Journal of Plastic, Reconstructive & Aesthetic Surgery (2016) 69, 1403—1410

JPRAS
An International Journal of Surgical Reconstruction
www.JPRASurg.com

Treatment of Kienböck's disease using a fourth extensor compartmental artery as a vascularized pedicle bone graft

Il-Jung Park [a], Hyoung-Min Kim [b], Jae-Young Lee [a], Youn-Tae Roh [a], Do-Yeol Kim [a], Neung-Han Jeon [a], Yong-Deok Kim [c], Soo-Hwan Kang [c,*]

[a] *Department of Orthopaedic Surgery, College of Medicine, Bucheon St. Mary's Hospital, The Catholic University of Korea, Republic of Korea*
[b] *Department of Orthopaedic Surgery, Good Samsun Hospital, 326 Gaya-daero, Sasang-gu, Busan 47007, Republic of Korea*
[c] *Department of Orthopaedic Surgery, College of Medicine, St. Paul's Hospital, The Catholic University of Korea, Republic of Korea*

Received 5 February 2016; accepted 5 July 2016

KEYWORDS
Fourth extensor compartmental artery;
Vascularized bone graft;
Kienböck's disease;
Lunate

Summary *Background:* Vascularized bone grafts for the treatment of Kienböck's disease may facilitate revascularization and remodeling of the avascular lunate. The aim of this study was to evaluate the radiological and clinical results obtained when a fourth extensor compartmental artery (ECA) bone graft was used to treat Kienböck's disease.
Methods: Between May 2009 and June 2012, 13 patients (6 men, 7 women) with Kienböck's disease were treated with placement of fourth ECA vascularized bone grafts. The mean patient age was 39.2 (20—58) years, and the mean follow-up period was 32.5 (12—72) months. At the time of surgery, One patient had Lichtman's stage II Kienböck's disease, 11 stage IIIA disease, and one stage IIIB disease. We measured the pre- and post-operative ranges of motion, pain, grip strength, and radiological parameters, including the carpal height ratio and the radioscaphoid angle.
Results: At the last follow-up, pain was significantly reduced, and grip strength had improved from 60.5% to 87.8% relative to that of the contralateral side. The mean range of motion for flexion had improved from 39° to 53° while that of wrist joint extension improved from 41°

* Corresponding author. Department of Orthopaedic Surgery, St. Paul's Hospital, College of Medicine, The Catholic University of Korea, Jeonnong-dong, Dongdaemun-gu, Seoul, 130-709, Republic of Korea. Fax: +82 2 965 1456.
E-mail address: gamjang@medimail.co.kr (S.-H. Kang).

http://dx.doi.org/10.1016/j.bjps.2016.07.013
1748-6815/© 2016 British Association of Plastic, Reconstructive and Aesthetic Surgeons. Published by Elsevier Ltd. All rights reserved.

to 56°. There were little or no changes in either the carpal height ratio or the radioscaphoid angle (both p values > 0.05).
Conclusions: Placing of a fourth ECA vascularized bone graft is a reliable alternative to other revascularization procedures for treatment of Kienböck's disease. Such grafting is effective, minimally invasive, and associated with a low risk of pedicle kinking.
Type of study/level of evidence: Therapeutic/IV
© 2016 British Association of Plastic, Reconstructive and Aesthetic Surgeons. Published by Elsevier Ltd. All rights reserved.

Introduction

Kienböck's disease is a form of avascular necrosis of the lunate bone, and, when advanced, causes collapse of the lunate and wrist arthritis.[1,2] Clinically, the disease presents with pain in the wrist joint, impaired movement, and decreased grip strength. The causes of the disease remain poorly understood, but the avascular necrosis is thought to develop from negative ulnar variance, increasing the shear force on the lunate, in turn restricting the blood supply and impairing circulation as a result of repetitive trauma.[3–5]

Various surgical methods have been introduced to treat Kienböck's disease. These include joint-leveling procedures such as ulnar lengthening and radial shortening, and salvage procedures such as carpal joint arthrodesis or proximal row carpectomy. However, no single method has been universally adopted.[6–8] Generally, salvage procedures are performed when the disease progresses to Lichtman stage IIIb or IV. However, in the early stages of this disease, methods that reduce the stress on the lunate (*i.e.*, radial shortening or ulnar lengthening) are preferred, as are approaches toward revascularization of the lunate with a vascularized bone graft.

Revascularization of the lunate using bone graft prevents disease progression and collapse of the lunate by restoring blood flow to the intraosseous artery. Various types of surgery are available.[9–14] In particular, Moran et al. introduced and reported on the utility of a 4+5 extensor compartmental artery (ECA) vascularized bone graft; this induced revascularization and remodeling of the necrosed lunate.[9] This procedure is the most common method used to treat Kienböck's disease and is performed using the fourth and fifth ECAs (4+5 ECAs). Upon ligation of the posterior branch of the anterior interosseous artery, the retrograde flow from the fifth ECA is directed into the fourth ECA in an orthograde direction (Figure 1). The advantages of this technique are: (1) the pedicle is of large diameter, (2) the pedicle is long, and (3) the ulnar location of the pedicle in the wrist allows arthrotomy to be performed, reducing the risk of injury to vessels.[9,13,14] However, as the pedicle is long, the time required for surgical dissection is also relatively longer and associated with a risk of pedicle kinking. Conversely, whereas placement of a fourth ECA vascularized bone graft (Figure 1) affords the same advantages as does use of the 4+5 ECA vascularized bone graft, the former operation can be performed after a relatively brief dissection, rendering the procedure less invasive. The pedicle length is sufficient to allow grafting onto the lunate, with a reduced risk of pedicle kinking. As the fourth ECA technique is an alternative to several vascularized bone graft (VBG) techniques, the indications for this procedure are the same as those given in previous reports on the use of VBG to treat Kienböck's disease.[9,10,15] Our inclusion criteria were: disease of Lichtman stage I, II, or IIIa; positive or neutral ulnar variance; but without complete lunate collapse and mid- or radiocarpal arthritis.

We investigated the utility of fourth ECA vascularized bone graft placement by performing radiographic and functional assessment of the wrist. As explained above, the surgical procedure affords certain advantages, but concerns about low vascularity remain since the donor bone graft site is more proximal than that of the 4+5 ECA technique. If the fourth ECA technique were to yield outcomes similar to or better than those using the 4+5 ECA technique, the fourth ECA technique would be a useful alternative to the 4+5 ECA technique.

Patients and methods

Patients

We studied 13 patients diagnosed with Kienböck's disease between May 2009 and June 2012 who underwent fourth ECA vascularized bone graft surgery and who were followed-up for at least 12 months (Table 1). There were six men and seven women; the mean age at the time of surgery was 39.2 (20–58) years, and the mean follow-up duration was 32.5 (12–72) months. Diagnostic plain radiography and magnetic resonance imaging (MRI) data were collected from all patients prior to surgery. At diagnosis, one patient was stage II, 11 were stage IIIA, and one was stage IIIB Kienböck's disease (Lichtman classification, Table 2).

Functional and radiological assessment

Radiological assessment was performed by evaluating anteroposterior and lateral plain radiographs taken before and after surgery, and at the final follow-up. The carpal height ratio (CHR) and radioscaphoid angle (RSA) were measured and the lunate was assessed to determine whether necrosis had progressed. In terms of functional assessment, subjective satisfaction and pain were evaluated

Download English Version:

https://daneshyari.com/en/article/4116949

Download Persian Version:

https://daneshyari.com/article/4116949

Daneshyari.com