KINEMATICS OF FOREHAND ATTACK ON ACCELERATED LOOP TECHNIQUES IN TABLE TENNIS - A CASE STUDY

Haifan Zhang and Yuqin Shi
Chengdu Institute of Physical Education, Chengdu, People's Republic of China

KEY WORDS: accelerated loop, EGM, swing time, swing distance

INTRODUCTION: Although the fast forehand attack style of Chinese players has secured for them a leading position in the table tennis world, the accelerated loop technique still presents a problem in competition. However, some elite Chinese forehand attack players have contended very well with players using the accelerated loop technique. This demonstrates that the forehand attack is an effective technique with which to overcome the "loop". From literature review, we found that cinematographical and electromyographical data on forehand attack on accelerated loop techniques was lacking. The purpose of this paper was to explore the technical characteristics of elite table tennis players performing forehand attack on accelerated loop techniques. In addition, the data collected for this study will provide biomechanical references for coaches and less experienced players.

METHODS: The subjects for this study included two Chinese elite table tennis players. NAC-16HD High-speed camera (Japan) operating at 500 frames per second was used to film the player's movement. The film materials were then digitized and analyzed on film motion analysis system (NAC HG-2000, Japan). Electromyography (EMG) signals of the anterior part of trapezius, extensor carpi iradialis longus, middle part of deltoid, anterior part of deltoid, greater pectoral, brachial biceps, round pronator and brachioradial were examined by eight-channel telemetry EMG system (China). A well-known table tennis player in China provided accelerated loop for subjects.

RESULTS AND DISCUSSION: Results of the analysis found that the total time that elapsed for the attack loop technique was 0.774s and 0.887s for the two players. The time of the drawing phase made up 62.9% and 71.2% of the total time respectively. The time of swing impact phase was 14.9% and 10.5% of the total time respectively. The time of follow through phase amount was 22.2% and 18.3% of the total time respectively.
The total swing distance of the two players was about 2.88m, and the distance distribution in three phases was quite similar. The distance of drawing, swing impact and follow through accounted for 33.2%, 28.9% and 36.9% of the total distance that the bat traveled, which was normally thought reasonable by the practitioners.
The instantaneous velocity of bat at the time of impact was 11.73m/s for the first player that was greater than the second player by 10.61m/s. However, in the swing impact phase and follow through phase, one player's average speed of swing was greater than that the other.
EGM signals showed that the order of muscle contraction followed the orderly principle for joint movements. The anterior part of trapezial muscle and the extensor carpi radialis longus muscle showed control pattern for the change of the joint angle of the upper arm and the grip posture respectively. The deltoid muscle seemed to be of mixed pattern. The remaining muscles showed explosive patterns in the swing impact phase.

REFERENCES:
Qiu, Z. (1982). *The Study of Modern Technique of Table Tennis*. Beijing, China: People's Sports Publishing House.