

## Outline:

### Introduction:

Complex Elbow instability is a relevant pathology, as it can lead to significant limitation of elbow function. Moreover, it is an important risk factor for the development of elbow arthritis. Complex instability can be caused merely by soft tissue injury, as after simple elbow dislocation. But even more, additional bony injuries may be the source of gross instability. It is important to acknowledge all relevant stabilizers of the elbow joint early, to be able to apply sufficient conservative or operative therapy.

### Stabilizers:

On the lateral side, the collateral ligament mainly consists of the radial collateral ligament, inserting on the annular ligament after originating at the area of the instant center of rotation at the lateral column. Moreover the lateral ligament is supported by the so called lateral ulnar collateral ligament, which inserts at the supinator crest. Medially, the ligament is made of an anterior and a posterior part, which function reciprocal. The ligamentous stabilizers are supported by bony ones. The radial head is besides being an important axial stabilizer, an important rest against valgus forces. The coronoid process on the other hand functions as not only as a stabilizer against a.p. shift of the forearm vs the arm, but also helps to compensate varus loading of the joint. The fine conformity of the trochlea and the greater sigmoid notch offers a reliable base for elbow stability, as the brachial muscle and the triceps muscle pull the distal humerus in the concave shape of the olecranon.

### Instability:

Several different instability patterns are known. With failure of the lateral ligament, an posterolateral rotatory instability is possible, where the forearm rotates out of the ulnohumeral joint and the radial head subluxes or finally dislocates from the radiohumeral articulation. In varus-posteromedial instability, a coronoid defect together with failure of the lateral ligament can also be causative for subluxation or dislocation. Moreover, pure varus or valgus laxity can lead to pain and rapid degeneration of the joint.

### Treatment recommendations:

The main elbow stabilizers must be investigated thoroughly. Ligamentous structures can be visualized by MRI and Ultrasound, and even with arthro CT. However, clinical examination and thorough history taken from the patient are by far the most reliable pillars of a proficient diagnostic approach. To identify insufficiency of the bony stabilizers, one should rely on x-ray and CT scans. Thereby the size of fracture fragments can be determined precisely. In the acute trauma, each of the main stabilizers has to be addressed surgically, if instability is clinically apparent. With deficient stabilizers, chronic instability can develop quickly and can lead to severe consequences for joint function.

