The Quadrangulated External Fixator in Complicated Carpometacarpal Fracture-Dislocations – a Retrospective Study

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Introduction
The traditional treatment of carpometacarpal fracture-dislocations is based on closed or open reduction and percutaneous k-wire fixation as advocated e.g. by Iselin. It lacks the possibility for recurrent fracture-reposition once the k-wire has passed the first corticals. Fracture-reposition must therefore completed before fracture-fixation can begin. The reposition is mostly carried by one hand, placing the k-wire by the other hand. A suboptimal reposition is often accepted just to prevent recurrent k-wire replacements.

Material and Method

A Hoffmann II Micro external fixator was used in 7 patients, supplemented by usual osteosynthesis equipment.

Method
Without further considering reduction, 4 pins are inserted bicortically into bone: 2 pins into the dislocated column, 2 pins into the neighboring stable column. These four corner-pins are linked by 4 rods, forming a quadrangle.

The inserted but not yet tightened external fixator allows for both hands reposition maneuver by the surgeon and synchronous clamp-fixation by the assistant. The construction is left in place for 6 weeks and provides sufficient stability for early mobilization.

There is no need for a brace-support. The external fixator is removed in local anesthesis.

Results

The retrospective study included 7 patients with quadrangulated external fixator, followed-up at least 3 months.

Discussion

Carpometacarpal fracture-dislocations are often multigranmental and accompanied by considerable soft tissue trauma. As movement in these joints is, with exception of the thumb ray, quite limited, posttraumatic irregularities of the joint surface are well tolerated. In the contrary, residual subluxation result in restriction of finger joint mobility and pain.

Placement of internal osteosynthesis material as plates and screws is difficult in this fracture type. K-wires need additional support and have, as they are often obliquely oriented a higher risk of infection. The synchronous tasks of reduction and fixation results in compromises penalizing one of them or even both.

The capsular longitudinal distraction by the external fixator could account for the low pain level even in remaining joint irregularities (Gelberman RH et al., 1979).

The external fixator accounts for nearly all of these considerations. In the majority of cases, it delivers acceptable and reproducible results. Even 6 weeks immobilization of the first carpometacarpal joint did not result in further stiffness, putting into perspective the advantage of dynamic Suzuki external fixation (Giesen T, 2016).

CT scan at least 3 months after the operation excluded secondary fracture compression, contesting even the necessity of cancellous bone transfer (Büchler U et al., 1991).

The external device was well tolerated by all of our patients. It was compatible with motorcycling, going on crutches and wearing a wedding suit.

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Literature

Model of the external quadrangulated fixator

Functional results 3 months postoperatively

Patient satisfaction > 3 months postoperatively

Pain with low load > 3 months postoperatively

Pain with high load > 3 months postoperatively

Quick-Dash > 3 months postoperatively