

Analysis of the serve and the serve return in Squash at the men's elite level

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Abstract:

Serving and receiving players have various possibilities of how and where to play their shot. The aim is to find out frequency and the most effective types of the serve and returns in professional squash. We have observed and analysed 15 matches involved in the tournament of the PSA World Series (Professional Squash Association) - Canary Wharf Squash Classic 2014. Notational analysis was based on shots type in the first two shots of the rally; i.e. a serve type, a return type including its placement, and the effectiveness (the relation of the serve and the return to the result of the rally). In 83% players used a forehand sidewall serve or a backhand sidewall serve with similar effectiveness, while they more often served from the right side of the court. Players received the serve on the volley in 72% (42% effectiveness), compared with receiving the serve after the bounce (37% effectiveness). The received ball was returned to the back court in 80%, 54% out of that was a straight drive, 46% was a cross-court drive, and the ball was more often directed to the opponent's backhand side (61%). From the player's angle of view, a more effective return shot was directed to the back left-hand corner (i.e. to the opponent's backhand side). When receiving on the right side, a shot played to the back left-hand corner (from the player's view) is more effective by 10% than a straight drive, which is, however, used more frequently despite its lower effectiveness. Coaches and players should know this kind of information and use more frequently a cross-court drive to the back court as a return shot than a straight drive to the back court in training and matches.

Key words: tactics, strategy, rally, sports games, notational analyses.

Introduction

Both the serve and the serve return in squash affect the whole rally. Data of strategy and tactics are important, and can help coaches and players to better understand and prepare a strategy for the match. Athletes must often make quick decisions and respond to activities of the opponent (Balkó et al., 2016a; Balkó et al., 2016b). However, the squash serve is not as deciding as e.g. the tennis serve, because in elite matches a squash player rarely wins a rally by the serve winner (Strnad, 2015). Huges et al., (2007) state that an average number of shots in a squash rally, at an elite level, is 13. Notational analysis and performance indicators in sports games are often dealt with in different studies (e.g. Abian-Vicen et al., 2013; Carboch et al., 2013; Hong & Tong, 2000; Laffaye et al., 2015), or in squash itself (Ghani et al., 2016; Hong et al., 1996; Hughes & Francks, 1994; or Hughes & Barlett, 2002). With regard to the above mentioned average number of shots in a rally, squash studies rather deal with shot combinations, or placement and types of all shots during the match (Vukovič et al., 2013).

There are several serve types in squash (Strnad, 2015; Šácha, 2006; Yarrow & Harrison, 2009). However, a properly chosen and well played serve can get the opponent in a disadvantageous situation and make his return shot harder (e.g. by a low bounce, or by the ball flying close to the wall). The serve return is essential for gaining the position on T and initiative, which determines the whole rally (Süss & Matošková, 2003; Valenta, 1996). The receiving player has several possibilities of how to return the opponent's serve: basically he can hit the ball after the bounce or hit a volley; he can use a drop shot return to the front court, or drive return to the back court (both straight or cross-court). Another possibility is to play the boast (i.e. the ball hits a side wall first, and then the front wall) (Griffin, 2014). The authors agree that return by the defensive boast is the least suitable (Šácha, 2006; Yarrow & Harrison, 2009). On the contrary, the most effective way is to receive the ball on the volley and play a straight drive return or cross-court drive return to the back corner (Griffin, 2014; Yarrow & Harrison, 2009).

Regarding strategy and tactics, in squash we distinguish an offensive and defensive play style. Hong et al. (1996) says that the most important strategy in elite male players is "a pressure and offensive play". Players place their shots into the back left-hand corner, but there are tactical differences in the shot choice depending on the player's position in the court and the length of time available for the shot (Vukovič et al., 2013). On the other side, in elite women's matches there is a combination of both, offensive and defensive play styles (Ghani et

al., 2016; Hong et al., 1996). Hughes & Robertson (1998) analysed the serve and return, however, they managed to obtain data just from 4 matches.

The above mentioned studies dealt only with the ratio of single shots, their placement, and their various combinations. However, they did not focus in detail on the first two shots in the rally (except for Hughes & Robertson, 1998). The purpose of this study is to analyse serve types and their returns, used by elite players, in relation to the result of a rally. The aim is to find out frequency and the most effective types of the serve and returns in professional squash.

Material & methods

Participants

In this study, we observed all 15 matches (8 matches in the 1st round, 4 quarter final matches, 2 semi-final matches, and the finals match) of the tournament PSA World Series (Professional Squash Association), Canary Wharf Squash Classic 2014. Altogether, we analysed 1072 rallies (points). The players had average PSA world ranking 19.6 ± 13.5 ; and age 24.5 ± 3.4 years. The research sample included 16 players (4 players out of 16 were left-handed). In 6 matches a left-handed player played against a right-handed one, and in 9 matches all players were right-handed. This study was approved by the Ethics Committee of the Faculty of Physical Education and Sport, Charles University.

Procedures

In this notational analysis we observed a serve type, a type and direction of the return shot, and the rally result in a squash match (see details below). We obtained all the video recordings on the internet (available at: www.youtube.com). A camera placed behind the back wall was recording the whole court towards the front wall. Quality of the video was considered suitable for a video analysis. Recording of the notational analysis was made into a category system prepared in advance. In each rally, we recorded by using expert evaluation, the serve type (Strnad, 2015) - a forehand sidewall serve (FS), a forehand hard serve into the nick (NS), a forehand hard middle serve (HM), a forehand high back wall serve (FB), a lob serve (LS), and a backhand sidewall serve (BS); the side of the serve (serve from the right or left service box); the return type (on the volley, after the bounce); the placement of the return shot (straight drop shot return to the front court; cross-court drop shot return to the front court; straight drive return to the back court; cross-court drive return to the back court; boast); the third shot in the rally (i.e. the second shot of the server) – forehand or backhand; and the rally result, as the referee announced: a point for the server, a point for the receiver, or “let” (replay of the point).

Data analyses

The expert rater had 12-year player’s experience in squash at a competitive level, and 7-year coach’s practice. The rater could stop the video record any time, or replay it a few times so that he could properly define the observed variables. Data were assessed by means of frequency analysis in absolute and relative values and by percentages in software MS Excel 2010. We assessed 5 matches again due to defining the intrarater’s reliability. Those data were then compared with the first measurement results. Consequently, the intrarater’s reliability was defined by means of the reliability test Cohen’s Kappa (Ghani et al., 2016; McHugh, 2012).

The analysis of the intrarater’s reliability reached a total value of Kappa 0.926. Single values were as follows: the side of the serve 1.00 (no error); the serve type 0.795; the return type (on the volley, after the bounce) 0.975; the return shot placement 0.897; the third shot of the rally (forehand, backhand) 0.907. We consider the total reliability as excellent and reliable for the consequent analysis (McHugh, 2012).

Results

Players used different types of the serve (Table 1). The most frequently used serve types were FS and BS.

Table 1. Frequency and effectiveness of serve types.

Serve type	Total	Point for server	Let	Point for receiver
FS	463 (42.7%)	191 (41.3%)	83 (17.9%)	189 (40.8%)
FN	38 (3.5%)	19 (50.0%)	5 (13.2%)	14 (36.8%)
HM	54 (5.0%)	19 (35.2%)	19 (35.2%)	16 (29.6%)
FB	11 (1.0%)	6 (54.5%)	0 (0.0%)	5 (45.5%)
LS	73 (6.7%)	40 (54.8%)	7 (9.6%)	26 (35.6%)
BS	433 (39.9%)	173 (40.0%)	81 (18.7%)	179 (41.3%)

Legend: FS - forehand sidewall serve; NS - forehand hard serve into the nick, HM - forehand hard middle serve; FB - forehand high back wall serve; LS - lob serve; BS - backhand sidewall serve.

Players more often served from the right service box, in 59% of all gained points. Gaining a point by the server who served from the right service box took place in 42%, and in 41% after serving from the left service box, “let” took place identically in 18% cases at serving from either side, and the server gained a point in 39%

cases when he served from the right side, and in 41% cases when he served from the left side. The use of different serve types and their effectiveness is shown in Table 2.

Table 2. The frequency and effectiveness of the serves according to the service sides.

Serve type	Right service box				Left service box				
	Total	Point for server	for Let	Point for receiver	Total	Point for server	for Let	Point for receiver	
FS	168 (15.5%)	71 (42.3%)	34 (20.2%)	63 (37.5%)	293 (27.0%)	119 (40.6%)	49 (16.7%)	125 (42.7%)	
FN	23 (2.1%)	9 (39.1%)	4 (17.4%)	10 (43.5%)	15 (1.4%)	10 (66.7%)	1 (6.7%)	4 (26.7%)	
HM	29 (2.7%)	10 (34.5%)	12 (41.4%)	7 (24.1%)	25 (2.3%)	9 (36.0%)	7 (28.0%)	9 (36.0%)	
FB	4 (0.4%)	3 (75.0%)	0 (0.0%)	1 (25.0%)	7 (0.6%)	3 (42.9%)	0 (0.0%)	4 (57.1%)	
LS	54 (5.0%)	31 (57.4%)	4 (7.4%)	19 (35.2%)	19 (1.8%)	9 (47.4%)	3 (15.8%)	7 (36.8%)	
BS	352 (32.4%)	141 (40.1%)	63 (17.9%)	148 (42.0%)	81 (7.5%)	32 (39.5%)	18 (22.2%)	31 (38.3%)	

Legend: FS - forehand sidewall serve; NS - forehand hard serve into the nick, HM - forehand hard middle serve; FB - forehand high back wall serve; LS - lob serve; BS - backhand sidewall serve.

Players mostly received the serve on the volley, in 72%. When the ball was received on the volley, the server gained a point in 40% cases, “let” took place in 18%, and the receiving player won 42% rallies. When the ball was received after the bounce (28% rallies), the server won the rally in 43% cases, “let” took place in 20%, and the receiving player won 37% rallies (Table 3). The most frequent serve return is hitting the ball to the back court, particularly, using the straight drive (Table 4). Table 5 then shows the direction of the serve return from the right and left sides of the court, including their effectiveness leading to winning a rally.

Table 3. The type of return and its effectiveness against single types of the serve.

Serve type	Volley return				Return after ball bounce				
	Total	Point for server	for Let	Point for receiver	Total	Point for server	for Let	Point for receiver	
FS	334 (30.8%)	127 (38.0%)	59 (17.7%)	148 (44.3%)	123 (11.3%)	59 (48.0%)	23 (18.7%)	41 (33.3%)	
FN	22 (2.0%)	13 (59.1%)	3 (13.6%)	6 (27.3%)	15 (1.4%)	6 (40.0%)	1 (6.7%)	8 (53.3%)	
HM	21 (1.9%)	7 (33.3%)	9 (42.9%)	5 (23.8%)	31 (2.9%)	11 (35.5%)	10 (32.3%)	10 (32.3%)	
FB	11 (0.9%)	5 (50.0%)	0 (0.0%)	5 (50.0%)	1 (0.1%)	1 (100%)	0 (0.0%)	0 (0.0%)	
LS	50 (4.6%)	31 (62.0%)	4 (8.0%)	15 (30.0%)	22 (2.0%)	8 (36.4%)	3 (13.6%)	11 (50.0%)	
BS	323 (29.8%)	126 (39.0%)	58 (18.0%)	139 (43.0%)	103 (9.5%)	43 (41.7%)	21 (20.4%)	39 (37.9%)	

Legend: FS - forehand sidewall serve; NS - forehand hard serve into the nick, HM - forehand hard middle serve; FB - forehand high back wall serve; LS - lob serve; BS - backhand sidewall serve.

Table 4. Direction and effectiveness of the serve return-overall (both serving sides).

Return direction	Total	Point for server	Let	Point for receiver
SF	89 (8.2%)	36 (40.4%)	16 (18.0%)	37 (41.6%)
CF	60 (5.5%)	22 (36.7%)	8 (13.3%)	30 (50.0%)
BS	472 (43.5%)	204 (43.2%)	92 (19.5%)	176 (37.3%)
BC	396 (36.5%)	160 (40.4%)	67 (16.9%)	169 (42.7%)
B	23 (2.1%)	6 (26.1%)	5 (21.7%)	12 (52.2%)

Legend: SF – straight drop shot return to the front court; CF – cross-court drop shot return to the front court; SB - straight drive return to the back court; CB – cross-court drive return to the back court; B – boast.

Return of the serve was directed to the opponent’s forehand in 39% (a point gained by the server in 45%, a point gained by the receiving player in 39%, in the remaining cases there was a “let”). The server played his third shot backhand in 61% (a point for the server in 42%, for the receiving player in 38%).

Table 5. Direction of the serve return and its effectiveness on the right and left sides of the court.

Return direction	Receiving on right side				Receiving on left side			
	Total	Point for server	Let	Point for receiver	Total	Point for server	Let	Point for receiver
SF	59 (5.4%)	25 (42.4%)	11 (18.6%)	23 (39.0%)	30 (2.8%)	11 (36.7%)	5 (16.7%)	14 (46.7%)
CF	27 (2.5%)	12 (44.4%)	3 (11.1%)	12 (44.4%)	33 (3.0%)	10 (30.3%)	5 (15.2%)	18 (54.5%)
BS	319 (29.4%)	140 (43.9%)	65 (20.4%)	114 (35.7%)	152 (14.0%)	63 (41.4%)	27 (17.8%)	62 (40.8%)
BC	194 (17.9%)	72 (37.1%)	33 (17.0%)	89 (45.9%)	201 (18.5%)	88 (43.8%)	34 (16.9%)	79 (39.3%)
B	9 (0.8%)	3 (33.3%)	2 (22.2%)	4 (44.4%)	14 (1.3%)	3 (21.4%)	3 (21.4%)	8 (57.1%)

Legend: SF – straight drop shot return to the front court; CF – cross-court drop shot return to the front court; SB - straight drive return to the back court; CB – cross-court drive return to the back court; B – boast.

Discussion

The purpose of this study is to analyse types of the serve and their occurrence, which are used by world elite squash players, in relation to the result of a rally. The results showed that in most cases players use a FS, or BS. Both serve types reached similar effectiveness for the serving player (41% FS, 40% BS). Players usually try to receive the served ball on the volley (effectiveness 42%), compared with receiving the served ball after the bounce (effectiveness 37%). Return of the serve was directed to the back court in 80% cases.

The most frequently used serve is the FS (43% of all serves) and the BS (40%). Although the backhand serve might not be so forceful, the chance to easily get a position in the middle of the court is a very important factor for the rest of the rally.

The serve effectiveness in squash in men reached 40%, compared to that, Hughes (1995) reported effectiveness of 54% in winners, and 43% in losers, however, these data are rather outdated. Compared with tennis, the squash serve does not gain such an advantage for the server, where it ranges from 52% to 72% depending on the court surface, and whether it is the first or the second serve (Carboch et al., 2014; Katic et al., 2011). In the HM, "let" appeared most often, compared to other serve types. Players try to serve mainly from the right service box. Results show a ratio of approximately 1,5 : 1 between the serve from the right and the left service boxes.

The higher frequency of a serve played from the right service box shows that players tend to direct their serve to the left part of the court (i.e. usually the opponent's backhand side to make him receive the ball by backhand). Hughes & Robertson (1995) stated that players most often played a hard serve (167 in total), a lob serve (149), and a medium fast serve (100). In elite squash, serves that prevail are the FS and the BS (from the right service box in the right-handed players, and vice versa) due to the chance to easily get a position in the middle of the court. Another serve, relatively less frequent (only 73 out of 1072), was the LS, which means a much lower proportion of this serve type in play than reported by Hughes & Robertson (1995). Our results show its use predominantly from the right service box, which might mean that the serving player rather wants to benefit from the opponent's return performed by backhand played on the volley.

The most frequent return of the serve is the straight drive (52% of the serve returns). The serve return was performed on the volley. 80% of all return shots were directed to the back court, 56% out of those were played straight. Hughes & Robertson (1995) reported higher effectiveness in the serve return played by a cross-court drive to the back court. In our study, return by the cross-court drive to the back court reached effectiveness of 43%, and return by the straight drive to the back court reached effectiveness of 37%. With regard to effectiveness, the best choice for the receiving player is to execute the return on the volley and cross-court to the back court (Yarrow & Harrison, 2009). The serve return was more often directed to the opponent's backhand side. Although boast return was highly effective by the receiving player, it is used minimally, as it is considered the least suitable from the tactical view (Šácha, 2006; Yarrow & Harrison, 2009).

When using less frequent serves, i.e. LS, NS, and FB, the serving player reached a higher effectiveness. It is not clear, if it is caused by a certain type of the serve, or as a consequence of an unexpected variant for the receiving player. In the LS and in the NS, the receiving players reached a pointedly higher effectiveness (52%) if they received the ball after the bounce (if they received on the volley, effectiveness was 29%). However, players received that serve on the volley in 68%. That might indicate that players were surprised at that type of serve, and might have been ready to receive a FS instead.

When receiving the ball on the right side of the court, it is the most beneficial to play the ball cross-court drive to the back court (effectiveness is higher by 10% than when played straight). Receiving the ball on the left side of the court and playing either straight or cross-court drive to the back court shows equal effectiveness. That might indicate that it is more beneficial for players to direct the strike to the opponent's backhand side. Hughes & Robertson (1995) claim that a straight return makes the server move across the whole court, ideally into the backhand corner. The cross-court return might cause a wrong position of the server, and reverse the "pressure" in favour of the receiving player. Vukovič et al. (2013) state that majority of shots are played from the back left-hand corner of the court.

This study was limited by the fact that there were 6 matches in the research sample in which a left-handed player played against a right-handed player. That partially limits the tactical information about whether the player intentionally directed his serve to the opponent's forehand or backhand side. Nevertheless, we have got this information concerning return of the serve. However, these results still provide interesting information. Next studies might deal with comparing frequency and effectiveness of shots in a match between two left-handed players, or between a right-handed player against a left-handed one, and vice versa.

Conclusion

The elite squash players use predominantly two types of the serve – the FS and the BS, which is better for the receiving player to play on the volley. On the other side, the LS and the NS, which can act as a form of surprise, is better to receive after the bounce. Players serve from the right side of the court more often. The most frequently used serve return is a straight drive to the back court. However, a cross-court drive return to the back court was more effective shot of the serve return, especially, when a player was receiving the serve on the right side of the court. These results indicate a tendency that players try to aim the ball towards the opponent's backhand side. At the men's elite level, a return shot played to the back left-hand corner of the court can be more

effective, especially when played from the right side. Coaches and players should know this kind of information, and when receiving a serve played from the right side of the court, players should use more often a cross-court drive as a return shot than a straight drive, both in training sessions and matches.

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