Overgrowth After Radial Shortening for Kienböck's Disease in a Teenager: Case Report

Mustafa Herdem, MD, Cenk Özkan, MD, Hüseyin Bayram, MD

From the Department of Orthopaedics and Traumatology, Çukurova University Faculty of Medicine, Balcali, Adana, Turkey.

A 16-year-old boy was treated by a radial-shortening procedure for symptomatic stage IIIB Kienböck's disease with 4 mm negative ulnar variance. The osteotomy corrected the ulnar variance to negative 1 mm after surgery, but further negative ulnar variance of 9 mm occurred at follow-up evaluation as a result of radial overgrowth. The functional outcome was excellent with remodeling of the lunate. The possibility of overgrowth should be considered when contemplating a radial-shortening osteotomy for Kienböck's disease in skeletally immature patients. (J Hand Surg 2006;31A:1322–1325. Copyright © 2006 by the American Society for Surgery of the Hand.)

Key words: Kienböck's disease, radial osteotomy, overgrowth, revascularization, children.

Kienböck's disease or aseptic necrosis of the lunate is a disabling problem that causes pain and loss of function in the wrist and limits the young active patient. Progression of the disease results in carpal collapse and degenerative arthritis of the wrist. The disease usually affects men ages 20 to 40 years.[1] Treatment is still a challenge and ulnar variance is important in deciding on treatment options.[1–3] The positive relationship between negative ulnar variance and the development of Kienböck's disease led to joint leveling procedures. A radial-shortening osteotomy has been reported to improve the clinical results in adults.[4–9]

Little is known about the natural history of the disease in the skeletally immature patient; however, there is evidence that children have a greater potential for remodeling with either surgical or nonsurgical treatment.[10,11] In a recent study, Iwasaki et al[12] reported that radial osteotomies provide satisfactory clinical and radiographic outcomes in teenage patients even at advanced stages (IIIA/B) of the disease. Younger patient age seems to be associated with a better surgical outcome, but only a small number of young patients have been reported in the literature.[11–14] Stimulation of longitudinal growth after forearm fractures has been reported.[15] This article reports on a 16-year-old boy treated with a radial-shortening osteotomy for stage IIIB Kienböck's disease with −4 mm ulnar variance. Although the ulnar variance was reduced to −1 mm by the osteotomy, further negative ulnar variance (−9 mm) occurred as a result of radial overgrowth. The clinical outcome was excellent with radiographic findings of revascularization at the long-term follow-up evaluation.

Case Report

A 15-year-old boy presented with pain in the right wrist for 4 months. He was working as a carpenter but had no history of an acute trauma. Radiographs showed loss of height of the lunate consistent with stage IIIA Kienböck's disease according to the classification of Lichtman et al[16] (Fig. 1). Symptoms persisted with activity modification and a static splint for immobilization. After conservative treatment for 6 months, the patient was treated surgically because of further lunate collapse and progression to stage IIIB. Physical examination at the time of surgery showed wrist motion of 40° flexion, 45° extension, 15° radial, and 30° ulnar deviation. Grip strength was 37% of the unaffected side. Direct radiographs showed sclerotic changes and lunate collapse with a carpal height ratio of 0.46 and a modified lunate index[5] of 0.33. Ulnar variance was negative 2 mm at the time of the first surgery.

The patient was treated by direct revascularization of the lunate with a reverse-flow distal radius vascu-

Figure 1. Posteroanterior radiograph at presentation shows loss of lunate height consistent with Lichtman stage IIIA Kienböck's disease.

larized bone flap based on the 4+5 extensor compartmental artery using the method defined by Shin et al.[17] Temporary intercarpal (scaphocapitate) fixation with 2 K-wires was performed to unload the lunate for 8 weeks (Fig. 2). Twelve months after surgery, although the patient had radiographic signs of revascularization, he complained of persistent wrist pain. Follow-up radiographs at that time showed an ulnar variance of negative 4 mm. Radial shortening was performed through a volar approach via a transverse osteotomy within the diaphysis away from the growth plate, achieving negative 1 mm ulnar variance.

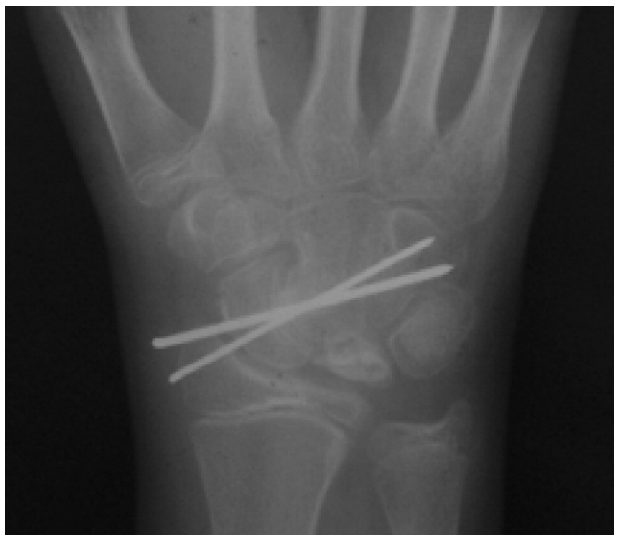

Figure 2. Early postoperative posteroanterior radiograph after direct revascularization and temporary scaphocapitate fixation. There is progression of disease stage to IIIB with further collapse of height.

Figure 3. Posteroanterior radiograph shows healing of radial osteotomy. Ulnar variance was corrected to −1 mm.

The osteotomy was protected in a below-arm cast for 6 weeks after surgery and healed without event (Fig. 3). Bone age determined by Greulich and Pyle[18] standards was 15 years, whereas the chronologic age was 16 years at the time of the osteotomy.

Radial overgrowth was observed and it continued for 2 years after surgery (Fig. 4). At the last follow-up evaluation at 80 months after surgery, radiographs showed improvement of cystic and sclerotic changes in the lunate, with a carpal height ratio of 0.49 and a modified lunate index of 0.44. Although the lunate healed with remodeling, normal architecture was not achieved, with marked loss of height on the radial aspect. The physical examination showed improvement in range of motion to 50° flexion, 45° extension, 20° radial deviation, and 40° ulnar deviation. Forearm rotation was not affected. Grip strength was 90% of the unaffected side. The patient was free of pain and continued to work in carpentry. Ulnar variance became further negative (9 mm) contrary to the expected outcome with radial overgrowth, but no angular deformity was present.

Discussion

The natural history of Kienböck's disease is progressive and passes through advancing stages over time