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## BENEFITS OF HYDROTHERAPY FOR REHABILITATION OF PATIENTS SUBMITTED TO TOTAL HIP ARTHROPLASTY

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### SUMMARY

*Total Hip Arthroplasty (THA) is a medical procedure necessary when the hip joint is degenerated to the point of interfering on daily activities, such as walking, hindering biomechanical changes. Post operative physical therapy through its vast scientific resources aims to promote and rehabilitate the health of these patients, using specialized techniques for proper application of resources (natural and physical). Hydrotherapy uses the water environment to achieve physical therapy goals such as increase or maintain the range of motion, increase muscle strength, relief the pain and promote functional independence. This study was a quantitative multicase, conducted between August and November 2011 in the Teaching Laboratory of Practice in Physical Therapy UNIFRA / RS. The sample consisted of six patients in the 14th day post operatory. The patients were submitted to twenty hydrotherapy sessions twice per week. After the 20 sessions a reevaluation was performed and as results it was possible to notice an increase of hip's ADM (range of motion) and muscle strength and decrease swelling, improving joint biomechanics.*

**Key-words:** Total Hip Arthroplasty, rehabilitation, biomechanics, hydrotherapy

### INTRODUCTION

The hip joint is a proximal lower limb and its movements are performed by a single joint, the coxofemoral. This articulation has its articular surfaces much like those of a sphere, the relationship between the orientation of the femoral neck and the acetabulum is an important factor in hip mechanical's.

The walking is a rhythmic movement resulting from the combination of a perfect balance between external forces acting on the body and the response of the internal forces from the muscles, tendons, bones, ligaments and capsules. When the joint is degenerated to the point of causing an antalgic walk is a sign that the abductor muscles are weak and the center of gravity is displaced laterally towards the affected hip, reducing the lever arm.

The postoperative physiotherapy aims to promote and rehabilitate these patients. Hydrotherapy uses the physical effects of water for rehabilitation, seeking to provide comfort and safety, facilitating movement without mechanical overload.

The aim of the study was to analyze the effect of hydrotherapy treatment in post operatory rehabilitation of patients who underwent THA. The specific objectives were: determine the motion range obtained by the hydrotherapy and observe the muscle strengthening provided by the technique.

### METHODS

The research was quantitative multicase and was performed with patients submitted for pool therapy on Teaching Laboratory of Practice in Physical Therapy UNIFRA / SANTA MARIA-RS. The population consisted of 6 patients who underwent total hip arthroplasty (cemented or cementless) with anterolateral access. Two were females and four were males, all started fourteen days after surgery due to healing epithelial tissue. The patients' age range was between 24 and 64 years old.

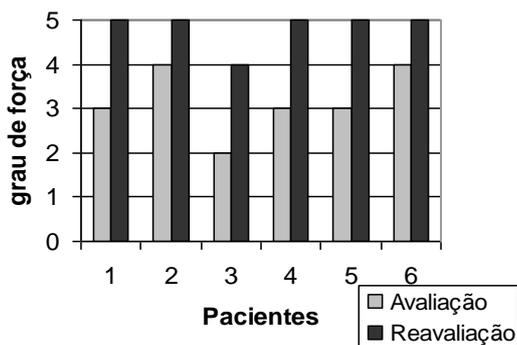
50 minutes sessions were held twice a week, between August and November 2011, totalizing 20 sessions for each patient. The study's inclusion criteria were: being at the 14th day after surgery; time availability to accomplish the proposed treatment and being able to practice hydrotherapy.

To perform data collection the following equipments were used: evaluation form, Carci® acrylic goniometer, Nikon® camera, measuring tape, pencil, floaters, steps and parallel bars. The first evaluation was performed with the patient on day 14 after surgery and the following tests were applied: goniometry, perimetry, measurement of the lower limbs, pain and strength check of the lower limbs, the whole history of the patient and the activities of daily living questionnaire (ADLQ).

Data were analyzed by comparing the statistical assessment and reassessment (performed after 20 sessions) using the Wilcoxon test for dependent samples with 95% confidence level.

### RESULTS AND DISCUSSION

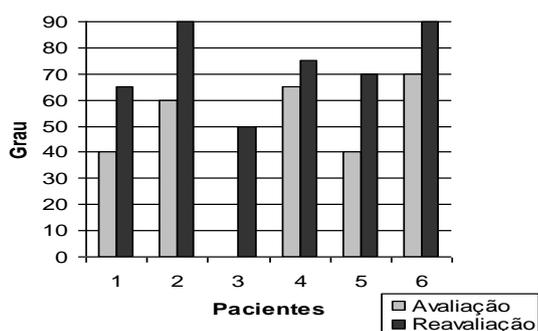
In figure 1 is possible to observe that three patients evolved from grade 3 to the maximum grade strength (grade 5). Two patients increased from grade 4 to 5. And only one patient went from level 2 to level 4, indicating that there has been effective changes in the magnitude of force as a result of the hydrotherapy procedure for all patients.



**Figure 1** – Hip muscular strength gain for each studied patient.

Hydrotherapy focuses on an improvement in the physical condition of muscle strength and endurance development in cases of muscle weakness, muscle facilitation and facilitation paretic gait and upright allowing early ambulation, (BATES; HANSON, 1998). Water's viscosity makes it a good medium to conduct strength training, because its resistance increases as more force is exerted, dropping to zero when movement ceases, (RUOTI; MORRIS; COLE, 2000). The floating force reduces body weight and consequently reduces the impact on joints and the risk of injury. Buoyancy is the physical property used most often to facilitate range of motion (HALL; BRODY, 2001).

In the assessment and reassessment of the range of motion (ROM) of hip flexion, as shown on Figure 2, patient 1 went from 40° to 65° of hip flexion, while patient 2 went from 60° to 90°, patient 3 from 0° to 50°, patient 4 from 65° to 75, patient 5 from 40° to 70° and patient 6 70° to 90°. The statistics revealed changes in range of motion in our patients as a result of hydrotherapy. Showing an increase in ROM of at least 15% for the patients.



**Figure 2** – Evaluation of ROM.

According to Campion (2000) the uses of floaters to get a good stretch with the technique of hold/relax followed by passive movements allows getting a greater range of motion. An important effect desired on hydrotherapy sessions is to maintain or increase the range of motion, by decreasing muscle tone, pain and stress factors (BATES; HANSON, 1998).

## CONCLUSIONS

After total hip arthroplasty (THA) surgery, patients have several limitations of motion, due to the long period of immobilization that causes pain and muscle weakness. Hydrotherapy raises as the ideal technique to start the care of patients after THA, because it uses the physiological effects of immersion combined with the heat from the water to make the movements easier, less painful, making rehabilitation more effective and safe. The goals established in this research were achieved after 20 sessions of hydrotherapy that led to an increase of strength and of range of motion.

## REFERENCES

1. BATES, A.; HANSON, N. **Exercícios aquáticos terapêuticos**. São Paulo: Manole, 1998.
2. CAMPION, Margharet Reid. **Hidroterapia: princípios e prática**. São Paulo: Manole, 2000.
3. HALL, C. M.; BRODY, L. T. **Exercício terapêutico na busca da função**. Rio de Janeiro: Guanabara Koogan, 2001.
4. RUOTI, Richard G.; MORRIS, David M.; COLE, Andrew J. **Reabilitação aquática**. São Paulo: Manole, 2000.
5. KAPANDJI, A.J. **Fisiologia Articular: Esquemas comentados de Mecânica Humana**. Vol.2. 6 ed. Rio de Janeiro: Guanabara Koogan, 2007.
6. ANDRIACCHI, T.P. e MIKOSZ, R.P. Musculoskeletal dynamics, locomotion and clinical applications. In: MOW, V.C.; HAYES, W.C. (ed). **Basic Orthopaedic Biomechanics**. 1. ed., New York, Raven Press. 1991, p.51-92.