



## Function of the Hand in Patient with Tetraplegia

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### Keywords

Tetraplegic hand; Cord injury; Functional electrical stimulation; Restoration of tetraplegics hand function

### Editorial

Function of the hand, even not precise, but useful in everyday- life activities is extremely important for the patients with quadriplegia. At high grade it is deciding about quality of life. Properly undertaken treatment, early rehabilitation, functional hand therapy in many cases allows recovering its function, assuring self service.

The results of transmitting active but usually weakened muscles tendons into paralyzed ones (sometimes taken in such cases) are uncertain. This refers particularly to spastic hand, when the operational indications should be stated very cautiously.

The biggest problem makes patients, who in spite of therapeutic efforts have got totally functionally useless hand. In such cases there are different trials performed to improve functioning of quadriplegic hand, but results of such procedures usually are not fully satisfactory.

### The Relation between Cord Injury and Function of the Hand

Many factors have influence on the range of hand function in patients after cervical spine injury. They are: severity of cord lesion, mechanism and force of trauma, duration of cord compression, undertaken treatment, age of patient, cooperation with the patient during rehabilitation process and others [1]. The most important factor though, seems to be the level and degree of the cord lesion [2-4]. This is clearly illustrated, where we can see the relation between upper extremity function notified in primary examination and the level of cord injury. As an active muscle complex has been assumed dynamic group of muscles with strength of more than 2 according to Lovett scale. Primarily at the admission it has been notified just the activity of elbow flexors (41% of cases), with accompanying activity of deltoid muscles only. A smaller was group of better prognosis, with additionally active extensors of the wrist (28% of cases). There was numerous though group of patients with total plegia of the upper extremity (23% of cases). The level of cord injury is in high correlation with dynamic complexes of upper limb, which work quite properly [5].

The cord lesion on the level of C5 is usually accompanied with functional paralysis of the limb (87% of cases). The symptom of lesion on the C6 level is the peripheral paralysis of extremity with left preserved activity of elbow flexors (96%). The lesion on the C7 level secures fair activity of flexors and extensors of the wrist (85% of cases). This creates the chance to regain at least the simple hand grip activity by the use of "trick" mechanism (this means that active, strong extension of fingers in the way of tensed finger flexors tendons). At the group of patients with lower cervical cord injuries we meet sometimes individuals with good fingers activity, though with the level of C8 lesion more common is group of patients with active only wrist extensors (56%).

### Conclusion

Based on the facts set out above, function of the hand, even not precise, but useful in everyday life activities is extremely important for the patients with quadriplegia.

At high grade it is deciding about quality of life. Properly undertaken treatment, early rehabilitation process, functional hand therapy in many cases allows recovering its function assuring self service. In the group of patients treated restoration of the hand functioning, in different level has been regained in 58%. Precisely performed manoeuvres was however rare (about 10% cases), and quite numerous (26%) where the hand function was very weak, enabling only simple tasks. In such cases it is worth consider special orthopedic equipment to use, what could improve functioning of the hand or on the way of surgical procedures [6-8]. But the indications into surgical procedures

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are not stated too often. The results of transmitting active tendons, but usually weakened muscles into paralyzed ones are uncertain. This refers particularly to spastic hand, when the operational indications should be stated very cautiously. The biggest problem makes patients who in spite of therapeutic efforts have got totally functionally useless hand (42% of analyzed group).

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