Case Report of Long-Term Results of Biaxial and Volz Total Wrist Arthroplasty

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Abstract

The purpose of this case report was to look at the long-term (average 17.8 years) results of total wrist arthroplasty. Of the 12 wrists (9 patients) available for evaluation, 7 wrists still had the arthroplasty in place whereas 5 wrists had been revised to an arthrodesis. The average age at time of arthroplasty for those requiring an arthrodesis was 17 years less than those not requiring an arthrodesis. This suggests that there is a higher incidence of loosening when total wrist arthroplasty is performed in younger patients, perhaps due to these younger patients having higher demands or having more severe rheumatoid arthritis. In this younger population, the implant metacarpal stem cut out in three wrists and ulnar drift occurred in two wrists. All patients said that if given the chance, they would have a total wrist arthroplasty again, despite their long-term results being poor and many of them being revised to a wrist arthrodesis.

Keywords

- wrist arthroplasty
- wrist
- implants

The arthritic wrist has been a challenging problem for hand surgeons. Total wrist arthroplasty (TWA) was developed as an alternative to wrist arthrodesis to preserve wrist motion and improve function. Metal-backed designs for wrist arthroplasty were modeled after the success experienced in hip and knee arthroplasty. Early results showed promising results, but issues with implant loosening and dislocation were evident in medium-term follow-up.^{1–3}

The purpose of this case study was to report on the long-term (> 10 years) results of wrist arthroplasty performed by a single surgeon to assess the reliability, durability, and effectiveness of Biaxial and Volz TWA.

Case Report

After approval from our Institutional Review Board, all patients who had undergone a TWA over the period from 1981 to 2001 were identified. Of the 73 patients representing 87 total wrist implants, 37 patients were still living and had a local address. Nine patients (12 wrists) responded to a mail invitation to participate in a review of their wrist(s). Each patient had an underlying diagnosis of rheumatoid arthritis. After receiving informed consent from these patients, each patient was clinically examined. Seven of the wrists still had a

TWA in place whereas five had been revised to an arthrodesis. Of the seven still in place, six were Biaxial (Biomet, Warsaw, IN) implants and one was a Volz (Stryker, Mahwah, NJ) implant. All Biaxial implants were inserted without cement; the Volz prosthesis was implanted with cement. The average follow-up time for those patients who still had the arthroplasty in place was 17.8 years (range: 11.7 to 28.3 years). The average lifespan of the arthroplasty for those patients that had been revised to an arthrodesis was 7.8 years (range: 3.0 to 11.0 years). Of the five wrists that had been revised to an arthrodesis, four wrists had been Biaxial implants and one wrist had been a Volz.

The average age of the nine patients, at the time of this review, was 68.3 years (range: 39.2 to 86.1 years). The average age of those patients who still had the arthroplasty in place was 71.0 years. The average age of those patients who had been revised to an arthrodesis was 61.9. The average age at the time of the initial procedure of those patients with an arthroplasty in place was 55.2. The average age at the time of the initial procedure for those revised to an arthrodesis was 38.2.

Each patient rated their pain level using a visual analog pain score (0 = *no pain* to 10 = *worst pain experienced in patient's life*). The average visual analog pain score for those

with an arthroplasty in place was 0.29 and for those who had been revised to an arthrodesis, it was 1.4. For those with an arthroplasty in place, the average flexion–extension was 54.5 degrees and the average radioulnar deviation was 28.0 degrees. Using the DASH scoring system (0 = *no disability* and 100 = *total disability*) to measure function of the upper extremity, those in the arthroplasty group had an average score of 60.7 whereas those in the fusion group had a score of 46.2. For those with an arthroplasty in place, the total forearm rotation was 133.5 degrees whereas for those with an arthrodesis, the total rotation was 117.0 degrees. There was no statistical difference in the DASH score ($p = 0.35$), pronation ($p = 0.57$), or supination ($p = 0.14$), perhaps due to the small sample size and therefore no conclusions could be made.

Each patient received a fluoroscopic examination to look for evidence of loosening, wear, or dislocation. Based on fluoroscopic examinations, all patients that had been converted to an arthrodesis appeared to have a solid fusion. For those that still had an arthroplasty in place, one TWA showed evidence of erosion of the component dorsally into the third metacarpal without any lucency around the component. One TWA showed evidence of erosion dorsally into the third metacarpal and erosion in a volar/radial direction into the radius. There were lucencies around both components in this patient. Both of these TWAs that showed erosion of the components were uncemented. Two other uncemented TWAs showed bone formation around the third metacarpal in response to the implant, but no lucencies around the component.

Of the five wrists that were revised to an arthrodesis, three were due to cutout of the prosthesis through the cortex of the third metacarpal and two were due to ulnar drift of the prosthesis. Three wrists were fused uneventfully. The other two wrists were both on the same patient, and this patient required one revision on one side, and two revisions on the other before obtaining a solid fusion. Of the patients who still had an arthroplasty in place, one patient had a revision of the carpal component due to loosening to a longer metacarpal stem.

All patients were satisfied with their clinical course and final outcome. All patients said that if given the chance, they would have a TWA again.

Discussion

In this case report of the long-term results of Biaxial and Volz TWA, we found there was a high failure rate and low functional scores for those with an arthroplasty still in place. Despite that, patients are happy with their outcomes, and remain nearly pain free.

One of the proposed benefits of TWA is retaining motion in rheumatoid patients with multiple joint involvement. There was no statistical difference in DASH scores between the arthroplasty and fusion groups, perhaps due to the small sample size and hence no conclusions can be drawn from this observation.

This study is certainly limited by its small sample size. However, this study shows that wrist arthroplasty has the ability to survive over many years in the rheumatoid wrist. Our average follow-up time was 17.8 years. These patients remained nearly pain free and retained a moderate amount of motion in their wrists. All patients responded that they would have a TWA performed again, even those who had to undergo revision surgery. Although the DASH scores were poor, a validated rheumatoid arthritis specific outcome scoring system might be a better predictor of patient satisfaction than the standard DASH questionnaire.

References

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