Shortening Osteotomy of the Radius for Kienböck’s Disease

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Introductory Remarks

The shortening osteotomy of the radius with internal fixation has a definite place in the treatment of Kienböck’s disease stage I to III (Decoulx) in the presence of an ulnar minus variant [1–5]. It is believed that the shortening of the radius results in a decreased pressure between lunate and distal radius, as more forces are transmitted through the triquetrum and the articular disc of the ulna [6]. The decrease in pressure on the lunate is said not only to prevent a further collapse but also to facilitate its remodelling. As already a shortening of 2 mm leads to a maximal decrease in pressure [6], a complete correction of the difference in length between the radius and ulna is not necessary. This decreases the danger of damage to the articular disc and the distal radio-ulnar joint. Avoidance of rotational malposition during the internal fixation can prove to be technically difficult as the proximal fragment of the radius has a tendency to rotate towards supination.

Surgical Principles

A 6-hole DCP for 3.5 mm screws will be adapted to the radius before the osteotomy and 2 holes will be drilled on each side in an eccentric position. After osteotomy and resection the gap will be closed using the compression principle without any danger of rotational malposition. During the same procedure a segmental resection of the dorsal interosseous nerve can be performed.

Advantages

Avoidance of malposition of the osteotomy in all 3 planes.

No need for expensive and unreliable additional instrumentation.

Shortening up to 5 mm possible.

Reliable consolidation of the osteotomy.

Limited exposure of the radius.

Partial denervation of the wrist through resection of the dorsal interosseous nerve is possible.

The same surgical technique can be used for shortening of the ulna.
Disadvantages
Attention to details is required when adapting the plate.
Image intensifier.
Removal of implant material after 3 years.
Possibility of late osteoarthritis of the distal radio-ulnar joint (see Figures 16a to 16c).
Damage to the articular disc through pressure.

Indications
Kienböck's disease, Decoulx stage I to III with or without ulna minus.

Contraindications
Advanced osteoarthritis of the radiocarpal and/or the distal radio-ulnar joint.
Ulnar plus.
Dysplasia of the distal end of the ulna with spherical or more conical articular surface.
Advanced carpal collapse with significantly decreased height of the lunate, palmar angulation of the scaphoid, and scapholunar dissociation.
Advanced fragmentation of the lunate (Decoulx stage III and IV).

Patient Information
It is the goal of the operation to prevent further collapse of the lunate.
It is impossible to reconstruct the lunate to its original shape.
Neither lunate nor wrist are involved in the surgical procedure.
Although rarely occurring, a progression of the disease is possible.
Should the collapse of the lunate progress or the complaints persist, other surgical procedures can still be performed.

These include arthrodesis of the scapho-trapezo-trapezoidal joint (the so-called STT arthrodesis) or of the scapho-capitate joint, transplantation of the pisiform bone, removal of the lunate with displacement osteotomy of the capitate associated with an intercarpal arthrodesis according to Graner (Figures 17a to 17c), replacement of the lunate, resection of the proximal row, replacement or arthrodesis of the wrist.

Even after successful surgery some symptoms may persist.
Possible limitation of forearm rotation.
Injury to the extensor pollicis longus with late rupture. In this instance tendon transfer may become necessary.
Injury to the superficial branch of the ulnar nerve with temporary or permanent disturbance of sensibility at the dorsum of the hand.
Scar over the dorsal aspect of the forearm, sometimes keloid. Implant removal is recommended but not earlier than 2 years after surgery.
Postoperative drainage.
Admission to hospital for 4 to 6 days.
Forearm cast for 5 to 6 weeks followed by exercises and increasing use as after ulnar fracture.
Full use during occupational or recreational activities only after 3 months.

Pre-Operative Work-Up
Determination of the difference in length between radius and ulna with standardized radiographs of the wrist in 2 planes: Posterior-anterior with the shoulder in 90° abduction and 90° of flexion of the elbow. Lateral view: in neutral position of the forearm.
If the difference is less than 2 mm the shortening of the radius should be 1 to 2 mm. A slight ulna plus is acceptable.
If the difference exceeds 2 mm a shortening of the radius of 2 to 3 mm is sufficient. Equalization of length is not necessary.
When determining the amount of shortening the width of the saw blade (usually 0.5 mm) must be taken into consideration.