Inferior scapula angles	Both external rotated
Scapulas medial margin	**abducted bilateral, but less than before therapy**
Scapula alata	**Positive, but slightly better than before the therapy**
Shoulder position	**Still more elevated on the right, but less than before the therapy**
Auricles	Symmetrical

Table 22 Posterior view

Knee joint position	Symmetrical
Position of pelvis	**Anterior tilt, but slightly less than before**
Lumbar part of spine	**Hyperlordosis, but slightly less than before**
Thoracic part of spine	**Hyperkyphosis of the upper part, but slightly improved**
Shoulder position	**Still protraction, but a bit improved**
Cervical part of spine	**Hyperextension, but slightly less than before**
Head position	**Forward, but slightly less than before**

Table 23 Side view

3.6.2 Anthropometrical measurements

Height: 180 cm

Weight: 83 kg

Distances of spine: table 24

Thomayer's distance	**5,0 cm**
Shober's distance	**4,0 cm**
Stibor's distance	**8,0 cm**
Lateroflexion	**20 cm bilaterally**
Otto's distance	**4,5 cm**
Flesh De Forestier	Normal
Cepoj's distance	**3,0 cm**

Table 24 Distances of spine

3.6.3 Gait evaluation

Stance phase: the heel strike, foot flat, mid stance and push off are normal

Swing phase: the initial, mid and terminal swing is normal

Pelvis rotation: normal

Pelvis synkinesis: normal. Slightly laterally horizontal movement towards the weight bearing leg in the swing phase

Trunk movement: normal

Arm synkinesis: the arms are swinging less than normal in both sides but with good rhythm, **the winging of scapulae are less.**

3.6.4 Examination of basic moving patterns

The examination of basic moving patterns were provided according to *Vladimir Janda*

Push up: positive

Pathological sign: During this test winging and rotating of the scapula occurs (scapula alata), **but it is slight less than before therapy.**

Head flexion: positive

Pathological sign: The patient is still not able to fully bend the head adequately, **but the movement is better and more fluent than before therapy.**

Shoulder abduction: positive in right side

Pathological sign: The movement starts with m.supraspinatous and **m.deltoideus, and the shoulder starts to elevate at 40 degrees, so it is improved since the therapy started.**

Trunk curl up: positive

Pathological sign: **It is slight better than before the therapy started**, but still the curling movement is not adequately in the cervical spine, and while the movement is performed there is hip flexion and anterior tilting of the pelvis.

Extension in hip joint: negative.

The motion starts with the activation of gluteus maximus, then hamstrings and finally the extensors of the back.

Hip abduction: negative

There is pure abduction bilaterally. The movement starts with gluteus medius/minimus, then tensor fascia lata and finally the quadratus lumborum.

3.6.5 Palpation examination

Examination of joints: Swelling and slight tenderness is still found in the small joints of the hands. While palpating the right shoulder joint in active and passive movement a crunching sensation is felt. The right shoulder joint is also tender when pressing at it.

Skin drag examination: **No hyperalgesic zones (soreness) in the area of suboccipitals, upper right trapezius and lower back erector spinae.**

Connective tissue: Normal.

Examination of fascia: **No restrictions in the cervical, upper right shoulder and lumbar area.**

Palpation examination of muscles:_the posterior muscles were mostly examined in the prone position due to its relaxing effect on these muscles. The patient was lying in supine position when examining m.pectoralis minor/major, m. scalene, m.SCM, suboccipital muscles, abdominal muscles and m.ilipsoas.

Left		**Right**
Normal tonus	Trapezius upper part	**Hypertonus, but improved. No TrPs.**
	Trapezius middle part	Normal tonus
	Trapezius lower part	Normal tonus
Normal tonus	Levator scapulae	**Normal tonus**
Normal tonus	Rhomboids	**Normal tonus**
Normal tonus	Subscapularis	Normal tonus
Normal tonus	Supraspinatus	**Normal tonus**
Normal tonus	Deltoideus	Normal tonus
Normal tonus	Infraspinatus	Normal tonus
Normal tonus	Teres minor	Normal tonus
Hypertonus, but improved	Scalenes	**Hypertonus, but improved**
Hypertonus, **but improved**	SCM	Hypertonus, **but improved**
Hyper tonus, **no TrP**	Suboccipitals	Hyper tonus, **no TrP**
Normal tonus	Pectoralis major	Normal tonus
Hyper tonus, **but improved**	Pectoralis minor	Hyper tonus, **but improved**
Normal tonus	Gluteus maximus	Normal tonus
Hyper tonus, **but improved**	Iliopsoas	Hyper tonus, **but improved**
Normal tonus	Internal oblique	Normal tonus
Normal tonus	External oblique	Normal tonus
Hypotonus, **but improved**	Rectus abdominis	Hypotonus, **but improved**
Normal tonus	Transverse abdominis	Normal tonus

Normal tonus	Erector spinae lumbar area	**Normal tonus**
Normal tonus	Latissimus dorsi	Normal tonus

Table 25 Palpation of muscles

3.6.6 ROM examination

Goniometry of active and passive movements

Left	Head	Right
A:43 **P:45**	Lateroflexion	A:45 P:46
A:80 P:82	Rotation	A:80 P:82

Head extension	A:40 P:42
Head flexion	**A:35** **P: 36**

Table 26 Head ROM

Left	Shoulder joint	Right
A:180 P:183	Flexion	**A:165** **P:166**
A:45 P:47	Extension	**A:40** **P:42**
A:180 P:181	Abduction	**A:155** **P:157**
A:90 P:90	External rotation	A:90 P:90
A:70 P:72	Internal rotation	A:70 P:71

Table 27 Shoulder ROM

Left	Wrist	Right
A:70 P:72	Extension	A:70 P:72
A:80 P:80	Flexion	A:80 P:80
A:45 P:45	Ulnar duction	A:45 P:45
A:20 P:20	Radial duction	A:20 P:21

Table 28 Wrist ROM

Joint	**Thumb**	**Left**	**Right**
CMC	Flexion	P: 15 A: 15	P: 15 A: 15
	Extension	P: 20 A: 20	P: 20 A: 20
	Abduction	P: 60 A: 60	P: 60 A: 60
	Adduction / Opposition	P: Good A: Good	P: Good A: Good
MCP	Flexion	P: 50 A: 50	P: 50 A: 50
	Extension	P: 0 A: 0	P: 0 A: 0
IP	Flexion	P: 80 A: 80	P: 80 A: 80
	Extension	P: 0 A: 0	P: 0 A: 0

Table 29 Thumb ROM

Joint:	2nd – 5th Digits	Left	Right
MCP	Flexion	2 A:85P:90	2 A:85P:90
		3 A:90P:90	3 A:85P:90
		4 A:85P:90	4 A:90P:90
		5 A:85P:90	5 A:85P:90
	Extension	2 A:0P:0	2 A:0P:0
		3 A:0P:0	3 A:0P:0
		4 A:0P:0	4 A:0P:0
		5 A:0P:0	5 A:0P:0
	Abduction	2 A:20P:20	2A:20P:20
		3 A:20P:20	3A:20P:20
		4 A:20P:20	4A:20P:20
		5 A:20P:20	5A:20P:20
PIP	Flexion	2 A:100P:100	2A:95 P100
		3 A:95 P:100	3A:100P:100
		4 A:100P:100	4A:95 P:100
		5 A:95 P:100	5A:100P:100
	Extension	2 A:0P:0	2 A:0P:0
		3 A:0P:0	3 A:0P:0
		4 A:0P:0	4 A:0P:0
		5 A:0P:0	5 A:0P:0
DIP	Flexion	2 A:70P:70	2 A:65P:70
		3 A:70P:70	3 A:70P:70
		4 A:70P:70	4 A:70P:70
		5 A:65P:70	5 A:70P:70
	Extension	2 A:0P:0	2 A:0P:0
		3 A:0P:0	3 A:0P:0
		4 A:0P:0	4 A:0P:0
		5 A:0P:0	5 A:0P:0

Table 30 Finger ROM

3.6.7 Muscle strength tests (according to *Kendall*)

Left		Right
	Trapezius	
9	**Upper fibers**	10
9	**Middle fibers**	**9**
9	**Lower fibers**	**9**
8	**Serratus anterior**	**8**
8	**Rhomboids**	**8**
10	**SCM**	10
9	**Scalenus**	**9**
9	**External oblique**	**9**
9	**Rectus abdominis**	**9**
9	**Hamstrings**	**9**
	Erector spinae	
9	**Upper part**	**9**
10	Supraspinatus	10
10	Opponensis pollicis	10
9	Abductor pollicis brevis	9
10	Abductor digiti minimi	10
9	Extensor pollicis longus	9
10	Adductor pollocis	10
10	Flexor pollicis longus	10
10	Palmar interossei	10
10	Dorsal interossei	10
10	Lumbricals	10

Table 31 Muscle strength tests

3.6.8 Muscle length tests (according to *Vladimir Janda*)

Left		Right
0	Trapezius upper part	**1**
0	Levator scapulae	**1**
1	Pectoralis minor	**1**
1	Erector spinae Lower part	**1**
0	Scalenii	0
1	Suboccipitals	**1**
1	Iliposoas	**1**
0	Hamstrings	0
0	Quadratus lumborum	**0**
0	SCM	**0**
1	SCM	1
0	Adductor pollocis	0
0	Palmar interossei	0
0	Dorsal interossei	0
0	Lumbricals	0

Table 32 Muscle length tests

3.7 Therapy effect

The patient's condition is improved after five rehabilitation sessions. The position of the head, neck, shoulder, thoracic part of back and the pelvis is better but has to be corrected more. The right shoulder is still painful, but its range of motion is a bit improved. The pain in lumbar area of back is less. The patient has some pain in the hands, and the swelling is still there. The walking examination showed no pathological signs.

The hypertonic areas of right upper trapezius, scalene, SCM, and suboccipitals has improved and TrPs were released after palpation. The tonus of rhomboideus, low back erector spinae, supraspinatus and right levator scapula has normal tonus.

The range of motion in the right shoulder was slightly better, but needs improvement. It is important that the patient daily do the exercises for maintaining and improving the range of motion. The hands are still painful, but a bit better.

The flexion of head was improved, but not in normal range of motion. The weak muscles, i.e. rhomboids both sides, upper part of erector spinae, upper - middle and lower trapezius, except the upper fibers on right side, serratus anterior bilaterally, scalenii, rectus abdominis, external oblique and hamstrings, had more power after the 5th rehabilitation session. Abductor pollicis brevis and extensor pollicis longus is still slightly weaker then normal.

The patient needs to exercise more according to a long term plan to become normal in strength. The shortened muscles like pectoralis minor, lower back erector spinae, iliopsoas, sub occipitals, upper right trapezius and levator scapula are improved, but not enough, thus it is important that the patient continuous with the auto-therapy.

3.8 Prognosis

Prognosis of the chronic, progressive type of rheumatoid arthritis in this patient requires long-term medical management. He had some improvement as discussed in the final kinesiological examination of his muscle imbalances. If the patient continues with therapy and autotherapy program I think his general condition may improve for the better. The prognosis may be poor, so it's important that the doctors and physiotherapists motivate him to consult physiotherapy on continually basis, so that he will be able to function as good as possible in everyday life.

4. Conclusion

The two weeks at rheumatology department at Albertov was very interesting. From the first day I was given a lot of responsibility. I was able to use my knowledge in a new setting, which improved my skills. One barrier was the language. I compensated that by gesticulation, and guidance from my supervisor at the clinic, miss Cermacova, who was helpful in any ways and gave me valuable advices throughout the practice.

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Pictures

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6 Supplements

1. Ethic committee agreement

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Application for Opinion of UK FTVS Ethic Committee

On the project of Bachelor Thesis including human participants

Title: Rheumatoid Arthritis

Project form: Bachelor Thesis

Author: (crucial author) Per Marius Reinem Moen

Supervisor (in case of student project) Mgr Miroslava Jalovcová

Project description

The case report of rehabilitation the patient with anamnesis .....elaborated with the vocational sight of physiotherapist in REV PRAHA (Health care unit)

No one invasive procedure will be applied.

Proposal of Agreement (enclosed)

Prague 3.4.2008 Author's signature Per Marius Reinem Moen

Statement UK FTVS Ethic Committee

Committee members: Ass. Prof. Staša Bartůňková, M.D., CSc.
Prof. Ing. Václav Bunc, CSc.
Prof. PhDr. Pavel Slepička, DrSc
Ass. Prof. Jan Heller, MD., CSc.

The project was authorized by Ethic Committee UK FTVS with reference number: 0099/2008

Date: 4.4.2008

Ethic Committee UK FTVS evaluated submitted project and found no discrepancy to valid principles, instructions and international guidelines for biomedical research, including human participants.

Author of project fulfilled necessary conditions for the agreement of Ethic Committee.

Faculty stamp

Signature of EC chairman

Univerzita Karlova v Praze Fakulta tělesné výchovy a sportu -3-

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2. List of abbreviations

-ACL: anterior cruciate ligament

-BMI: body mass index

-CCP antibodies: anticitrullinated cyclic protein

-CRP: c - reactive protein

-Co: occipital bone

-C1: first cervical vertebra (atlas)

-C2: second cervical vertebra (axis)

-C/Th: cervicothoracic

-DIP: distal interphalangeal joint

-DMARDs: disease-modifying antirheumatic drugs

-ESR: erythrocyte sedimentation rate

-m: muscle

-M: muscle

-MCP: metacarpophalangeal joint

-m.m.: muscles

-MRI: magnetic resonace imaging

-MT: metatarsal joint

-MTP: metatarsalphalangeal joint

-NSAID's: non-steroidal anti-inflammatory drugs

-PIP: proximal interphalangeal joint

-PIR: post isometric relaxation

-PFS: post facilitation stretching

-RA: rheumatoid arthritis

-ROM: range of motion

-SCM: sternocleidomastoid muscle

-SI: sacroiliac joint

-TNF-a: tumor necrosis factor

-TrP: trigger point

-TrPs: trigger points

-US: ultrasonography