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Using technology in modern tennis: an insight into the practice of the world's top tennis player

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ABSTRACT

Investigating physical activity profiles of individual-sport practice and competition provides coaches with an understanding of the aspects of physical fitness that may influence match performance. In the present study, we tracked (1) the activity profiles in approximately a 30-minute period of practice of a top tennis player, and (2) the intensity of activity during predefined periods of practice match-play of the player. The player wore the GPS device (OptimEye S5, Catapult, Australia) during their on-court practice. It can be concluded that using technology in modern tennis could be of great help for coaches in order to avoid overtraining but also enables coaches to greatly improve the quality of feedback to their athletes.

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INTRODUCTION

On-court tennis training and match play involve prolonged, physically demanding activity profiles, resulting in substantial elevation of physiological and perceptual strain and reduced contractile function. Tennis players are expected to be in optimal condition during a large number of tournaments during the year, and there is no time for the "long" preparation period (Duffield et al., 2014). For this reason all the measurements that provide a quick feedback of performance are very beneficial. Early identification of high training load is critical for avoiding overtraining (Hagger & Chatzisarantis, 2005). There are many monitoring devices in elite sport, with many coaches using them to enhance performance and mitigate injury risk. In general, using technology in sport could be very useful in analysis of sport performance and enabling coaches to greatly improve the quality of feedback to players/athletes, but also increase accuracy in time measurements of sport performance. However, fewer studies to date have focused on quantifying activity profiles during the practice of top tennis players. In the present study, the experiments investigated (1) activity profiles in approximately a 30-minute period of practice of a top tennis player, and (2) the intensity of activity during predefined periods of practice match-play of the player.

METHODS AND PROCEDURES

The subject in this study was an elite male player who was top 10 in the world while this study was conducted (The Association of Tennis Professionals ranking list, December, 2016). He gave consent in accordance with the requirements of the Declaration of Helsinki. The study was performed during the winter off-season (November and December, 2016). The preparation period was marked by a fairly large amount of conditioning trainings (i.e., jogging, endurance, tennis, strength and power training).

Movement was recorded using a GPS unit (OptimEye S5, Catapult Innovations, Melbourne, Australia). The GPS unit included a tri-axial accelerometer and gyroscope sampling at 100 Hz, which provided information on player load and volume of explosive efforts. The unit was worn in a small vest, on the upper back of the player.

RESULTS

The summary of time-motion analyses is presented in Table 1. In general, the figures seem to be very constant during the observed period. A total player load of 133 units during the period of 30-minutes with an average player load per minute of 4.75 units (Picture 1) can be observed. It is interesting to note that the player performed a high number (302) of low explosive efforts (locomotive movements) comparing with medium (rallying groundstrokes) and high explosive efforts (drives) (Picture 2). Interestingly, there are very few jumps, especially low jumps during the practice match-play (Picture 3).

	Total player load	Player load per minute	Total explosive efforts / min	High explosive efforts	Medium explosive efforts
Game 1	36	4.33	12.75	12	21
Game 2	23	4.94	18.13	13	19
Game 3	29	5.21	17.73	15	22
Game 4	45	4.54	17.11	22	32
Total	133	19.02	65.73	62	94

	Low explosive efforts	Total jumps	Medium jumps (20-40cm)	High jumps (>40cm)
Game 1	72	1	0	0
Game 2	52	2	1	0
Game 3	62	2	0	0
Game 4	116	5	2	0
Total	302	10	3	0

Table 1. Summary of time-motion analyses.

DISCUSSION

The preparation period of the top tennis player provided a unique opportunity to evaluate activity profiles that occur during prolonged high intensity activities. The objective of this study was to investigate the (1) activity profiles in approximately a 30-minute period of practice of a top tennis player, and (2) the intensity of activity during predefined periods of practice match-play of the player. The results of some previous studies demonstrate that compared with more successful players, less successful players covers greater total distance, perform more high-intensity running, and are involved in a greater number of repeated high-intensity effort bouts (Austin, Gabbett, Jenkins, 2011; Gabbett, 2012). Therefore, some findings suggest that greater amounts of high-intensity activity and total distance are not related to success in elite sport (Gabbett, Jenkins, Abernethy, 2012; Hulin et al. 2015). Hulin et al. (2015) suggest that a greater number of collisions are linked with a greater rate of success in elite rugby league teams. As a result, our findings are of importance to coaches and sport scientists when interpreting time motion analyses, as our results may indicate that overall technical and tactical effectiveness of the player rather than greater running workloads may indeed be a greater determinant of success.

Recognition of physiological and psychological factors contributing to the development of performance, therefore, would be of particular value for those administering training routines (Terry, 2000). This type of practice activity tracking using the GPS technology could be very beneficial for fitness and tennis coaches for avoiding symptoms of decreased performance or overtraining. Also, using technology could be useful in analysis of sport performance and enabling coaches to greatly improve the quality of feedback to athletes, but also increase accuracy in time measurements of sport performance. It is, however, also worth pointing out that the sample size in this case study is too small to produce a clear picture, however, it is still considered important and beneficial to measure these changes during the preparation period.

CONCLUSION

Tennis today requires the tennis player to have a very high level of readiness. At the same time, one must be aware that the stress of overtraining may lead to the development of "staleness" (Ryan, 1983; Morgan et al., 1987). The GPS technology could be very beneficial tool to track activity profiles of tennis players especially during high intensity sessions. Additional studies are needed to identify interventions that can increase performance with the ultimate goal of achieving healthier athletes.

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