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365 DAYS - EVOLUTION AND REHABILITATON STRATEGY IN A UNCEMENTED HIP REPLACEMENT PROSTHESIS CASE STUDY

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Abstract

Hip replacement is a surgical procedure in which the hip joint is replaced by a prosthetic implant, that is, a hip prosthesis.

A total hip replacement (total hip arthroplasty or THA) consists of replacing both the acetabulum and the femoral head while hemiarthroplasty generally only replaces the femoral head. Hip replacement is currently one of the most common orthopaedical operations, though patient satisfaction short- and long-term varies widely.

In this paper we present the case of a 75-year-old woman, with classic uncemented hip prosthesis intervention, from the preoperative preparation stage to 1 year after the intervention and the recovery phases and their evolution. Due to a quality management of the intervention and good hygiene and nutrition, the lack of osteoporosis and the absence of paleopathology, the patient recovered in a fast and correct manner, returning to a good functionality and state of health. Also, the cooperation between the patient, family, therapist, doctor and psychologist had a decisive role in the success of both the intervention and the postoperative period with optimal results for the age and possibilities of the patient.

Keywords: *Hip prosthesis, rehabilitation, pre and post operatory, evolution, range of motion, functionality.*

Abstract

Înlocuirea șoldului este o procedură chirurgicală în care articulația șoldului este înlocuită cu un implant protetic, adică o proteză de șold.

O proteză totală de șold (artroplastie totală de șold) constă în înlocuirea atât a acetabulului, cât și a capului femural, în timp ce hemiartroplastia înlocuiește în general doar capul femural. Înlocuirea șoldului este, în prezent, una dintre cele mai frecvente operații ortopedice, deși satisfacția pacientului pe termen scurt și lung variază foarte mult.



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În această lucrare prezentăm cazul unei paciente în vârstă de 75 de ani, cu intervenție clasică de proteză de șold necimentată, din stadiul de pregătire preoperatorie, până la un an de la intervenție. Datorită unui management de calitate al intervenției, a unei igiene și alimentații bune, a lipsei osteoporozei și a absenței polipatologiei, recuperarea pacientei s-a produs într-o maniera rapidă și corectă, determinând buna funcționalitate, dar și o bună stare de sănătate. De asemenea, cooperarea dintre pacient, familie, terapeut, medic și psiholog a avut un rol decisiv în reușita atât a intervenției, cât și a perioadei postoperatorii, cu rezultate optime pentru vârsta și posibilitățile pacientei.

Cuvinte cheie: *proteză de șold, reabilitare, pre și post operator, evoluție, amplitudine a mișcării, funcționalitate.*

The earliest recorded attempts at hip replacement were carried out in Germany in 1891 by Themistocles Gluck (1853–1942), who used ivory to replace the femoral head (the ball on the femur), attaching it with nickel-plated screws, plaster of Paris, and glue.

On September 28, 1940 at Columbia Hospital in Columbia, South Carolina, American surgeon Dr. Austin T. Moore (1899–1963) performed the first metallic hip replacement surgery. The original prosthesis he designed was a proximal femoral replacement, with a large fixed head made of the cobalt-chrome alloy Vitallium.

It was about a foot in length and bolted to the resected end of the femoral shaft (hemiarthroplasty). A later version, the so-called Austin Moore Prosthesis which was introduced in 1952, is still in use today, although rarely. Like modern hip implants, it is inserted into the medullary canal of the femur, and depends on bone growth through a hole in the stem for long-term attachment.

Hip replacement is a surgical procedure in which the hip joint is replaced by a prosthetic implant, that is, a hip prosthesis. Hip replacement surgery can be performed as a total replacement or a hemi (half) replacement. Such joint replacement orthopaedical surgery is generally conducted to relieve arthritis pain or in some hip fractures. A total hip replacement (total hip arthroplasty or THA) consists of replacing both the acetabulum and the femoral head while hemiarthroplasty generally only replaces the femoral head. Hip replacement is currently one of the most common

orthopaedical operations, though patient satisfaction short- and long-term varies widely.

Approximately 58% of total hip replacements are estimated to last 25 years. The average cost of a total hip replacement in 2012 was $40,364 in the United States, and about $7,700 to $12,000 in most European countries.

Total hip replacement is most commonly used to treat joint failure caused by osteoarthritis. Other indications include rheumatoid arthritis, avascular necrosis, traumatic arthritis, protrusion acetabuli, certain hip fractures, benign and malignant bone tumors, arthritis associated with Paget's disease, ankylosing spondylitis and juvenile rheumatoid arthritis. The aims of the procedure are pain relief and improvement in hip function. Hip replacement is usually considered only after other therapies, such as physical therapy and pain medications, have recently failed.

Case report

The 71-year-old female patient came to the state hospital for a pelvic and hip X-ray, following previous medical investigations. Corroborated with the orthopedic analyzes and investigations, the patient complaining of pain and difficulties in walking and mobilizing, was scheduled for surgical intervention through uncemented right hip replacement.

The initial diagnosis was bilateral coxarthrosis, degenerative changes in the dorso-lumbar spine with multiple marginal osteophytosis and disc arthrosis. Urinary infection. Until the surgical intervention that was performed in February 2019, the patient received a 7 days treatment for urinary infection with Ciprofloxacin, and a set of post-operative exercises in the outpatient clinic to prepare the body and the affected area for the intervention.

Also, during this period, a series of blood tests, EKG and various markers were collected to prepare the operating field in stable parameters, without infections or other associated disease factors. The patient does not present any other polypathologies or malfunctions.

The pre-operative preparation period consisted of diet, general but also specific muscle toning exercises for the upper limbs in order to support them in crutches, for the lower left limb which will take the weight in the first stage, for the paravertebral and abdomen muscles, but especially for the pelvic muscles, buttock, thigh, of the right leg. This program was executed daily, in the morning with an average duration of 30-40 minutes.

So, after the specific measurements and the surgical decision of the performed hip prosthesis, the patient was operated successfully by removing the arthroses bone areas with a total uncemented hip prosthesis through open intervention.

Hip arthroplasty was performed with uncemented total endoprosthesis type Zimmer Trilogy Versys - Trilogy cup #50, Versys stem = 12LM, Versys head diam. 28, Col 0, Cone 12/14, Liner Longevity 28/50 mm. The patient was discharged afebrile with the dressing intact, following the medical indications. She followed treatment with Clexane 0.4 ml per day subcutaneous paraumbilical 1/day, at the same time up to 35 days postoperatively, Oximed spray on the wound once a day until the staples are removed, avoiding local contact with water or other substances.

At discharge, laboratory analyzes were within normal limits with several elevated



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parameters, ESR (41), serum urea (60.18) and prothrombin time PT with INR (590 with 0.81).
The direction of the acetabular cup influences the range of motion of the leg, and also affects the risk of dislocation. For this purpose, the acetabular inclination and the acetabular anteversion are measurements of cup angulation in the coronal plane and the sagittal plane, respectively. The patient received a postoperative program which she followed for a average duration of 40-60 minutes appropriate to the daily dynamics of the patient, adapting the methods worked to the possibilities of the house and existent stairs.
The patient showed a positive and volitional attitude of trust and active participation throughout the recovery period, starting from simple to complex exercises, from the period of walking in a frame, then crutches, then a cane and later walking freely until climbing and down the stairs. The indicated postoperative program consists of:
Exercises: *from lying position*:

1) Isometry of the thigh muscles with 6 second hold and 8 second rest - repetition 10 times.
2) Isometry of the gluteal muscles with 6 sec hold and 8 second rest - repetition 10 times.
3) With both knees well stretched - ankle pedals - 30 times.
4) Bending (flexion) and stretching (extension) of the operated knee- 10/15 times.
5) With a pillow rolled and placed under the knee of the operated leg - raising the heel from the ground -20 reps. And lifting the operated leg stretched up 20 times (possibly with help).
7) Take the operated leg to the side (abduction)- without external rotation of the leg - 10/15 times.
8) From *lying on the non-operated side*, with a large pillow between the legs - raising the operated leg stretched up - 10/20 times.
9) From *sitting on the edge of the bed*, leg swing- 60 times.
10) From sitting position, raise the arms up and return to the back of the head, with a stick of heads grabbed - 30 reps.
11) From the sitting position with two 2 kg dumbbells, raising the arms up from the front or from the side - 20 reps.
12) From the position of sitting the hands on the bed next to the hips pushing the trunk up with the elbows outstretched - 20 reps.
13) From the stand facing a wall, at a distance of 1 step, hands shoulder-width apart, push-ups against the wall by flexion and extension of the elbows - 15 reps.
14) From lying position, breathing exercises with an emphasis on abdominal breathing - 30 reps.

Contraindications:

- it is not allowed to cross the leg
- it is not allowed to sit on an armchair that



Figure 1. *Initial Hip Joint X-ray January 2019*



Figure 2. *Initial Legs Measurements January 2019*



Figure 3. *Initial Right Hip X-ray January 2019*





Figure 4. *Postsurgical wound after discharge*





Figure 5. *Postsurgical Hip replacement X- ray - May 2019*

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Figure 6. *Postsurgical Hip replacement X- ray - December 2019*



Figure 7 *Postsurgical wound December 2019*



Figure 8 *Postsurgical wound February 2020*

is too low or too soft (that is, an angle less than 90 degrees)
- it is not allowed to turn the foot outwards
- it is not allowed to lie on the operated side- for 1-2 months
- it is not allowed to lie on the non-operated side without pillows between his legs- for 2-3 months
- it is not allowed to do pirouettes and sudden turns on the heel of the operated leg
- it is not allowed to carry weights (bucket, luggage, etc)
- it is not allowed to sit on the stool.

Indications:
- when lying on the back, the legs must be slightly apart, but without external rotation
- when sitting on the edge of the bed, the knees must be oriented to the side
- when it is lying down, the operated leg is kept slightly stretched - also labile for the toilet
- permission to get out of bed only on the side with the operated leg.

Recommendations:
- raised toilet (possibly a special coil)
- raising the bed, armchair, chair
- repeat the 2 hours/day gymnastics program.

Walking is with a frame or crutches following the lesson learned in the hospital: patient should first move the frame, then the operated leg and then the healthy leg;
Use of stairs with crutches/canes: the operated leg is doubled by crutches x cane in this order:

Climb:
1. healthy foot
2. then operated leg with staff

Descent:
1. Staff with operated leg
2. Sane leg.

From May 2019 the patient started the second preoperatory program which consisted in exercises and method for leg muscles, core muscles, stability and equilibrium, mobility, walking and stairs workout without cane.

Results

The results of the imaging investigations at 6 and 8 months respectively show a correct consolidation of the prosthesis with a favorable evolution.
In the first months, the patient presented a contracture of the psoas iliac and the adductor muscles of the thigh, but following the postoperative recovery program, the balance of the pelvis and bipedality was restored.
The patient did not have any adverse reaction to the prosthesis and the scar recovered in optimal conditions without adhesions, infections or adenomas. Please find below two representative images of the wound scar recovery at 6 and 9 post operatory months.
Due to a quality management of the intervention and good hygiene and nutrition, the lack of osteoporosis and the absence of paleopathology, the patient recovered in a fast and correct manner, returning to a good functionality and state of health.
Also, the cooperation between the patient, family, therapist, doctor and psychologist had a decisive role in the success of both the intervention and the postoperative period with optimal results for the age and possibilities of the patient.



Conclusions

The prosthetic implant used in hip replacement consists of three parts: the acetabular cup, the femoral component, and the articular interface. Options exist for different people and indications. The evidence for a number of newer devices is not very good, including: ceramic-on-ceramic bearings, modular femoral necks, and uncemented Monoblock cups. Correct selection of the prosthesis is important.

Post-operative projection radiography is routinely performed to ensure proper configuration of hip prostheses.

The patient cooperated by being confident in her own body and in the exercises performed conscientiously every day. She maintained a proper nutritional and physical hygiene that allowed a quick and correct recovery.

We performed the preoperative program according to the standard recovery stages as well as the postoperative medical indications and post intermediate and final evaluation of the orthopedic doctor. The patient returned to active life and to daily functions even from the first postoperative months, and from the 6th postoperative month she was able to walk with a cane when walking outside the house or walking the dog.

Discussion

Metal hypersensitivity is a well-established phenomenon and is common, affecting about 10–15% of the population. Contact with metals can cause immune reactions such as skin hives, eczema, redness and itching. Although little is known about the short- and long-term pharmacodynamics and bioavailability of circulating metal degradation products in vivo, there have been many reports of immunologic type responses temporally associated with implantation of metal components. Individual case reports link hypersensitivity immune reactions with adverse performance of metallic clinical cardiovascular, orthopedic and plastic surgical and dental implants.

A few patients who have had a hip replacement suffer chronic pain after the surgery. Groin pain can develop if the muscle that raises the hip (iliopsoas) rubs against the edge of the acetabular cup. Bursitis can develop at the trochanter where a surgical scar crosses the bone, or if the femoral component used pushes the leg out to the side too far. Also, some patients can experience pain in cold or damp weather. Incision made in the front of the hip (anterior approach) can cut a nerve running down the thigh leading to numbness in the thigh and occasionally chronic pain at the point where the nerve was cut (a neuroma). The lateral approach is also commonly used for hip

replacement. The approach requires elevation of the hip abductors (gluteus medius and gluteus minimus) to access the joint. The abductors may be lifted up by osteotomy of the greater trochanter and reapplying it afterwards using wires (as per Charnley), or may be divided at their tendinous portion, or through the functional tendon (as per Hardinge) and repaired using sutures. Although this approach has a lower dislocation risk than the posterior approach, critics note that occasionally the abductor muscles do not heal back on, leading to pain and weakness which is often very difficult to treat.

We recommend that the preoperative program be addressed to the whole body according to the principle of individualizing the treatment and the exhortation: "there is no disease, only the patient".

An important role in the success of recovery is played by psychological support, especially in the case of elderly people who need a holistic and integrated approach with family and social support.

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