



ORIGINAL ARTICLE

Results of treatment of scaphoid nonunion with microvascularized bone grafts of the 1,2 intercompartmental supraretinacular artery and osteosynthesis[☆]

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KEYWORDS

Scaphoid;
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Bone graft;
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Abstract

Objective: To analyze the results of treatment of scaphoid nonunion with questionable viability of the proximal fragment, but without significant deformity or collapse, using a vascularized bone graft of 1,2 intercompartmental supraretinacular artery (1,2 ICSRA) and subsequent osteosynthesis.

Materials and methods: A retrospective study was performed on 10 male patients with a radiographic diagnosis of nonunion. Functionality, pain using Visual Analog Score (VAS), grip strength, patient satisfaction and reintroduction to working life, using QuickDASH and may specific wrist scales were assessed after the treatment. The integration of the graft was checked by radiography.

Results: The mean follow-up was 31.4 months, and 90% of the questionnaires were satisfactory. The VAS decreased by 4.6 points and the flexor-extensor mobility gain was 5°. The total graft consolidation rate reached 40% in 5.5 months on average.

Discussion: Several studies have demonstrated better results using vascularized bone graft versus non-vascularized. From the description by Zaidenberg in 1991, the vascularized graft with 1,2 ICSRA artery, distal radius, has been the most widely used for the treatment of scaphoid nonunion.

Conclusions: Our results are comparable with the literature reviewed; thus using vascular graft of the 1,2 ICSRA and osteosynthesis with Herbert-type screw may be an alternative treatment for proximal scaphoid nonunion, without collapse or significant deformity.

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PALABRAS CLAVE

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Resultados del tratamiento de pseudoartrosis de escafoides con injerto microvascularizado de arteria 1,2 intercompartmental suprarretinacular y osteosíntesis

Resumen

Objetivo: Estudiar los resultados del tratamiento de la pseudoartrosis de escafoides, con dudosa viabilidad del fragmento proximal, pero sin deformidad ni colapso importante del mismo, mediante la utilización de un injerto óseo vascularizado de la arteria suprarretinacular 1,2 intercompartmental (1,2 ICSRA) y osteosíntesis posterior.

Material y método: Estudio retrospectivo de 10 pacientes varones con diagnóstico radiográfico de pseudoartrosis. Después del tratamiento se evaluó la funcionalidad, el dolor medido por la escala analógica visual (EVA), la fuerza de agarre, la satisfacción del paciente y la reintroducción a la vida laboral, utilizando las escalas de Mayo y QuickDASH específicas de muñeca y comprobándose radiográficamente la integración del injerto.

Resultados: El seguimiento medio fue de 31,4 meses; un 90% de las encuestas fueron satisfactorias. La EVA descendió en 4,6 puntos y la ganancia de movilidad flexo-extensora fue de 5°. La tasa de consolidación completa del injerto alcanzó el 40% en 5,5 meses de media.

Discusión: Diferentes estudios han demostrado mejores resultados utilizando injerto óseo vascularizado frente al no vascularizado. Desde la descripción por Zaidemberg en 1991, el injerto microvascularizado con arteria 1,2 ICSRA, de radio distal, ha sido el más utilizado para el tratamiento de pseudoartrosis del escafoides.

Conclusiones: Nuestros resultados, comparables con la bibliografía revisada, utilizando el injerto vascularizado de arteria 1,2 ICSRA y osteosíntesis con tornillo tipo Herbert, pueden ser una alternativa de tratamiento para la pseudoartrosis proximal de escafoides, sin colapso ni deformidad importante.

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Introduction

Fractures of the scaphoid bone are the most frequent ones of the carpal bones.^{1,2} The high incidence of appearance of pseudoarthrosis represents a problem for choosing the treatment for it.³⁻⁶ Given the prevalence in work environments and over age ranges in the first decades of work insertion, scaphoid pseudoarthrosis has a major impact on the social and work life of the patients.⁷ Scaphoid pseudoarthrosis can have implications for the development of degenerative changes in the wrist,^{8,9} beginning in the radioscapoid joint and then affecting all the bones of the carpus.

Numerous techniques have been described and used to treat scaphoid pseudoarthrosis.³⁻⁶ These range from the radial styloidectomy, resection of the proximal scaphoid fragment or proximal row of carpal bones; through interventions providing non-vascularized¹⁰⁻¹⁴ (Matti-Russe, Fernández, Stark, etc.) and vascularized grafts¹⁵⁻²³ (Kawai, Zaidemberg, etc.), up to wrist arthrodesis. Recent studies have shown excellent results in shortening the time of bone consolidation using vascularized bone grafts.²⁴⁻²⁸ The literature includes transfers of vascular pedicle from the tubercle of the scaphoid itself, pisiforme,²⁶ 1st metacarpal²⁷ or palmar and radialdorsus areas¹⁵ of the distal radius, achieving the consolidation of the union defect in 80% of the cases.²⁴ Studies have also been published on vascularized grafts from other areas: cubital artery, iliac crest,²⁴ and femoral condyle.^{24,28}

The objective of our study was to study the results of the treatment of scaphoid pseudoarthrosis with questionable viability of the proximal fragment, but without significant

deformity or collapse (Herbert and Fisher classification type D1).²⁹ To do so, we used a vascularized bone graft with the 1,2 intercompartmental suprarretinacular artery (1,2 ICSRA)⁹⁻²⁴ described by Zaidemberg plus osteosynthesis.

Materials and methods

We reviewed 10 patients retrospectively (all male and with a mean age of 20.8 years) treated in our hospital complex between August 2008 and January 2012 with X-ray diagnosis of scaphoid pseudoarthrosis, of more than 6 months of evolution without clinical or X-ray evidence of bone consolidation. The patients attended the consultation due to pain and functional limitation of the affected wrist. This corresponded to the dominant wrist in 6 patients. Their employment status included 2 students, 1 athlete and 7 manual workers, where the requirement for strength and agility in both wrists was high.

The mechanisms of lesion for the fractures were grouped into 6 chance falls, 2 sports accidents, 1 work accident, and 1 traffic accident. Two patients had a lesion associated to the fracture of the scaphoid (in 1 case, a trans-scaphoperilunar dislocation with fracture of the radius and, in the other, fracture of the triangular fibrocartilage). Initial treatment for the fracture of the scaphoid was orthopedic in half the cases, surgical (osteosynthesis with Kirschner wire) in 3, and another 2 patients did not receive any treatment at all.

Mean time from the injury to pseudoarthrosis surgery with microvascularized graft was 22.3 months. Avascular necrosis of the scaphoid appeared in 6 of the cases (in 4 of them

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