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CORR Insights®: Good Functional Recovery of Complex Elbow Dislocations Treated With Hinged External Fixation: A Multicenter Prospective Study

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Where Are We Now?

Complex fracture dislocations of the elbow present a difficult clinical situation and their treatment poses a number of problems. Conservative treatment involving prolonged immobilization will often lead to a stiff, paradoxically unstable, and painful joint. Therefore, surgical intervention in a patient who is fit for surgery is the accepted treatment option. Diagnosis should include

meticulous neurovascular examination and adequate imaging; however, standard radiographs may be insufficient, and CT scanning with 3-D reconstructions can yield additional information. The timing of surgery is critical. In general, after initial reduction, definitive stabilization surgery should be considered semielective and scheduled accordingly because of its complexity, unless there is neurovascular compromise to the limb.

Clinical experience has shown that the collateral ligaments tend to heal in

simple dislocations if the joint is adequately reduced and stabilized. After dislocation the osseous elements become the main stabilizing element [4]. The radial head, in case of displaced fracture, needs to be reduced, fixed or replaced, and the integrity of the ulnohumeral joint must be restored including the coronoid in case of displaced fracture. Triceps muscle function needs to be preserved and concomitant olecranon fractures should be securely fixed. Surgical approaches should not compromise later surgery; in case of radial head excision the coronoid may be approached from a lateral incision, if the radial head is reconstructible, a medial incision is called for to reconstruct the coronoid, and if an olecranon fracture is also present, a unique posterior approach, as described by Boyd [2] may be the best solution. When applying an external fixator around the elbow the nerves in the area must be visualized using adequate incisions. Early mobilization of a stabilized joint is the key to success.

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Where Do We Need To Go?

Coronoid reconstruction and radial head stabilization are strategic measures to obtain anatomical restoration. In complex dislocations, the reconstructed coronoid along with the restored radial head must be protected to allow not only bony but also ligamentous healing. A protective external fixator offers a reasonable option to support this goal. Iordens and colleagues [3] use an image intensifier to determine the position of the guide pin in turn setting the center of rotation for the hinged fixator—a time-honored technique. The fixator pins are inserted under direct vision through 4 cm incisions to avoid nerve damage. The unilateral fixator used is mechanically adequate so as to avoid using a bilateral transfixing frame. This construct then allows early motion avoiding lengthy immobilization of the elbow leading to stiffness.

The difficulty, however, lies in the exact positioning of the external fixator with respect to the center of rotation of the elbow.

How Do We Get There?

The floppy-hinge concept as described by Morrey and his group [5] has been refined by a recent study [1] that found ulnohumeral flexion extension to be a combination of a spiral and translational motion. It is crucial for physiological ligamentous healing to occur that asymmetrical tensions of the collateral ligaments are to be minimized. Hinges must be developed that will accommodate for the complex flexion-extension motion of the elbow. Motion is such an important component for recovery that one could imagine, the development, in the near future, of a computer driven, motorized and hinged fixator which might aid the patient in his or her active mobilization efforts.

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