The relationship between speed and spin of serve and serve-return in tennis

Ryogo Kashiwagi[1], Shunsuke Murakami[2], Koki Numata[1], Shinya Iwanaga[1], Hiroo Takahashi[2],

[1]*Graduate school, National Institute of Fitness and Sports in Kanoya, Kagoshima, Japan*

[2] *National Institute of Fitness and Sports in Kanoya, Kagoshima, Japan,*

Introduction

The serve-return has become 1 of 2 most important shots, along with the serve, in the modern tennis game (Gillet et al., 2009). The purpose of this study was to clarify relationship between serve and serve-return in men's professional tennis players. This study is focused on speed and spin.

Methods

Trackman tennis radar (Trackman Inc., Copenhagen, Denmark) was used to collect the data. We installed two Trackman tennis radars to measure ball speed and ball spin on each side of the tennis court and analyzed the player's serve and serve-return. We analyzed 286 trials of 1st serve and 1st serve-return and 215 trials of 2nd serve and 2nd serve-return from 8 singles matches for 12 male professional tennis players in the ATP Challenger Tournament.

Results and Discussions

The 1st serve is significantly faster than the 2nd serve, and the spin is significantly lower (Table 1). This result is similar to the result shown in the previous study (Maquirriain et al., 2016, Sakurai et a l., 2013). Also, regarding the serve-return, the 1st serve-return is significantly slower than the 2nd serve-return, and the spin is significantly lower. (Table 1). This result show that 1st serve tends to reduce the speed and spin of serve-return, this is considered to be one of the factors that the 1st serve is said to have a higher winning rate than the 2nd serve (Macheri et al., 2016).

References

Gillet et al. (2009) A Notational Analysis of Elite Tennis Serve and Serve-Return Strategies on Slow Surface. Journal of Strength and Conditioning Research., 23(2): 532-539.

Macheri et al. (2016) The Serve Impact in Tennis: First Large-Scale Study of Big Hawk-Eye Data. Statistical Analysis and Data Mining: The ASA Data Science Journal., 9(5): 310-325.

Maquirriain et al. (2016) Male professional tennis players maintain constant serve speed and accuracy over long matches on grass courts. European Journal of sport science., 16(7): 845-840.

Sakurai et al. (2013) Ball spin in the tennis serve: spin rate and axis of rotation. Sports Biomechanics., 12(1): 23-29.

Table 1. Mean and standard deviation of serve speed and spin

	Speed (km/h)				Spin (rpm)			
	Mean	±	SD		Mean	±	SD	
1st Serve	179.5	±	14.3	*	2258.2	±	916.6	*
2nd Serve	147.5	±	10.8		3912.6	±	712.8	
1st Serve-Return	97.4	±	21.4	*	1512.0	±	939.3	*
2nd Serve-Return	107.9	±	17.4		1692.8	±	944.7	

*p<0.05