Total Hip Replacement in Patients With Previous Osteosynthesis

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ABSTRACT

There is abundant literature on the clinical and radiographic outcomes of a complex primary total hip arthroplasty after osteosynthesis conversion. Most of these reports refer to conversion from an intramedullary nail or femoral plate and screws (due to a previous fracture or osteotomy) to THA with a distal fixation stem. That said, the objective of this report is to make a technical note on performing a complex primary THA without removal or with partial removal of a previous screw plate using primary implants.

Keywords: hip; total hip replacement; osteosynthesis removal

Level of Evidence: IV

Reemplazo total de cadera en pacientes con osteosíntesis previa

RESUMEN

Existe literatura abundante sobre los resultados clínicos y radiográficos de un reemplazo total de cadera (RTC) primario complejo tras una conversión de osteosíntesis. La mayoría de esos reportes se refieren a la conversión de un clavo endomedular o una placa con tornillos femoral (debido a una fractura u osteotomía previa) en un RTC con un tallo de fijación distal. El objetivo de esta nota técnica es describir la realización de RTC primarios complejos sin el retiro de una placa con tornillos preexistente, o con su retiro parcial, utilizando implantes primarios.

Palabras clave: Cadera; Reemplazo total de cadera; Retiro de osteosíntesis

Nivel de Evidencia: IV

INTRODUCTION

Primary total hip replacement (THR) in patients with hip osteoarthritis has shown excellent long-term outcomes in reducing pain and improving function and quality of life.[1] However, there are patients who, due to a history of trauma, developmental dysplasia of the hip or femoral deformity, present complex reconstructive scenarios due to the existence of plates with femoral screws that obliterate the intramedullary canal, or deform the metaphyseal-diaphyseal region of the femur.[2] In this population, THR has failure rates of 14% to 30% at 10 years and 60% after 15 years, when conversion to primary THR is often necessary.[3-7]

Performing a primary THR in patients with a previous osteosynthesis in the proximal femur presents a complex situation for the surgeon. The use of a versatile approach is of utmost importance, which allows locating and taking into account the anatomical structures that may have lost their topographical references with previous surgeries. The total or partial removal of the material from a previously performed osteosynthesis generates areas of weakness and changes in the modulus of elasticity of the femur, which increase the risk of intraoperative femoral fractures.[8-10] Likewise, it is common to find deformities of the proximal femur that make it difficult to correctly position the prosthetic components. These scenarios usually warrant the use of revision femoral stems, including distal fixation stems, megaprostheses, or combined metaphyseal-diaphyseal fixation stems. In

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How to cite this article: Albani Forneris A.,Slullitel P., Buttaro M. Total Hip Replacement in Patients With Previous Osteosynthesis. *Rev Asoc Argent Ortop Traumatol* 2022;87(5):727-730. https://doi.org/10.15417/issn.1852-7434.2022.87.5.1659.

patients with a large amount of osteosynthesis material, its removal can make the remaining bone quality incompatible with a THR in the same surgical stage, which is why some surgeons choose to perform the procedure in two stages.

The objective of this technical note is to describe a surgical alternative to avoid the total or partial removal of previous implants and the need to use revision stems in cases of complex primary THR in a femur previously treated with a plate and screw.

Case 1 (Video 0:16-0:49)

The case of a 78-year-old male patient is shown, with a history of osteotomy of the right proximal femur in 1974, who consulted for limiting right groin pain. Radiographically, Tönnis 3[11] osteoarthritis with translational metaphyseal deformity[2] and presence of osteosynthesis is evidenced. After careful pre-surgical planning and taking into account the pre-existing osteosynthesis, the patient was proposed a resurfacing arthroplasty without the need to remove the previous implant.

Technical consideration

The patient is placed in the supine position on a traction table and, under fluoroscopic guidance following the technique described by Bolanos et al.,[12] a guide pin is inserted percutaneously in the axis of the femoral neck and through the joint surface about 2 or 3 mm. Subsequently, the patient is repositioned in lateral decubitus and, through a posterolateral approach, the hip is dislocated, exposing the guide pin. With a cannulated drill bit on the pin, the drilling is performed, creating an orifice for the fixation stem of the femoral component. This is then followed by the conventional technical steps for resurfacing.[13]

Postoperative outcome

Twelve years after the procedure, the patient is pain-free, walks unaided with a slight limp, and has a Merle D'Aubigne & Postel (MDA) score of 16 points.[14]

Case 2 (Video 0:50-1:57)

A 51-year-old female patient with a history of a varus osteotomy of the right femur at the age of 46, with a dynamic condylar screw. She consulted for coxalgia that prevented her from performing her daily activities. Radiographically, Tönnis 3 osteoarthritis and previous osteosynthesis are evident. A short-stem THR is proposed, partially preserving the plate with screws.

Technical consideration

Using a posterolateral approach, the femoral dislocation is performed; next, the cervical and femoral head osteotomy is performed to expose the dynamic screw of the pre-existing osteosynthesis. It is removed in an antegrade manner, allowing the femoral canal to be identified. Following the preoperative planning, the 2 most proximal screws of the plate are removed to allow for the placement of the programmed stem. After canal preparation with progressive rasps, the final femoral component is implanted. The implantation of the acetabular component does not present differences from the conventional technique.

Postoperative outcome

Five years after the procedure, the patient walks unaided and without pain, with an MDA score of 18 points.

Case 3 (Video 1:58-3:56)

This is a 48-year-old female patient who consulted for left coxalgia, with a history of diaphyseal fracture of the left femur that occurred 20 years earlier and was treated with reduction and osteosynthesis using a nail-plate with screws. She had Tönnis 3 osteoarthritis. A THR with a short stem prosthesis with partial preservation of the previously placed plate is proposed as treatment.

Technical consideration

As in the cases described, the existing osteosynthesis in this patient obstructed the femoral canal and prevented the placement of a conventional femoral stem. In order to avoid the complete removal of the implant, partial removal was chosen. In this case, as it was a non-modular nail plate (without the possibility of removing

the cephalic fixation by decoupling), it was necessary to use a high-speed saw with a small-diameter diamond blade to cut metal precisely and with less damage to the adjacent tissue. After extracting the osteosynthesis, the cervical-diaphyseal region was prepared for the insertion of the short stem, following the conventional technique.

Postoperative outcome

Two years after the procedure, the patient has no pain and walks unaided without functional limitations.

Case 4 (Video 3:57-4:12)

This is the case of an 82-year-old woman with a history of left subtrochanteric fracture treated with a dynamic condylar screw 15 years earlier, with advanced coxarthrosis of the left hip and a secondary varus deformity, with its respective shortening. Due to her functional limitation, a THR with partial withdrawal of the osteosynthesis was indicated.

Technical consideration

Taking into account the patient's age, osteopenia of the proximal femur, and varus deformity, a cemented femoral stem was chosen. As in the patient in case 2, partial removal of the pre-existing osteosynthesis was carried out, performing the extraction of the dynamic screw in an antegrade manner. The use of cemented stems in patients with angular deformities allows their correction with a greater degree of freedom and technical ease, which helps to avoid the occurrence of an intraoperative calcar fracture.

Postoperative outcome

One year after the procedure, the patient walks unaided, with a slight limp, and without pain, with an MDA score of 16 points.

Final considerations

The presence of osteosynthesis material in the proximal femur when performing a THR represents a technical challenge for the surgeon. If a femoral implant is removed in its entirety, the last screw of said implant must be bridged with at least 2 cortical diameters of the width of the native femur.[10] Taking this into account, not all previous implants need to be completely removed. Some can be partially or fully maintained and function as internal tutors, avoiding the need for revision implants.

Preoperative planning is a crucial step in these scenarios, allowing the correct selection of the implant. Surface arthroplasty could be an indication in these cases, especially in those with translational metaphyseal deformities. However, some translational metaphyseal deformities may require corrective osteotomies for proper component orientation when metaphyseal fixation femoral implants are used. Short uncemented stems can accommodate angular varus deformities due to their curved geometry. However, in cases of severe osteopenia, the selection of a cemented stem makes it possible to minimize the risk of intraoperative fracture of the femur. It is essential to know that, in all the cases described, the surgeon always had a plan B with conventional stems (cemented or not) and distal fixation stems, since, on certain occasions, the initial plan cannot be carried out.

CONCLUSION

It is possible to perform total hip replacements in patients who have already undergone osteosynthesis without the need to completely remove the pre-existing osteosynthesis material or resort to revision implants. Proper identification of deformities and careful preoperative planning allow the use of primary implants, whether they are surface implants, short uncemented stems, or conventional cemented stems.

Conflict of interest: The authors declare no conflicts of interest.

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