MUSCULAR TIMING IN THAI-BOXING KICKS – A PILOT STUDY
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Introduction
Kicking is the most effective and spectacular technique in Thai-Boxe. A good, strong kick delivered on target can win the fight. For this reason it is important to analyse the activity of the muscles and its firing order during the kicks.

Aims
Main aim is to create a new method in which analyse the muscular recruitment strategy during the movement. The biomechanical events joined to Emg activity of gluteus medialis, rectus femoris and biceps femoris were looked within the kicker’s leg in relation to three different types of Thai boxing kick.

Materials
All kicks were analysed using the Vicon 460 IR led registration system, with 6 cameras (100Hz), connected with the Noraxon Telemyo 2400 Emg system (1000Hz).

Methods
A Thai Boxing instructor (25 yrs, 178 cm, 73 kg with 7 years of sport practising) was used as a subject. The participant completed 5 repetitions of each kick at maximum performance to a specific target. He kicked with his dominant leg at a punch-bag placed before him.

The middle, high and hatchet kicks were analysed. After qualitative analysis the best trial for each kick was selected. Considered epoch of execution is between the first activated muscle (onset) and the end of the last active muscle (offset) (2). We allocated the take-off (TKF) of the kicker foot, the hit (HIT) and the strike (STK). For each kick data were collected: Emg epoch between onset and offset, average and peak values of Emg (2), and the muscles firing order, the kick phase (considered between TKF and STK), time to hit (TKF to HIT), and the hit’s high. Three goniograms were analysed: flex-extens (FXH-EXH) and abduct-adduct (ABH-ADH) of the hip, flex-extens (FXK-EXK) of the knee.

Results
Middle kick showed 1 phases of ABH and 1 of ADH, 2 of FXH and 2 of EXH and 3 of FXK and 4 of EXK, Emg epoch is 2,72 sec. and TKF-HIT is 0,21 sec. The gluteus m. is the early recruited muscle and widely used (100% of Emg epoch) and the more engaged 0,088 mV.

High kick showed instead 2 phases of ABH and 2 of ADH, 3 of EXH and 2 of FXH and 3 of EXK and 3 of FXK. Emg epoch is 2,04 sec. and TKF-HIT is 0,24 sec. The gluteus m. is the early recruited muscle and the more engaged 0,126 mV. The biceps f. is the widely used (98%).

Hatchet kick showed 2 phases of ABH and 2 of ADH, 1 of FXH and 2 of EXH with one’s blockage between, and 3 of EXK and 2 FXK. Emg epoch is 2,84 sec. and TKF-HIT is 0,49 sec. The gluteus m. is the early recruited muscle, the more engaged 0,116 mV, and also the widely used (100%).

Conclusions
Middle and high kicks are more similar but different from the hatchet. Gluteus m. is the most important of the observed muscles in these kicks, than to consider with others proposed by (1). The activity of gluteus is higher in high kick. These results suggest that is possible using this method for a better analysis of different trials and movements.


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