

## An Option for Ulnar Pain

By Sanjay Desai, MD

*Surgical procedures for alleviating pain and maladies affecting the ulna are discussed.*

Patients who suffer from severe rotational instability of the forearm and pain of the distal radioulnar joint (DRUJ) may be able to attribute these symptoms to ligamentous disruption, ulnar styloid fractures, and fractures involving the DRUJ. Additionally, osteoarthritis (OA) and rheumatoid arthritis (RA) are also frequent causes of DRUJ pain. Over the last 30 years there have been limited advances in the techniques and implants for treating DRUJ pain, and forearm instability. Treatment options have ranged from wrist fusions and fusion of the DRUJ joint to a variety of excision techniques. Despite these developments, the ulna is only now beginning to gain the attention of the medical community as an anatomic region that needs a better treatment modality than is currently available. To address this need, some medical device manufacturers are now offering an ulnar head arthroplasty prosthesis. This article will take a detailed look at the progression of treatment options for DRUJ pain, and a new solution for this unmet challenge.



Historically, injuries of this nature have been treated with surgical techniques necessitating partial or complete ulnar resections. The most common treatment options over the last 30 years have been: a Darrach procedure, a Sauve-Kapandji procedure, or a hemi-resection interposition (HRI), also referred to as the “Bower’s procedure.” While these procedures are well documented, each of them relies on the removal of bone mass (except for fusions) with no replacement or substitution of the excised bone. As these standard practices do not yield desirable results for all patients, many surgeons and device manufacturers have been prompted to develop an alternative treatment modality. This is the path that led many orthopedic surgeons to explore ulnar head arthroplasty procedures.

## **THE DARRACH PROCEDURE**

The Darrach procedure is considered to be the traditional approach to excising the arthritic surface of the DRUJ. This procedure dates back to 1912 when William Darrach, MD, first described it. There are several variations of the Darrach procedure, some of which call for the complete excision of the distal ulna. Other variations of the Darrach procedure call for a limited excision leaving a partial interposition of the connective soft tissues to the remaining distal ulna. While this is a common procedure, it is plagued with complications that may include: distal forearm instability, convergence, and other complications. The primary cause of these complications is the removal of the ulnar head and destabilization of the ulna, which ironically is also the source of the patients' pain relief.

## **THE SAUVE-KAPANDJI PROCEDURE**

The Sauve-Kapandji procedure involves the resection of ulnar bone mass proximal to the DRUJ of several centimeters; however, the ulnar head itself remains intact. The ulnar head is then fused to the distal radius. The presence of the distal ulnar stabilizes the joint. This procedure is often preferred over the Darrach procedure. However, the patient is still likely to suffer from convergence, reduced grip strength, and reduced rotational range of motion.

## **THE HRI PROCEDURE**

The HRI was developed by William Bowers, MD. This procedure involves a partial resection of the distal ulna. The triangular fibro cartilage (TFC) is left intact, and a tendon or joint capsule is placed in the void to serve as a spacer. This procedure has had good success in younger patients; however, the clinical outcome still leaves patients with reduced grip strength among other potential complications.

## **ULNAR HEAD ARTHROPLASTY AND POTENTIAL INDICATIONS**

In recent years, a new approach has emerged for treating patients suffering from DRUJ instability, arthritis of the distal ulna, and traumatic injury: distal ulnar arthroplasty.

Expanded potential indications may include patients suffering from: OA; rheumatoid arthritis; ulnar impaction with OA; failed Darrach procedures; failed matched resections; postfracture management of the distal ulna; and ulnar impaction without OA in patients who refuse to quit smoking. Over the last 5 years, several major orthopedic manufacturers have developed ulnar arthroplasty products. The benefits to patients who have received an ulnar head implant include pain relief (as was the case with the Darrach procedure), good stability to the DRUJ (an advantage of the Sauve-Kapandji procedure), and better forearm stability by diminishing convergence.

## **PATIENT PROFILES FOR THIS STUDY**

To further examine the benefits and possible complications of ulnar arthroplasty, a retrospective look was taken at 14 ulnar head arthroplasty procedures that were performed. The age of the patients involved in this study ranged from 41 to 73 years of age, with an average age of 53. Of these 14 patients, eight were male and six were female. In reviewing the mechanism of injury, the following was noted: five of the patients suffered a traumatic injury to the wrist with resultant post-distal radius fracture complications; five of the patients received this treatment for primary arthrosis of the DRUJ; one patient had a previous Darrach procedure that failed; and two of the patients suffered from TFC disruptions with OA (in smokers). The average follow-up for these cases is 2.3 years, with a range of 2 to 4 years.

## **MATERIALS AND METHODS**

This study used a prosthesis that was anatomically designed to replicate the distal ulnar head and its contact within the sigmoid fossa of the distal radius. The prosthesis has a cobalt-chrome head and a titanium plasma sprayed stem. It may be applied with or without cement. All of the patients in this retrospective study did not require any cement for their applications. There is also a range of stem and head sizes to accommodate patients of differing anatomy, and a reconstructive stem (with an elongated stem collar to compensate for traumatic bone loss of the distal ulna). It should be noted that some ulnar head device manufacturers produce implants from alternative materials such as ceramics, for similar applications. Each of the patients involved in this study received one implant (no bilateral applications).

## **RESULTS**

Of the 14 patients who received an implant with the anatomically designed prosthesis that replicates the distal ulnar head, 13 experienced reduced pain, while one patient had the implant removed due to continued wrist pain. This particular patient experienced an Essex-Lopresti lesion due to a work accident that resulted in continued pain even after the prosthesis was explanted. There were no infections recorded in any of the patients who received the prosthesis.

The remaining 13 patients all experienced increased range of motion and forearm stability.

In review of one specific case, Figures 1 and 2 show a patient with impingement and OA present, resulting in no ulnar deviation and pain experienced during rotation and ulnar deviation. Figures 3 and 4 show the same patient post implantation with the anatomically designed prosthesis that replicates the distal ulnar head. The patient now has 20 degrees of ulnar deviation and no pain during rotational movement. Grip strength has also increased from the patient's preoperative status.



Figures 1 and 2 show a patient with impingement and OA, resulting in no ulnar deviation and pain experienced during rotation and ulnar deviation. Figures 3 and 4 show the same patient (post implantation) with an anatomically designed prosthesis that replicates the distal ulnar head. Figures 5 and 6 show a patient (post fracture) with OA, resulting from a 20-year-old injury.

Figures 5 and 6 show a patient post fracture with OA resulting from an injury 20 years prior. Additionally, this patient suffers from pain during rotation of the forearm and compression of the DRUJ. No pain was noted during flexion/extension.

After implantation of the anatomically designed prosthesis that replicates the distal ulnar head, the patient has noted no pain during pronation/supination, and the DRUJ is stabilized without impingement occurring. (Figures 7 and 8.)



Figures 7 and 8 show patient, after implantation of the anatomically designed prosthesis. The patient noted no pain during pronation/supination, and DRUJ is stabilized without impingement occurring.

Within the patient population in this study, three of the patients were workers' compensation cases. This is especially significant as two out of three of these particular patients returned to their preinjury jobs with excellent range of motion. While further research is required, it is possible that this procedure could become an important tool for treating work-injured patients with DRUJ problems.

## CONCLUSIONS

Distal ulnar arthroplasty is a reliable procedure in properly selected patients. This procedure thus far seems to address the immediate need for pain relief, but unlike traditional treatment options, yields greater stability within the forearm and increased grip strength. The potential patient population is considerable in size; OA, RA, ulnar impaction with OA, failed Darrach, in lieu of Darrach, failed matched resection, postfracture management, and ulnar impaction without OA in smokers who refuse to quit. This procedure does have some technical demands and can be challenging in the stiff post-traumatic patient. While this procedure is only just starting to gain in acceptance, it is an important tool in the treatment of these difficult cases.

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