Ulnar Shortening Osteotomy

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Abstract
Objective
Ulnar shortening to unload the ulnocarpal ligamentous complex.

Indications
Clinically relevant ulnar impaction syndrome, be it congenital or posttraumatic.

Contraindications
Concomitant pronounced malunion of the radius. Osteoarthritis of the distal radioulnar joint.

Surgical Technique
Ulnopalmar approach. Oblique osteotomy of the ulna in its distal third. Removal of a bony wafer of predetermined thickness. Internal fixation with a 7-hole LD-DC plate or special plate and lag screw.

Results
29 patients (14 men, 15 women, average age 42 years) underwent an ulnar shortening osteotomy for a therapy-resistant ulnar impaction syndrome.

Follow-up after an average of 25 (7–37) months. Average amount of shortening 4.5 (1.5–13) mm. 72% reduction of pain as determined with a visual analog scale. The range of motion was improved by 7% in extension/flexion, by 8% in abduction/adduction, and by 11% in pronation/supination. Grip strength measured with a vig- orimeter (balloon size 5) increased by 12%.

Complications: three malunions, effectively treated by revision of internal fixation.

Key Words
Ulnar impaction syndrome · Ulnar shortening osteotomy · Decompression of triangular fibrocartilaginous complex · Ulna-plus variance

Operat Orthop Traumatol 2002;14:190–205–14
Orthop Traumatol 2002;10:190–9
DOI 10.1007/s00065-002-1048-6

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Ulnar Shortening

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Introductory Remarks
Impingement of the triangular fibrocartilaginous complex (TFCC) between ulnar head on one side and triquetrum and lunatum on the other side is known as the ulnar impaction syndrome characterized by an increase in pressure in the longitudinal direction [5]. The term ulnocarpal impingement should only be used to describe a transverse contact between distal ulna, and carpus or radius [1]. The term ulnocarpal abutment, being used for various conditions, should be abandoned.

The most frequent cause of ulnar impaction syndrome is, besides the congenital ulna-plus variant, the malunited distal radius fracture. Less frequent causes include proximal migration of the radius after radial head resection, early closure of the radial physis, and the Essex-Lopresti lesion. The latter is accompanied by an instability of the distal ulnar joint and therefore merits special consideration. The choice of treatment is influenced mostly by the amount of force transmission through the ulnocarpal joint. Palmer & Werner [12] could show that in the presence of a neutral ulnar variant 82% of the force is transmitted through the radiocarpal and 18% through the ulnocarpal joint. In case of an ulna-plus variant of 2.5 mm the force of the ulnocarpal joint increases to 42%, whereas a shortening of 2.5 mm reduces this force to 4.3%. Besides the ulnar variance, the position of the distal radial articular surface plays an important role in the force transmission at the triangular fibrocartilaginous complex. Dorsal tilting of the distal radius by 40° leads to an increase of ulnar force transmission by approximately 60% [5].

Possible procedures to reduce the force at the triangular fibrocartilaginous complex include an arthroscopic debridement and an ulnar shortening osteotomy (first described by Milch in 1942) [9, 11, 18]. Other possibilities include the so-called wafer procedure which is a distal ulnar resection [2, 20], and the ulnar head decompression osteotomy as described by Pechlaner [13]. Both techniques involve the articular surfaces of the ulnar head and, therefore, constitute an intraarticular procedure, whereas the technique described by Milch [11] realizes a shortening through an extraarticular approach recommended to alleviate symptoms after ulnar fracture [9]. Different procedures are described in the current literature [14, 15, 19]. We prefer the technique presented here.

Surgical Principles and Objective
Decompression of the triangular fibrocartilaginous complex through extraarticular shortening of the ulna at its distal third while preserving the distal radioulnar joint. Ulnopalmar approach through the intermuscular septum, oblique osteotomy and internal fixation with a palmarly placed 7-hole LC-DC plate or preferably with a special plate or lag screw well covered by soft tissue.
Decrease of pain and increase in range of motion.