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The effect of physical therapy following arthroscopic removal of calcium deposit in the glenohumeral joint

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ABSTRACT

The rising number of patients with the arthroscopic removal of calcium deposits in the shoulder joint has increased the need for high-quality post-surgical rehabilitation care. The aim of the survey was to identify the effectiveness of physical therapy following the arthroscopic removal of calcification from the shoulder joint and to compare the impact of the physical therapy on painfulness.

The survey was conducted on 24 patients that had been intentionally selected. They were divided into two groups according to their physical therapy. One group was treated by means of ultrasound, and the other by 4-week magnetotherapy. The patients had an average age of 52, 54 years. For the purposes of the summary of statistics we used Chi-squared test. Table values of Chi-square were calculated on a standard level of significance 0.05.

Statistically verified results showed that the influence of the ultrasound on painfulness was better when compared with magnetotherapy. Two patients treated by ultrasound claimed difference in painfulness by two degrees. Eight patients claimed 8 degrees and 2 claimed 4 degrees. As for magnetotherapy, 1 patient claimed 1-degree difference, 10 patients claimed 2-degree and there was just one who claimed 3-degree difference. Magnetotherapy did not see a single patient claiming 4-degree difference in painfulness. The survey confirmed the positive effects of physical therapy. It is necessary to instruct patients properly and encourage them to have positive approach to physical activity at home. Since its extent and performance are limited due to painfulness, physical therapy is recommended, especially an ultrasound that has proven itself in practice.

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Introduction

At the present time, arthroscopy is a surgical procedure which is minimally invasive, has a low risk of complications, and its scope of practice is continuously being further expanded. In some cases, it has replaced open surgery completely. Arthroscopy is most frequently used for surgery of knee and glenohumeral joints. One of the most common surgical interventions is the removal of calcium deposit within the rotator cuff tendon. Despite the fact that conservative treatment is often times successful with the stated diagnosis, the use of surgical procedure is on the rise, which requires increased attention and emphasis in rehabilitation of such patients. The aim of this study was to investigate the effect of physiotherapy on painfulness. The sample was comprised of 24 patients who were divided into two groups equal in size based on the type of physical therapy applied. This allowed for observation of the effect of different therapies on painfulness. Both groups of patients were treated with the same kind of kinesiotherapy, which was individually tailored to the patient's current state and to the mobility of the glenohumeral joint. The research study was conducted in a medical facility, and the duration of each patient's treatment was four weeks. The measurements were taken before therapy and after one month of therapy. The programme Microsoft Excel 2007 was used for statistical data processing. For the purposes of statistical evaluation, a nonparametric method of Chi-squared test was employed.

The use of physical therapy following arthroscopic removal of calcium deposit

Physical therapy is an essential component of treatment in case of calcium deposit, impingement syndrome caused by a calcium deposit, or calcific tendinitis. Increased muscle tonus in the area surrounding the calcium deposit results in contracture of the muscle and muscular ischaemia, which leads to compartment syndrome [1]. As many as 90% of cases with this affliction are successfully treated with conservative therapy. The most important components of conservative treatment are radiotherapy, ultrasound, shock wave, and diathermy. Certain kinds of physical therapy, such as ultrasound and magnetic therapy, are also employed in postoperative treatment [2].

An ultrasound is a wave motion of the environment with a frequency of more than 20,000 Hz. The most considerable treatment effects can be achieved through frequencies ranging from 0.5 to 3 MHz, which are also the most widespread in use. This wave motion is generated by means of high-frequency electric current which causes the ceramic plate or the piezoelectric crystal in the application head to vibrate. Two basic types of radiation are known: pulsed and continuous. The mechanism of ultrasound consists in the transmission of this longitudinal wave motion to tissues, causing the vibration of all particles and tissue cells in both width and particularly in depth. The process that occurs is thus called micro-massage. The transmission of wave motion from the application head to the tissue is most frequently carried out with the use of gel which prevents the conversion of mechanical energy to heat energy. The application of the ultrasound maybe static, quasi-static, or dynamic. Based on the location of application, the ultrasonic sound production is divided into the following categories: local, segmental, radicular, and neutral. An ultrasound may be applied by means of direct or indirect (underwater) contact. The duration of application depends on indications, stage of the medical condition, intensity, size of the application head, and other associated factors. As is the case with all forms of physical therapy, there are certain contraindications also for ultrasound therapy. Absolute contraindications include the areas of gonads and eyes, bleeding conditions, the areas of bone epiphyses and bony protuberances, and organs such as the heart or the brain [3].

Shock wave is, in essence, an intense change in pressure. These immense pressure changes are caused by the production of strong waves of pressure force and traction force, which are created by a generator. The waves can penetrate almost any elastic medium, such as atmosphere, water, and certain solid substances. Shock wave is defined as an acoustic wave whose first part of the pressure curve rises rapidly from the value of the surrounding environment to a set maximum. This characteristic maximum peak amplitude of pressure reaches the value of 500 bars over a period of less than 10 ns. Afterwards, the amplitude drops just below zero. This cycle is repeated in the course of a few microseconds to a few milliseconds in the frequency spectrum of 16 Hz–20 MHz. It is necessary to direct this pulse energy towards the treated location, and the pulse energy will cause expansion of microgaseous particles and a subsequent formation of air bubbles as a consequence of the pressure drop. Cavitation is an indirect form of shock wave activity upon the calcium deposit, mechanical activity being the principal agent. The contraindications of shockwave therapy include gravidity, thrombosis, phlogoses, oncological diseases, and blood clotting disorders [4,5].

Magnetic therapy makes use of electromagnetic field that is induced around a conductor through which electric current flows. The properties of this current form the foundation for the properties of the magnetic field. The field may be alternating, pulsed, or static. Pulsed fields, which may be either low-frequency, or high-frequency ones, are the most prevalent in use [3]. The most important effects of magnetic therapy are vasodilation, analgesic and anti-phlogistic effects, myorelaxation, and by far the most significant one is acceleration of the healing process. The effectiveness of magnetic therapy treatment for a specific disease or injury depends on the combination of different parameters, such as induction, frequency, impulse shape of the pulsed field and its length, gradient, and many more. There are also various types of applicators, and the most frequently used ones include pad, spool, and ring applicators. Applicators differ in shape, size, active surface, applicability for specific diagnoses, and localisation. The most common indications for the use of magnetic therapy are fractures, post-surgery conditions, and phlogistic and degenerative diseases. For purposes of pain management by means of magnetic therapy, significant effectiveness can be achieved with the use of high-induction magnetic therapy, which does not stimulate surface areas but penetrates to the depth, and the patient undergoes a perceptible but painless therapy. High-induction magnetic