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Original Article

Acetabular revision in total hip arthroplasty with tantalum augmentation and lyophilized bovine xenograft☆

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ABSTRACT

Objective: To evaluate a mixed technique of acetabular reconstruction, which uses trabecular metal in the form of tantalum augments associated with lyophilized bovine xenograft.
Methods: Fifteen patients were evaluated prospectively, who underwent acetabular reconstruction with impacted lyophilized bovine xenograft associated with the use of tantalum augments. The main outcome was the failure of the tantalum–bone interface.
Results: The population had a mean age of 58.33 years ± 14.27; the majority was female, 80%. Of the total subjects, 66.7% were operated for failure in primary arthroplasty. The mean follow-up time was 45.2 months ± 11.39. The failure rate of the method in the period and population studied was 6.7%.
Conclusion: An extremely high index (93.3%) of success was observed in an average time of 45.2 months of follow-up. Data were comparable to current literature, demonstrating that the technique employed and proposed is adequate for hip reconstruction in young patients.

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Revisão acetabular em artroplastia total de quadril com cunhas de tântalo associadas a enxerto ósseo bovino liofilizado

Palavras-chave:
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RESUMO

Objetivo: Avaliar uma técnica mista de reconstrução acetabular que usa metal trabecular na forma de cunhas de tântalo associadas com enxerto ósseo bovino liofilizado.
Métodos: Foram avaliados prospectivamente 15 pacientes submetidos à reconstrução acetabular com enxerto bovino liofilizado impactado associado ao uso de cunhas de tântalo. O principal desfecho avaliado foi a falha da interface tântalo-osso.
Resultados: A população apresentou idade média de 58,33 anos ± 14,27, a maioria do sexo feminino 80%. Do total, 66,7% foram operados por falha da artroplastia primária. O tempo médio de seguimento foi de 45,2 meses ± 11,39 meses. A taxa de falha do método no período e na população estudada foi de 6,7%.
Conclusão: Observou-se um índice extremamente elevado (93,3%) de sucesso em um tempo médio de 45,2 meses de seguimento. Os dados são comparáveis à literatura corrente, o que demonstra que a técnica empregada e proposta é adequada para reconstrução de quadril em pacientes jovens.

Introduction

With the increasing number of hip arthroplasties performed worldwide, a likely proportional increase in the number of arthroplasty revisions is expected.[1] The term revision suggests the simple inspection or discrete adjustment of arthroplasty, and underestimates the actual scope of these procedures. Most of these cases present severe bone defects, which require large reconstructions of the bone structure about the hip, especially the acetabulum.

Several techniques can be used for acetabular reconstruction. Among the most common techniques is the use of Jumbo cups,[2] reconstructions that use structural homologous graft (allograft)[3] or impacted morselized homologous graft, with or without graft protection devices such as on the renowned technique described by Slooff et al.[4] The use of autograft, although biologically considered ideal, is not possible in most cases due to its insufficient amount and the need for another procedure, which is not risk free.

Other bone substitute alternatives are grafts derived from species other than human (xenograft); those of bovine origin are the most routinely used.[5] To avoid immunological reactions in the recipient area, animal bone grafts are prepared in various ways in order to eliminate or minimize their antigenicity. One such manner is lyophilization, the process in which the bone is degreased, decellularized, and ultimately sterilized. Regardless of the several manufacturing protocols, the final product should maintain its potential for osseointegration and osteoinduction, as well as being physicochemically similar to human bone.[6,7]

In the past ten years, the use of trabecular metal has gained ground in hip reconstructions. These metal structures are produced using cutting-edge technology and made of titanium or tantalum; they seek to imitate the bone microstructure, with porosities between 400 and 600 microns, which theoretically facilitates their integration into the host bone.[8,9]

Reconstructions using large grafts, whether autologous, homologous, or xenologous are those with the highest number of failures.[10] Moreover, the type of acetabular defect also influences the success of the reconstruction. Defects considered as contained, i.e. those in which the acetabular structure (walls, roof, and floor) is preserved, are more likely to have good performance when compared with severe segmental defects (loss of walls and especially loss of acetabular roof)[11] or those with pelvic discontinuity.[12]

The authors believe that, whenever possible, bone should be replaced by bone, especially in young individuals. Despite this reconstruction philosophy, failures are observed, particularly in severe defects, especially those involving the loss of the acetabular roof[11] and when combined with the need for a large amount of graft. Thus, encouraged by the study by Gerhke et al.,[13] the authors decided to study a technique that combines the use of trabecular metal in the area of higher shearing force (acetabular roof), associated with the use of graft, replacing the filling of the remaining defects with lyophilized bovine (instead of human) bone graft.

Material and methods

This was a prospective cohort study conducted from September 2011 to November 2016. The project was approved by the Research Ethics Committee of the institution and registered under number 15.0248; the ethical precepts of the Declaration of Helsinki of 1975 were followed.

The study included patients with acetabular roof defect in whom large grafts were expected to be necessary for reconstruction. Patients who had one or more failures in previous acetabular reconstructions were also included.

All patients were operated by the same surgeon and medical team. Only the posterolateral approach was used, followed by removal of the previous acetabulum and inspection of the cavity. The defect was classified preoperatively, in accordance