

Use Of Dual Mobility Prosthesis In Revision Surgery As Treatment In A Patient With Juvenile Rheumatoid Arthritis And Acetabular Loss: A Case Report

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Abstract

Rheumatoid arthritis (RA) is a chronic systemic inflammatory disease characterised by persistent inflammation of the articular synovial membrane, which can lead to bone erosion, destruction of articular cartilage, and complete loss of function in the affected joint. Primary or secondary osteoarthritis is a disabling condition characterised by joint pain and stiffness, so total arthroplasty is indicated in advanced stages. The Dual Mobility System is a current and innovative system that improves the biomechanics and safety of a conventional prosthesis. The case is presented of a 45-year-old female patient, she began with pain in the right buttock in 2019, which was exacerbated at the start of ambulation, in addition to predisposing to a claudication gait, and functionally limiting her work and daily activities, whereby she was protocolised by outpatient clinic and scheduled for revision surgery with placement of double mobility prosthesis.

Keywords: Rheumatoid arthritis, Coxarthrosis, double mobility arthroplasty, prosthetic dislocation, case report

Introduction

Rheumatoid arthritis (RA) is a chronic systemic inflammatory disease characterised by persistent inflammation of the joint synovial membrane, resulting in bone erosion, destruction of articular cartilage, and complete loss of joint function (1). The disease is more common in women, with a 7:1 ratio compared to men, and can occur at any age, but with a peak incidence between 30 and 60 years of age. The inflammatory process is mediated by soluble

mediators, primarily cytokines, growth factors, and chemokines, with the ultimate effect being the destruction of the underlying cartilage and bone, as well as various extra-articular manifestations (1). Pain, stiffness and polyarticular inflammation are the main clinical manifestations of RA, and delay in the timely use of disease-modifying antirheumatic drugs (DMARDs) is commonly associated with more rapid progression of joint damage and an unfavourable

medium- to long-term outcome (1). When advanced stages of joint wear and tear occur, compromising patients' function and independence, referral to an orthopaedic surgeon is necessary for assessment (2).

Among the techniques used are surgical synovectomy and arthroplasty, the latter being the most effective for regressing joint damage and promoting recovery of function. However, it appears that the risk of hip dislocation after arthroplasty is increased in patients with RA compared to patients with primary osteoarthritis (2), with the following case of a patient with rheumatoid arthritis requiring arthroplasty of both hips. This is the case of a patient with rheumatoid arthritis who needed arthroplasty of both hips, which over time progressed to a prosthetic dislocation and required revision surgery, which for surgical resolution was implemented for the first time in the Merida Regional Hospital ISSSTE the first placement of a double mobility hip prosthesis, as is currently suggested internationally for this type of case.

Case presentation

The case is presented of a 45-year-old female patient, originally from and resident of Merida Yucatán, married, Catholic, active nurse, with a history of Arnold Chiari deformity type 2 and rheumatoid

arthritis of long evolution with management based on methotrexate, folic acid and acetaminophen with a surgical history of fundoplication 26 years ago secondary to hiatal hernia, total right hip arthroplasty 22 years ago, total left hip arthroplasty 21 years ago secondary to osteoarthritis secondary to rheumatoid arthritis, lumbar discectomy with placement of Peek interspinous spacers 11 years ago secondary to L4-L5 disc herniation, craniectomy 9 years ago secondary to cerebral malformation, and laparoscopic cholecystectomy 8 years ago secondary to chronic calculous cholecystitis.

She began with pain in the right buttock in 2019, which was exacerbated at the start of ambulation, in addition to predisposing to a claudication gait, and functionally limiting her work and daily activities, this was managed as chronic low back pain with oral analgesics and frequent intramuscular steroid administration, until she was referred to the orthopaedic service of the ISSSTE Merida Regional Hospital in October 2020, where imaging studies of the spine, pelvis and pelvic limbs were requested, showing evidence of prosthetic dislocation of the right hip, and she was scheduled for removal of prosthetic material in October 2020.

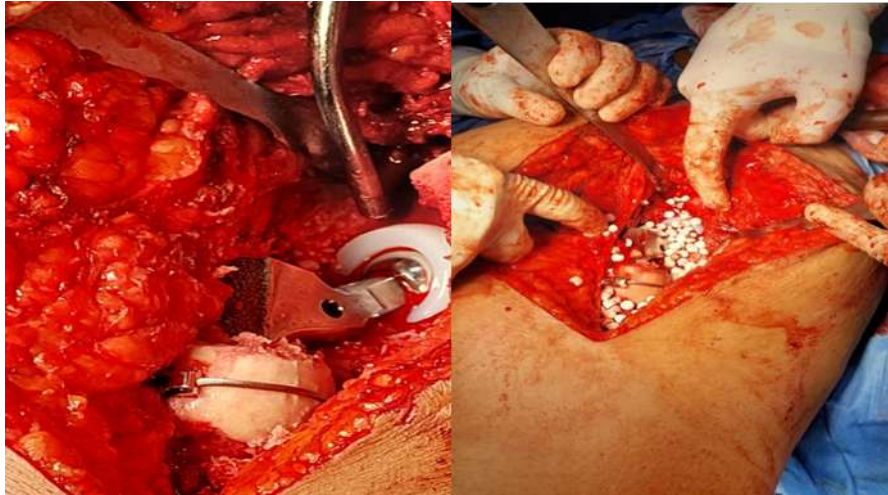
Figure 1: AP X-ray of the pelvis showing prosthetic dislocation of the right hip, with its attachment to the iliac bone and acetabular remodelling (red arrow) because of continuing to walk in this way.



During the surgical procedure, a metallosis process was identified, indicating the rupture of the acetabular polyethylene, and abundant inflammatory exudate was observed. The acetabular prosthetic components were in poor condition, so it was decided to remove the material, perform surgical cleaning, take cultures, and leave the hip in a Girdlestone type, these being interventions taken due to the risk of infections or loosening that could occur when immediately placing a new prosthesis. Upon discharge from the hospital, the patient was sent to physical therapy to avoid limb contracture, protocolised by outpatient clinic and scheduled for revision surgery with placement of double mobility prosthesis + bone graft for acetabular reconstruction + placement of calcium

sulphate beads with antibiotics on direct lateral approach, which was carried out on 13 October 2022 with no transoperative or postoperative complications.

Figure 2: On the left side, there is evidence of a double mobility prosthesis placed to replace the primary prosthesis and on the right side, the placement of calcium sulphate beads with antibiotic prophylaxis.



The patient was found awake, stable and conscious in her three neurological spheres, without neurovascular or cardiorespiratory compromise, with right hip flexion of 95 degrees, full extension, adequate internal and external rotation without pain, abduction 30 degrees, acceptable muscle strength overcoming gravity without resistance, adequate and preserved inguinal, popliteal and pedal pulses, left hip without changes prior to surgery, walking with the support of a four-point walker without discomfort.

The patient was discharged from our Institute on the second postoperative day without complications with gait training with a walker and complete support. Postoperative management followed the postoperative Harris score system, which yielded 72 points, indicating relatively independent functionality without complications. The patient is currently using a cane, with independent bipodalic gait, performing her functions without problems, with frequent physical therapy, due to the hypotrophy she presents in her leg muscles

Figure 3: AP X-ray of the pelvis showing immediate postoperative control of the double mobility prosthesis.



This case becomes a special one for our work Institute, because the double mobility prosthesis is a prosthesis that has been suggested for a decade as the best option for patients with severe coxarthrosis, however none had been placed in our hospital until October 2022, being a favourable case in the post-surgery and up to this moment, being this the starting point, so that the progression has begun with the placement of double mobility prosthesis to the beneficiaries who have the factors that predispose it as the best option for them.

Discussion

The dual mobility prosthesis was developed by Gilles Bousquet (surgeon) and André Rambert (engineer) in 1974, combining the principle of low friction with a 22.2 diameter head popularised by Charnley with the McKee-Farrar concept of using a larger diameter femoral head to improve stability and calling this innovation with two surfaces of movement a dual mobility joint (7).

The principle is based on a mobile prosthetic head within a retentive polyethylene, which in turn moves freely within the metal acetabular cup. These two joints aim to decrease wear and loosening forces while increasing joint range without compromising prosthetic stability (8).

Total hip replacement is considered one of the most successful surgical procedures in orthopaedics; however, dislocation remains a frequent complication (9). In addition to peri-prosthetic osteolysis, a widely recognised phenomenon caused by bone resorption induced by the prosthesis itself, this condition is also known as particle disease, resulting from changes in the friction pattern between its components due to wear between the prosthetic components or dislocations (10).

The occurrence of dislocation after total hip arthroplasty is a serious and disabling complication for the patient, and can be anterior, posterior, or multidirectional (11). The risk factors for instability are multifactorial and may be patient-specific, such as: gender, age, abductor deficiency, psychiatric and neurological diseases, American Society of Anesthesiologists Physical Status 3 or 4, and fractures; related to surgical variables: choice of approach, position of components; and related to the implant: type of fixation, diameter of the femoral head, retentive or not (7).

Unrestricted dual-mobility hip implants provide additional support through a movable polyethylene component between the prosthetic head and the outer metal shell, thereby increasing the effective diameter of the head compared to a conventional prosthesis. The latter makes them an attractive option for challenging situations in unstable total hip arthroplasty (12).

Conclusion

The interest in this new prosthetic system is due to the gesture of preventing and reducing complications from periprosthetic dislocations due to the increase in the placement of hip prostheses. Various studies have been conducted, such as the one done at the Churruasca Hospital in Buenos Aires where a retrospective study was conducted on patients at risk of dislocation in 44 patients subjected to double mobility prostheses (7), and nationally, such as the study carried out in Aguascalientes, Mexico, which evaluated the incidence of early dislocation in post-surgical patients using the dual mobility hip system at the Hospital Centenario Miguel Hidalgo, where it was demonstrated that the cup conferred adequate stability, giving comparable results already demonstrated in previous publications (9). Therefore, it is widely suggested that primary prostheses with a basic system should be replaced with a double mobility hip prosthesis, due to the greater security it provides, in addition to the fact that the mobility arches achieved are closer to the native ones. Therefore, in the present case, it is demonstrated that, institutionally, by the Regional Hospital Merida ISSSTE, this type of prosthesis is an adequate option for the surgical resolution of our patients.

Additional information

Disclosures Human subjects: Consent was obtained by the patient in this study.

Conflicts of interest: Financial relationships: Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Gamero-García, D. (2022). Artritis reumatoide, epidemiología, fisiopatología, criterios diagnósticos y tratamiento. Medicina e Investigación Universidad Autónoma del Estado De México, 6(2), 47-55.

- <https://medicinainvestigacion.uaemex.mx/article/view/19154>>.
2. Criado, A. B. (2018). Guía de Práctica Clínica para el Manejo de Pacientes con Artritis Reumatoide.
3. Gómez-García, F. (2022). Copa de doble movilidad: aciertos, riesgos y enseñanzas. *Acta ortopédica mexicana*, 36(5), 308-317. <https://doi.org/10.35366/111166>
4. Somarriva, L. M. (2014). Cuándo indicar una prótesis total de cadera. *Revista Médica Clínica Las Condes*, 25(5), 765-767. [https://doi.org/10.1016/S0716-8640\(14\)70105-1](https://doi.org/10.1016/S0716-8640(14)70105-1)
5. García-Rey, E., & García-Cimbrelo, E. (2021). Factores de riesgo de luxación en una serie de 2732 prótesis totales de cadera. *Revista Cubana de Ortopedia y Traumatología*, 35(2).
6. Ramos-Guarderas, P., Arteaga-Guerrero, G., Vargas-Morante, M., Ramos-Murillo, P., Chaves-Lara, C., Peñaherrera-Carrillo, C., Ramos-Murillo, D., Endara-Urresta, F., & Linzan-Muñoz, M. (2024). Artroplastia total de cadera con sistema de doble movilidad de segunda generación como tratamiento de coxartrosis primaria, resultados a mediano plazo. *Revista española de cirugía ortopédica y traumatología*, 68(5), 438–445. <https://doi.org/10.1016/j.recot.2024.04.004>
7. Peirano, F. H. (2019). Artroplastia Total de Cadera con articulación de Doble Movilidad. Estudio retrospectivo en pacientes con riesgo de luxación. *Revista ACARO*, 5(1), 16–24.
8. Valdez, S., & Bouxin, B. (2009). Cotilos con doble movilidad: principios, ventajas y resultados. *Revista de la Asociación Argentina de Ortopedia y Traumatología*, 74(1), 102-110.
9. Villasuso-Rodríguez, V. (2023). Incidencia de luxación temprana en pacientes tratados con artroplastia total de cadera con copa acetabular de doble movilidad. Tesis de especialidades.
10. Rodriguez, L. S., Garcia, S. Q., & Urda, L. L. Cascada de metalosis en paciente reintervenido de luxación recidivante de artroplastia total de cadera.
11. Martinot, P., Disegni, E., Blairon, A., Putman, S., Girard, J., & Migaud, H. (2020). Tratamiento quirúrgico de las luxaciones de prótesis totales de cadera: diagnóstico y tratamiento. *EMC - Técnicas Quirúrgicas - Ortopedia y Traumatología*, 12(1), 1–12. [https://doi.org/10.1016/S2211-033X\(20\)43430-9](https://doi.org/10.1016/S2211-033X(20)43430-9)
12. Blakeney, W. G., Epinette, J. A., & Vendittoli, P. A. (2019). Dual mobility total hip arthroplasty: should everyone get one?. *EFORT open reviews*, 4(9), 541-547. <https://doi.org/10.1302/2058-5241.4.180045>
13. Garabano, Germán, Alonso, Manuel I., Pérez Alamino, Leonel, Jaime, Adrián, Cullari, Matías L., & Pesciallo, César Á. (2023). Resultados iniciales del uso de cotilos de doble movilidad en pacientes >65 años con fractura de cadera. Análisis retrospectivo de 102 casos. *Revista de la Asociación Argentina de Ortopedia y Traumatología*, 88(5), 520-526. <https://dx.doi.org/https://doi.org/10.15417/issn.1852-7434.2023.88.5.1757>
14. Reyes, K., & Zenteno, J. G. (2024). Uso de cotilo doble movilidad en artroplastias totales primarias de cadera. Temas libres.
15. Perez, M., Gomez, M. L., & Scaglione, F. (2021). Copa doble movilidad: ¿ una solución sin límite de edad? Serie de casos. Posters científicos.