Kinematic patterns of modified grasp (tenodesis) in C6 quadriplegic patients
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C6 quadriplegic patients can achieve functional grasp using tenodesis effect. Grasping kinematics of modified prehension after tetraplegia have been poorly reported in the literature. This study investigated the kinematic parameters in pointing and tenodesis grasping in these patients. Four complete C6 quadriplegic patients and four healthy subjects were included. Each subject performed three different tasks: i) pointing to two targets with the forefinger, ii) reaching for and grasping a 7 cm diameter apple; iii) reaching for and grasping a vertical floppy disk.

Movements were recorded with an optoelectronic system at a sampling rate of 50 Hz. The kinematic parameters computed were: Movement Time (MT), Peak Velocity (PV), wrist extension and pointing accuracy. In both pointing and grasping tasks, patients showed a longer MT associated with a weaker PV compared to control subjects. Pointing errors were slightly more pronounced in the sagittal plan. In the grasping tasks, the main difference was observed for the wrist angle. During the transport phase, quadriplegic patients presented a more pronounced wrist flexion compared to control subjects. During the grasping phase, tetraplegic patients achieved a more important wrist extension known as “tenodesis effect”.

Active wrist extension in quadriplegic subjects occurs later after the onset of movement, unlike the early opening of the hand in control subjects, indicating that this grasp using tenodesis reflect an intentional compensatory mechanism.