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A CASE REPORT: RADIAL SHORTENING OSTEOTOMY FOR GRADE II KIENBOCK'S DISEASE IN AN ATHLETE.

Orthopaedics

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ABSTRACT

Introduction: Progressive avascular osteonecrosis of the lunate is the described as Kienböck's disease. The common signs are a unilateral decrease in wrist motion with concomitant discomfort and edema. The decision of surgery for symptomatic Kienböck's disease is mostly determined by the preferences of the patient and the surgeon, as well as radiological parameters such as disease stage and ulna variation. For Kienböck's disease, radial shortening osteotomy is a commonly used treatment that doesn't cause secondary alterations in carpal alignment or radiocarpal osteoarthritis. **Case Report:** A 21-year-old male presented to our OPD with pain and restriction of movements in the left wrist. Clinical examination was suggestive of tenderness over the lunate and restriction of terminal wrist motion. Radiographs were suggestive of ulnar negative variance and distal radio ulnar joint widening. Conservative management with NSAIDS was unsuccessful and we did an MRI of the left wrist joint. Report was suggestive of Keinbock's disease. We performed a radial shortening osteotomy and the patient had good post operative recovery and clinical results. **Conclusion:** Radial shortening osteotomy provides good clinical outcomes in patients of Keienbocks disease with an ulnar negative variance pattern. Good long term functional outcomes are seen with this procedure.

KEYWORDS

Kienbock's disease, Joint levelling procedure, Radial shortening osteotomy, Lichtman Grade II

INTRODUCTION:

Progressive avascular osteonecrosis of the lunate is the described as Kienböck's disease. The common signs are a unilateral decrease in wrist motion with concomitant discomfort and edema(1). The lunate and distal radius shapes, ulnar variation, the lunate's radius coverage, the blood supply, high intraosseous pressure, and venous stasis are among the anatomical risk factors. Age and gender, connected disorders, trauma-related factors, social and environmental factors, and the relationship to osteonecrosis of other carpal bones are examples of personal factors(2). Examining the lunate reveals a painful swelling on the dorsal side. Reduced wrist grip strength and range of motion are common.

There is no one best way to treat Kienböck's disease; instead, there are several approaches, ranging from conservative methods to surgical techniques. The treatment plan is based on radiological and clinical signs(3). The radiological classification most frequently used to characterize Kienböck's disease is the Lichtman scale. A revised Lichtman scale was proposed by Goldfarb and associates in 2003(4).

When Kienböck's disease is symptomatic, radiographic parameters including disease stage and ulna variation, along with surgeon and patient preference, play a major role in determining the best course of action(5). Without further alterations in carpal alignment or radiocarpal osteoarthritis (e.g., stage 2 and 3A according to the Lichtman classification) and without negative or neutral ulna variance, radial shortening osteotomy is a commonly used surgery for Kienböck's disease. By redistributing the axial stress across the carpus and leveling the distal surfaces of the radius and ulna, radial shortening osteotomy reduces mechanical pressure on the lunate(6).

We present a case of a 21-year-old male with left side Keinbocks disease managed with radial shortening osteotomy.

Case Report:

A 21-year-old male professional kabaddi player presented to our outpatient department with complaints of pain and restriction of movements in the left wrist. He had sustained a wrist injury 6 months ago while playing kabaddi. On clinical examination, there was dorsal tenderness over the lunate. Terminal flexion and extension was restricted along with reduction in grip strength. Radiographs of the left wrist were suggestive of ulnar negative variance with sclerosis of the lunate bone and widening of the distal radioulnar joint (Fig. 1). Conservative management with wrist bracing and NSAIDs was given for 3 months but the patient showed no clinical improvement.

An MRI scan was advised which was suggestive of avascular necrosis of the lunate bone (Fig. 2). We decided to go ahead with a joint levelling procedure -radial shortening osteotomy. Patient was taken up for surgery once he was deemed medically fit. Distal radius was approached through a dorsal incision of 10 cms. Plane was developed between the 2nd and 3rd extensor compartments to reach the distal radius. A 10 mm wedge of bone was marked over the distal radial diaphysis where the shortening osteotomy was going to be performed. Osteotomy was performed and a 10 mm wedge of bone removed from the distal radius (Fig. 3). The proximal and distal ends were plated together using a LCDCP.

Post operative radiographs showed a levelling of the joint line and an ulnar neutral variance (Fig 4). Good postoperative outcome was achieved and bony union was seen by the 3rd month. Patient got back to professional sports by the 6th month post-surgery.

Fig 1: Left wrist AP and Lateral radiograph shows an ulnar negative variance and sclerosis of the lunate bone with widening of the distal radioulnar joint

Fig 2: Sagittal and Frontal MRI images are suggestive avascular necrosis of the lunate bone.

Fig 3: 10 mm sliver of distal radial diaphysis removed.

Fig 4: Post operative AP and Lateral radiographs showing radial shortening osteotomy resulting in ulnar neutral variance

DISCUSSION:

Selecting a course of treatment for Kienböck's disease can be challenging, mostly because there are so many variables that need to be taken into account(3). The patient's age, ulnar variance, osseous evaluation (Lichtman), vascular assessment (Schmitt), and cartilage assessment (Bain) are some of these variables. The treatment of Kienböck disease is typically nonoperative in its early stages. The first course of treatment is immobilization with a splint or short arm cast for at least three months(7). Despite the fact that Kienböck disease progresses, many individuals who get conservative treatment are able to function and have manageable symptoms(4). So, in our case we initially tried conservative management for three months after which we decided to go for further treatment when conservative management failed.

For stage II Lichtman's, lunate unloading, lunate decompression, and lunate revascularization are the three main therapeutic objectives(4,7). Ulnar variance is a key component that divides patients into two groups: those with neutral or positive ulnar variance and those with negative-ulnar variance(3). Watanabe et al analysed the DASH questionnaires of 13 patients who underwent radial shortening osteotomy with a mean follow up of 21 years. In comparison with the findings in the contralateral wrist, the mean range of motion was 81% in flexion and 82% in extension, and the mean grip strength was 88%. The mean DASH score was 8 points (range, 0 to 23 points), and patient satisfaction was high. He concluded that for Lichtman stage II and IIIA patients, this operation is a dependable long-term treatment; for patients with stage IIIB patients, it might be a viable choice(8).

Raven et al examined in retrospect 12 individuals with Kienböck's disease who underwent 13 radial shortening osteotomies in order to see whether the short- and medium-term outcomes that were documented held true over an extended period of time. They examined nine osteotomies in nine out of the twelve patients who had at least sixteen years of follow-up. When compared to the normal side, the nine patients' range of motion was reduced. The average grip strength was 90% of the side that was unaffected. At the most recent follow-up, the average visual analog scale score for pain was 2.4, and the average score for disabilities of the arm, shoulder, and hand was 14. The Lichtman classification of Kienböck's disease did not alter in eight individuals at follow-up, but in three patients, the disease progressed radiographically within the first ten years following surgery. They advocated radial shortening to the level of the ulna, typically 4 to 6 mm, in stable wrists (Stage 3A or less) with a negative ulnar variance. This should be followed by stable (plate) fixation under compression(9).

Quenzer et al retrospectively analysed 68 patients who had undergone a radial shortening osteotomy for avascular necrosis of the lunate with a mean follow up of 52 months. 93% of patients had less pain, their grip strength increased, and their wrist motion was unaffected. 75% of patients carried on with their previous jobs, which included heavy lifting. Complications from surgery were rare. Following joint leveling, lunate healing was seen in one-third of the patients. Evidence suggests that concurrent lunate revascularization or vascularized bone transplantation may improve the radiographic result. They came to the conclusion that in Kienböck's disease, radial recession osteotomy improves function and decreases pain(10).

Daecke et al reviewed retrospectively analysed 23 patients who underwent radial shortening osteotomy for ulnar negative variance along with vascularised pisiform transposition. 20 out of 23 patients reported reduced pain. Although range of motion was only 80% of the opposite side, it had risen dramatically compared to preoperative values. Grip power was 84% of the contralateral hand. They came to the conclusion that vascularized pisiform bone grafting combined with radial shortening osteotomy is a successful treatment for patients with negative ulnar variation(11).

Both ulnar lengthening and radial shortening osteotomy had comparable outcomes with reference to lunate strain in a biomechanical investigation by Trumble et al(12). On the other hand, the most recent cadaveric study revealed that preparations undergoing radius shortening exhibited a more advantageous pressure distribution than those undergoing ulna lengthening(13). In terms of joint-leveling treatments, radial shortening osteotomy continues to be the most commonly chosen alternative(6). This can be explained by the increased scientific evidence favoring radial shortening and the frequency of union-related problems associated with ulna lengthening(7,8).

CONCLUSION:

Radial shortening osteotomy provides good clinical and functional outcomes in Grade II Keinbock's disease with ulnar negative variance. Radial shortening are easier to perform and show good bone union and return to functional activities as compared to ulnar lengthening osteotomies.

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