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Original Article

Homologous structural graft for treatment of bone defect during knee revision arthroplasty★

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ABSTRACT

Objective: Obtaining stable bone-implant interface, correct alignment of the components, proper balance of soft tissues' tension, maintenance of proper joint interline are fundamental principles for success in surgical revision total knee arthroplasty, which are only obtained with management bone deficiency. However, proper treatment of large defects remains unclear. The aim of this study was to evaluate the clinical and radiographic results of patients that had underwent revision surgery for total knee arthroplasty with use of structural grafts of musculoskeletal tissue bank in the period between January 2002 to December 2010 by the Knee Surgery Center of National Institute of Traumatology and Orthopaedics (INTO). The study included 26 revision arthroplasties with homologous structural bone grafting in 25 patients. Thirty-four structural bone grafts were used during the 26 revision total knee arthroplasty surgeries studied. The proximal tibia and distal femur were the grafts most frequently used. Six patients developed deep infection and in one of them with damage to the extensor mechanism associated. The average score on the WOMAC was 24,9. In the assessment of functional capacity in the SF-36, the average was 52.5. In radiographic evaluation, resorption of the graft occurred in three patients and no cases were observed of osteolysis, fracture of the graft, migration or subsidence of the components. Bone grafting of a musculoskeletal tissue bank is a satisfactory option to the handling of the bone defect in the setting of revision surgery for total knee arthroplasty.

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Enxerto homólogo estrutural para tratamento do defeito ósseo durante artroplastia de revisão do joelho

Palavras-chave:
Artroplastia do joelho
Revisão
Transplante ósseo

R E S U M O

Objetivo: A obtenção de estável interface osso-implante, o correto alinhamento dos componentes, o apropriado equilíbrio das tensões de partes moles, a manutenção de adequada altura da interlinha articular são princípios fundamentais para êxito nas cirurgias de revisão de artroplastia total de joelho, os quais somente são obtidos com manejo da deficiência óssea. Contudo, o correto tratamento de grandes defeitos permanece indefinido. O objetivo deste estudo foi avaliar os resultados clínicos e radiográficos dos pacientes submetidos à cirurgia de revisão de artroplastia total do joelho com uso de enxerto estrutural de Banco de Tecidos Músculos-Esqueléticos, entre janeiro de 2002 e dezembro de 2010, no Centro de Cirurgia do Joelho do Instituto Nacional de Traumatologia e Ortopedia (INTO). Foram incluídos no estudo 26 artroplastias de revisão com enxertia óssea homóloga estrutural em 25 pacientes. Foram usadas 34 peças estruturais para enxertia homóloga durante as 26 cirurgias de revisão de artroplastia total de joelho. O terço proximal da tíbia e o terço distal do fêmur foram as peças mais frequentemente usadas. Seis pacientes evoluíram com infecção profunda, em um desses casos associada à lesão do mecanismo extensor. O valor médio da pontuação obtida no questionário WOMAC foi de 24,9. Na avaliação da capacidade funcional no SF-36, o valor médio foi de 52,5. Na avaliação radiográfica, a reabsorção do enxerto ocorreu em três pacientes e não foram observados casos de osteólise, fratura do enxerto, migração ou afundamento dos componentes. Enxerto ósseo de Banco de Tecidos Músculo-Esqueléticos representa satisfatória opção ao manejo da falha óssea no cenário da cirurgia de revisão de artroplastia total de joelho.

Introduction

Today, statistical data show that life expectancy is increasing among the population worldwide, with growing demands for improvements in quality of life. This has led to increases in the number of total knee arthroplasty (TKA) procedures and consequently greater numbers of revision operations.[1] Kurtz et al.[2] estimated that the number of revision surgery procedures in the United States will increase by 600% by 2030.

TKA revision involves complex procedures with high technical demands, in which appropriate bone deficiency management becomes imperative in order to obtain satisfactory clinical results.[3,4]

Obtaining a stable bone-implant interface, correct alignment of the components, proper balance of soft tissue tensions and maintenance of proper joint interline level are fundamental principles for success in these surgical procedures, which is only achieved through management of the bone deficiency.[5-7]

Bone defects may result from primary disease, the technique and implants used, the failure mechanism of the TKA or the difficulty in extracting fixed implants. The classification system of the Anderson Orthopedics Research Institute (AORI), as described by Engh and Parks,[8] is the system currently most used: type I presents intact metaphyseal bone; type II presents moderate metaphyseal deficiency in one (IIA) or two (IIB) femoral or tibial condyles; and type III has severe metaphyseal deficiency, with possible detachment of the collateral ligaments or the patellar ligament.[8,9]

Bone defects cam be filled with methyl methacrylate or be managed by using modular metallic expanders, thicker polyethylene components or unconventional prostheses. In addition, autologous or homologous bone grafts, which may be spongy or structural, can also be used.[8-12] Nonetheless, the correct treatment for large defects remains undefined.

Structural bone grafts offer many advantages, which include biocompatibility, restoration of the bone stock and the potential for ligament reinsertion.[7,13,14] The main disadvantages include the possibility of bone reabsorption, probably secondary to the immune response;[14] the risk of fracturing or pseudarthrosis;[14,15] and the possibility of disease transmission.[16]

The objective of the present study was to evaluate the clinical and radiographic results from patients who underwent TKA revision surgery using structural grafts.

Material and methods

Patients who underwent TKA revision surgery with use of structural grafts from a musculoskeletal tissue bank, at the Knee Surgery Center of the National Institute of Traumatology and Orthopedics (INTO), between January 2002 and December 2010, were evaluated.

Structural grafts were used in surgical procedures in which the bone deficiency presented could not be adequately treated by means of metallic expanders and were defined in accordance with concepts currently used in the literature.