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ORIGINAL STUDY

Ulnar shortening or arthroscopic wafer resection for ulnar impaction syndrome

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The outcome of ulnar shortenings was compared to the outcome after arthroscopic wafer resections for ulnar impaction (or abutment) syndrome in patients with a positive ulnar variance. Both surgical techniques are described. The outcome was measured by the DASH score, the visual analogue score for pain and the working incapacity. The mean DASH score in the ulnar shortening group was 26, in the wafer group it was 36. The VAS were respectively 4.4 and 4.6. The working incapacity was 7 months in the ulnar shortening group and 6.1 months in the wafer group. The differences between the two groups were not statistically significant.

Keywords : wrist ; ulnar pain ; ulnar impaction syndrome ; osteotomy ; arthroscopy.

INTRODUCTION

Ulnar impaction or abutment syndrome is a degenerative condition characterized with ulnar sided wrist pain, limitation of grip strength and – rarely – limitation of prosupination, related to excessive loads across the ulnocarpal articulation (*5,6,7*). The ulnar head of a too long ulna (ulna plus variance) impacts on the TFCC (triangular fibrocartilage complex) and the lunate, with thinning and degenerative tears of the TFCC, chondromalacia of the lunatum and ulnar head and lunotriquetral ligament tears (*6*). The treatment concept is mechanical decompression of the ulnacarpal articulation by decreasing ulnar variance (*1,3,4,13*). An arthroscopic partial resection of the distal ulna, with debridement of the TFCC tear is another technique to deal with this problem. The aim of this study is to compare both techniques for a similar problem.

MATERIAL AND METHODS

Patients

Inclusion criteria were : an obvious ulnar abutment syndrome i.c. ulnar sided wrist pain, an ulnar plus variance on plain radiographs and TFCC and/or cartilage wear on MRI and arthro-CT. Exclusion criteria were patients with inflammatory arthritis, ulnar minus or neutral variance, inconsistent complaints, accidental findings of TFCC perforation without ulnar sided signs and symptoms. Thirty two patients could be retrieved. We compared 25 patients, 20 women and 5 men with an ulnar shortening osteotomy to 7 patients, 4 women and 3 men with an arthroscopic wafer resection (*15*).

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In the ulnar shortening cohort, the mean age at operation was 36 years (range : 16-61). The dominant hand was affected in 12 patients, 17 of them were treated previously with an arthroscopic debridement of the TFCC. A scapholunate ligament tear was present In 4 patients, a triquetrolunar ligament rupture in 5 and a rupture of both ligaments in 3. The mean ulnar variance was + 1.98 (SD 0.92).

In the wafer resection group the mean age was 44 years (range : 27-56). The dominant hand was involved in 4 patients. A scapholunate ligament tear was found in one patient. The mean ulnar variance was + 2.68 (SD 1.79).

Surgical technique

For the shortening osteotomy, the distal half ulna was approached through a dorso-ulnar longitudinal incision between ECU and FCU. The dorsal branch of the ulnar nerve was protected and the ulna was exposed extraperiostally. A 7-hole AO DCP-plate (3.5 mm) was used. A longitudinal saw cut along the plate was made as a rotational marker. The plate was swung away and 2 parallel osteotomies were performed, either transverse or oblique. In this series there were 16 transverse and 9 oblique osteotomies. The plate was aligned again and bicortical screws were introduced, 3 distally and 3 proximally to the osteotomy. Mobilization was allowed immediately postoperatively (Fig. 1).

For the wafer resection a standard wrist arthroscopy set-up was performed. The 3-4 portal was used for visualisation, the 6R for instrumentation. After general inspection, the synovium in the ulnar compartment of the wrist was removed with soft tissue shavers, afterwards the central tear was debrided with arthoscopic nibblers and shavers. The distal 2 mm of the prominent distal ulna with damaged cartilage were removed with bone burrs. The portals were not closed and the wrists were packed in a bulky dressing. Mobilisation was allowed between pain limits (Fig. 2).

Fig. 1. — Ulnar shortening osteotomy with a standard technique.

Evaluation

Since pain and functional disability were the main complaints, we focused on evaluation of these outcome measures. A questionnaire was sent to all patients. The Quick DASH questionnaire (Disability of arm, shoulder and hand) was used to evaluate the disability, and pain was evaluated using a VAS (visual analogue score). Complications requiring further surgery were noted. The DASH questionnaire was designed to evaluate the disability rather than the impairment. It is a self-administrated questionnaire which includes 30 items related to functional activities and symptoms in daily life. The patient is asked to attribute a score of 1 to 5 on all items. The raw score is converted into a 0 to 100 scale. The DASH score has been proposed by the AAOS as the standard for hand and upper limb disability evaluation. The Quick DASH is limited to only 11 questions but correlates very well with the former DASH score (9). The unpaired Student's t-test and Chi square test was used for statistical comparison. Significance was set at $p < 0.05$.

Fig. 2. — Postoperative radiograph after a wafer resection of the distal ulna.

RESULTS

In the ulnar shortening cohort, the mean DASH score improved from 40 to 25.78 (SD ± 18.3) ($p < 0.001$ paired t-test). The final DASH wrist score was excellent in 11 (39%), good in 10 (35.7%), fair in 6 (21.4%) and poor in 1 (3.5%) patient. The VAS for pain was 4.4 (SD, 1.99). Nine secondary operations were required : one conversion to a Sauvé-Kapandji procedure, three nonunions with iliac crest bone grafting and 5 hardware removals. The mean time out of work was 7 months (range 0.5 to 30 months), four patients could not regain their occupation. In the wafer resection cohort, the DASH score improved from 46 tot 36 (SD 22). The mean VAS for pain was 4.6 (SD 2.8). One patient underwent an ulnar shortening osteotomy later on. The mean time out of work was 6.1 months (range : zero to 13 months).

There were no significant differences in post-operative disability (t-test : $p = 0,23$) and pain evaluation (t-test : $p = 0.11$) and the secondary surgeries required (chi square $p = 0.3$). The difference in working incapacity was not significant either (t-test : $p = 0.10$).

DISCUSSION

The outcomes of both procedures have been studied and reported by several authors, including ourselves. The results after an ulna shortening for static or dynamic ulnocarpal abutment (Table I) are satisfying : 82 percent of the patients were satisfied with the outcome. The consolidation may however be problematic, requiring secondary surgery as well as the necessity to remove the hardware in a substantial number of cases (*1-3,5,8,10,12-15,17*).

For the wafer resection, outcome studies are sparser. Detailed data were published by Tomaino and Weiser (*16*). Their series consisted of 12 cases, 8 were completely painfree and 4 had minor symptoms, they all were satisfied. Bernstein *et al* (*2*) had 9 excellent and good results in their eleven cases. The outcome was better than classical extra-articular shortening.

Table I. — Reported outcomes of ulnar shortening

Authors	Year	N	Satisfied or excellent + good
Baek *et al* (*8*)	2005	31	29
Loh *et al* (*11*)	1999	23	17
Chun and Palmer (*10*)	1993	30	28
Minami and Kato (*16*)	1998	25	23
Jain *et al* (*14*)	2000	20	13
Hulsizer *et al* (*13*)	1997	13	12
Van Sanden and De Smet (*17*)	2001	11	7
Moermans *et al* (*18*)	2006	28	21

This is a retrospective study as a first tool to evaluate the value of arthroscopic wafer technique compared to the more classic ulnar shortening procedure. We specifically only included patients with a marked positive ulnar variance. The arthroscopic cohort is too small for detailed statistical analysis or to disclose smaller statistical differences. However, with this study it is clear that arthroscopic shortening is as valuable as the ulnar shortening. Larger groups, more detailed analysis and longer follow-up are required in further studies.

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