

FEMORAL HEAD DECOMPRESSION AND GRAFT: TECHNIQUE WITH NEW INSTRUMENTS

DESCOMPRESSÃO DA CABEÇA FEMORAL E ENXERTIA: TÉCNICA COM NOVO INSTRUMENTAL

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ABSTRACT

Introduction: Osteonecrosis of the femoral head (ONFH) is a pathology that can be treated with many approaches by the hip surgeon. Advanced decompression is a technique that aims to prevent the collapse of the femoral head and the arthrosis process of the joint, a technique already widespread and used by hip surgeons. In this study, we performed the technique with a new retractable blade and a new bone substitute as graft for the femoral head. **Objective:** To evaluate the technique with new instruments (EasyCore Hip[®]) and a calcium phosphate bone substitute (Graftys[®] HBS). **Methods:** Patients with osteonecrosis of the femoral head without major degenerative changes, such as femoral head collapse, were selected. Femoral head decompression was performed using the EasyCore Hip[®] retractable blade along with the calcium phosphate bone substitute as graft (Graftys[®] HBS). **Results:** The instruments proved to be reliable and reproducible, and the bone substitute presented good mechanical resistance, maintaining its temperature during the surgery. The disposable retractable blade presents variation in size and angle, which is an advantage in the removal of necrotic bone. However, we must take some precautions in order to achieve a better result. **Conclusion:** using EasyCore Hip[®] instruments and a calcium phosphate bone substitute (Graftys[®] HBS) is safe; however, some precautions must be taken during the use of the technique. **Level of Evidence IV, Case Series.**

Keywords: Decompression. Grafts. Osteonecrosis. Hip. Bone Substitutes.

RESUMO

Introdução: A osteonecrose da cabeça femoral (ONCF) é uma patologia que pode ser tratada com diversas abordagens pelo cirurgião de quadril. A descompressão avançada é uma técnica que busca evitar o colapso da cabeça femoral e o processo de artrose da articulação, técnica já bastante difundida e utilizada entre os cirurgiões de quadril. Neste estudo, foi realizada a técnica com uma nova lâmina retrátil e um novo substituto ósseo como enxerto para a cabeça femoral. **Objetivo:** Avaliação da técnica com novo instrumental EasyCore Hip[®] e substituto ósseo de fosfato de cálcio (Graftys[®] HBS). **Métodos:** Foram selecionados pacientes com osteonecrose da cabeça femoral sem alterações degenerativas importantes, como o colapso da cabeça femoral. Foi realizada a descompressão da cabeça com a lâmina retrátil EasyCore Hip[®] associada à enxertia com o substituto ósseo de fosfato de cálcio (Graftys[®] HBS). **Resultados:** O instrumental mostrou-se confiável e de aplicação reprodutível, e o substituto ósseo apresentou boa resistência mecânica e isotermia durante o procedimento. **Conclusão:** em nossa série de casos, verificamos segurança na utilização do EasyCore Hip[®] e substituto ósseo de fosfato de cálcio (Graftys[®] HBS), porém alertamos para cuidados que devem ser tomados durante a realização da técnica. **Nível de Evidência IV, Série de Casos.**

Descritores: Descompressão. Enxertos. Osteonecrose. Quadril. Substitutos Ósseos.

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INTRODUCTION

Osteonecrosis of the femoral head (ONFH) is a complicated pathology for hip surgeons. This pathology results from the death of bone cells due to impaired blood supply, and inevitably causes a secondary arthrosis of the coxofemoral joint, which can lead to a total hip arthroplasty (THA), since it reduces the quality of life of patients.¹⁻⁴

Despite several studies, its multifactorial pathophysiology hinders the establishment of the ideal treatment for various groups of patients.⁵ This ideal treatment—whether surgical, medical, or behavioral—is especially controversial in less advanced cases, in which the joint is still preserved, as these patients usually do not present femoral head collapse or subchondral fracture yet.⁵ Rest, load removal, oral medications, change in physical activity, core decompression or

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decompression associated with adjuvant methods, derotation osteotomies, and arthrodesis are treatment options for this early stage.^{3,6} Advanced decompression—the process of grafting a synthetic bone after removing the necrotic area—is a technique that, besides mitigating the patients' pain symptoms, aims at enabling a mechanical framework in the necrotic area and preventing the collapse of the femoral head, reducing the risk of progression to arthrosis. Cases of small lesions located outside the weight-bearing area of the femoral head, without subchondral fracture and with adequate removal of the necrotic area at surgery, present better results in the literature.^{7,8} In this study, we addressed cases operated by the technique of decompression of the femoral head using a new blade to remove the necrotic bone, new graft materials (EasyCore Hip[®]), and a calcium phosphate bone substitute (Graftys[®] HBS). As advantages, this blade enables the removal of more or less amount of bone and allows a curvature as it is expanded, and the bone substitute proved to be biocompatible and isothermal during the surgery, presenting good mechanical resistance.

MATERIALS AND METHODS

A total of eight patients were evaluated, all diagnosed with ONFH, under follow-up at the hip surgery outpatient clinic of the *Instituto de Ortopedia e Traumatologia do Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo* (IOT HC-FMUSP). All participants signed the informed consent form. This study was approved by the Research Committee of the IOT-HCFMUSP, under no. 16321, CAAE 67588417.7.0000.0068.

This study presents the surgical technique of femoral head decompression, removal of the necrotic area, and synthetic graft with calcium phosphate step by step:

- 1) The patient is placed in supine position in a traditional X-ray transparent table to facilitate anteroposterior views and frog position. The use of an orthopedic traction table is also possible. A small longitudinal incision is made in the patient's thigh, in the region of the greater trochanter, and a guidewire is passed through the femoral neck with the aid of an image intensifier, which is inserted through the lateral femoral cortex up to 5 mm from the subchondral bone of the femoral head, in an area predetermined by imaging tests (area where the lesion is located), to ensure that the guidewire is correctly placed.
- 2) The cortical and spongy bone is punctured by a 10-mm cannulated drill (Figure 1).
- 3) After removing the drill and the guidewire, a curette can be used to initiate the removal of the necrotic bone (Figure 2).
- 4) Then, the Easycore Hip[®] disposable retractable blade is inserted and the handle is rotated until the intended amount of necrotic bone is removed (Figures 3 and 4).
- 5) After removing the bone from the lesion area, the Graftys[®] HBS calcium phosphate bone substitute is inserted (Figure 5).
- 6) Characterization of the Graftys[®] HBS bone substitute:



Figure 1. Cortical and spongy bone drilling by a cannulated drill.



Figure 2. Curettage and removal of the necrotic bone.



Figure 3. EasyCore Hip[®] retractable blade insertion.



Figure 4. Removed necrotic bone.



Figure 5. Insertion of the Graftys[®] HBS calcium phosphate bone substitute.

- CE-marked product approved by the Brazilian Health Regulatory Agency (ANVISA) and Food and Drug Administration (FDA). Certified by: ISSO 9001:2000 and ISSO 13485:2003.
- Composition: calcium phosphate formed by mixing calcium phosphate salts and polysaccharides in powder form (solid part) and an aqueous solution of sodium phosphate (liquid part).

- Characteristics: biocompatible with tissues, isothermal (the handling and implantation steps maintain neutral pH and do not generate heat); osteoinductive, and osteoconductive, with adequate mechanical resistance.
- 7) The product starts crystallizing in 15 minutes and hardening in 30 minutes, being necessary to wait for the crystallization time.
 - 8) The soft tissue is washed with saline solution and the lesion is sutured.

RESULTS AND DISCUSSION

Considering all the aspects presented and the experience of using these materials in surgeries, the following precautions must be taken:

- 1) As the disposable retractable blade has a certain degree of fragility, we recommend starting with smaller sizes and advance gradually.
- 2) The disposable blade must not be used on the contralateral hip during the same surgery, exactly because of the aforementioned fragility.

3) A learning curve establishes the ability of removing the ideal amount of necrotic bone in the exact location; however, the advantage of an instrument with varying sizes and angles is exactly trying to remove the correct amount of necrotic bone.

4) If this removal is not ideal, the graft may not be properly inserted, impairing the expected result.

5) For an adequate hardening of the graft, pressurize the graft as it is placed. This process can be repeated a few times.

CONCLUSION

The use of the EasyCore Hip® disposable retractable blade and the Graftys® HBS bone substitute proved to be safe, reproducible, and useful in removing the necrotic bone and filling the resected cavity. In this study, we warned about some precautions that should be taken during surgery. Medium- and long-term studies are necessary to evaluate the patients' follow-up and the effectiveness of the method.

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