1. ABSTRACT AND KEY WORDS

Thema: Using EMG for comparing correct technic of upper limb recovery phase in the front crawl.

Introduction: Our measurement is aimed to detect influence of muscles activity of the shoulder joint and back during the upper limb recovery phase in the front crawl. Monitoring and recording muscles activity by EMG inform about movement stereotype of our probands. We've tried to localized uncorrect activation oppossite to optimal muscle activity of (ex) competitive swimmer. Results of measuremens are used for correction of faulty upper limb recovery stereotype. Results should enlarged knowledge about technic of recovery and help in way of teaching both competitive and noncompetive swimmers, like students of FTVS UK (Fakulty of phyzical education and sport at The Charles University in Prague), which learns to swim in the age of adulthood.

Protocol and measurements: Muscles were selected acording recommendation of leader of my diploma dissertation Mgr. Daniel Jurák. The locations of the electrodes on the body were chosen acording to the recommendation of MUDr. David Pánek. Groups of muscles round shoulder joint were measured using EMG during the upper limb recovery phase in the front crawl. The EMG is synchronized with videorecorder. Both videorecord and EMG measurement were analysed by Noraxon EMG data software.

Results: Movement stereotypes of our probands are noticeably different. Proband with correct recovery phase activate these muscles in this secvention: M. Pectoralis dextra, it is a muscle of inner rotation. It helps to put upper limb to correct position at the begining of recovery. M. Deltoideus pars posterior dextra, (0- 0.2027sec); partialy M. Deltoideus pars anterior dextra gives impuls for movement above the surface. At the biginning of movement above the surface:

M. Deltoideus pars anterior, 0.0173 – 0.853sec; M. Obliques Externus hepls to fixate pelvis in correct position in order to improve condition for the recovery(0.0753 – 0.1833sec) ; pars caudalis M. Trapezius, 0.0853 – 0.5067sec and Mm. Lumbales sinistra and M. Pectoralis maior, 0.1953sec work till the end of recovery phase. At the time of projection of upper limb to the axis of shoulder joint are active: pars posterior M. Deltoidea dextra; then M. deltoideus pars anterior; M. Trapezius pars caudalis et cranialis. Activity of lumbal muscles on the right side is not significant.

Movement stereotype of second proband with uncorrect recovery phase activates these muscles: M. Deltoideus pars posterioris dextra, 0- 0.0500sec; together is activated M. Trapezius pars cranialis dextra, do 0.1193 sec; M. Pectoralis maior dextra; M. Trapezius pars caudalis; M. Obliques externus dextra a Mm. lumbales dextra, but activity of last two muscles is not significant. At the time when upper limb has no contact with surface are active: M. Trapezius pars caudalis 0.1507sec till the end of phase and M. Deltoideus pars posterior; M. Trapezius pars cranialis. At the time of projection of upper limb to the axis of shoulder joint are active (0.3180-0.4013sec): M. Deltoideus pars anterioris dextra; M. Pectoralis maior from 0.3373sec to 0.4433sec. Muscle activity of Mm. Lumbalis dextra and M. Obliques externus is not significant, which shows that proband is not able fixate the pelvis in correct position.

Key words: front crawl technic, recovery phase, muscle activation, electromyograph (EMG), electromyography analysis, electrodiagnostic, swimming technic, kinematic parametres, upper limb,swimming crawl.