OBSERVATIONAL ANALYSIS OF WOMEN WATER POLO PLAYERS IN THE OLYMPIC GAMES OF LONDON 2012

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Fecha recepción 13 Diciembre 2016 / Fecha aceptación: 6 Febrero 2017

ABSTRACT

Game analysis has been traditionally used in water polo to improve the preparation of players and thus enable better results to be obtained in the competition. The goal of the current study was to analyse the shots performed during women’s water polo matches during the Olympic Games in London 2012, according to the outcome of the match in terms of winning or losing, in order to discover possible patterns linked to the outcome of the match. The results showed that the tactical behaviour of winners was characterized by the use of the ‘M’ defensive arrangement and throws from the central position in even situations, the use of other types of shots as pat-downs in power-play situations, and the execution of a greater number of counterattacks than loser teams. It is concluded that coaches should use 3:3 tactical systems in even situations to maximize effectiveness, and to use the ‘M’ defensive arrangement to prevent this attack. Moreover, teams should use their advantage over a weak defence, striving to steal the ball from the opposite team and then to initiate a counterattack that could result in scoring a goal.

Key words: Water polo, Olympic Games, shot, tactical system, observational analysis.

RESUMEN

El análisis de los partidos en waterpolo se ha utilizado tradicionalmente para mejorar la preparación de los deportistas y ser capaces de obtener mejores resultados en competición. El objetivo del presente estudio fue analizar los lanzamientos realizados en los partidos de waterpolo femenino durante los Juegos Olímpicos de Londres 2012 en función del resultado de ganador o perdedor del partido para descubrir posibles patrones asociados a la victoria del mismo. Los resultados del presente estudio mostraron que el comportamiento táctico de los equipos ganadores era diferente al de los perdedores en la utilización de la defensa en M y los lanzamientos desde la posición central en las situaciones de igualdad numérica; la realización de otros tipos de lanzamientos en las situaciones de superioridad numérica y la realización de un mayor número de contraataques que los equipos perdedores. Se concluye que los entrenadores deberían emplear el sistema táctico de 3:3 en situaciones de igualdad ya
que parece ser el más efectivo, utilizando la defensa en M para detener dicho ataque. Además, los equipos deberían aprovechar las defensas débiles para robar el balón al equipo contrario e iniciar así un contraataque que finalice con la consecución de gol.

**Palabras clave:** Waterpolo, Juegos Olímpicos, lanzamiento, sistemas tácticos, análisis observacional.

**INTRODUCTION**

Water polo is a water sport which was invented during the second part of the 19th century in Great Britain, and was derived from aquatic polo, in which athletes play on a barrel (Lloret, 1998; Smith, 1989). Water polo was included in the Paris Olympics of 1900 as exhibition sport for males; however, women’s water polo became an Olympic sport one century later in Sydney (2000) (Annett, Fricker, & McDonald, 2000; Lloret, 1998; Smith 1998). This sport is becoming increasingly popular, and the number of federative licences rises each year. This increase in the number of licences and teams has motivated researchers to focus on the study of water polo (Argudo, Arias, & Ruiz, 2009) from different perspectives, such as physiological (i.e., Botonis, Toubekis, & Platanou, 2015), psychological (i.e., Thanopoulos 2006), biomechanical (i.e., Stirn & Strojnik 2006) or technical/tactical (i.e., García, Argudo, & Alonso, 2012; Tucher et al., 2014).

It appears that the technical/tactical perspective has had more impact within the scientific literature (Argudo, Ruiz, & Alonso, 2008). This could be due to the fact that since the beginning of this sport (the first regulation created was by Wilson in 1876), several modifications to the regulations have been introduced to make it more attractive. The first of these was the physical revolution in 1949, in which the static game was eliminated, thus leading to a more dynamic game that favoured fast, resistant players. The second revolution was a technique in 1966 whereby the penalty shot was included, demanding better offensive shots and stops for defensive players when both teams have similar physical abilities. After the Montreal Olympics, a tactical revolution appeared, since the players had similar technical and tactical abilities; it was necessary to establish offensive and defensive variants as well as the use of strategies to win the game (Lloret, 1998). Since the last revolution, it has appeared to be necessary to establish technical strategies to defeat an opponent.

Today, according to the regulations, a water polo match consists of four eight-minute quarters in which two teams of six field players and a goalkeeper play matches in a 25 x 20 m court. However, the number of players can vary according to the situation of the match (even or uneven) (Lupo, Tessitore, Minganti, & Capranica, 2010). Even situations are those in which the number of offensive and defensive players are equal, while the opposite situation (an unequal number of players) represents an uneven situation as a power-play, caused by the exclusion of players during 20 s counterattacks and transitions (Lupo et al., 2009, 2010, 2011). The transition is a situation where an offensive player is playing away from the zone of defensive arrangement and the other offensive players (Lupo, Condello, Capranica and Tessitore, 2014). Normally this player has possession of the ball and waits while the rest of their teammates advance towards the opposite goal to start a positional attack (Argudo, Alonso, García, & Ruiz, 2007b). Finally, a counterattack can be defined as a rapid transition, strategically occupying free space to create numerical superiority (Argudo et al., 2007b); an opportunity arises to score, particularly if defensive players are not able to stop offensive players in a transition to the opposite goal (Lupo et al., 2011, 2014).

Depending on the situation of play, players may be in a better position or have more opportunity to score. Lupo et al. (2010) found that left-hand-side positions (Positions 4 and 5) and centre
forward (Position 6) were better for players in even situations (Lupo et al., 2010). This could be because skilled players tend to play in these positions (4 and 5) because they have a better or more accurate shot, in addition to a better angle for shooting towards the goal. On the other hand, the centre forward is in central position and is a shorter distance away from the goal. In contrast, players in Positions 1, 2 and 3 appear to score more goals in situations of counterattack or numerical superiority (Lupo et al., 2010).

In a previous study, Lupo et al. (2011) highlighted the differences in situations depending on success (winning vs. losing), being losers who involved a greater number of players than the winners in situations of numerical equality. Likewise, winners made a greater number of shots from the five-metre area than losers did. This indicates the better technical-tactical skill of the winners, who were able to create opportunities to score goals. In counterattacking situations, winners performed a greater number of direct shots (without fakes), which also suggests the greater ability of winners to create a rapid and effective completion of play. As in situations of numerical superiority, players carry out a series of passes and movements to create the opportunity to score goals. In this sense, the ability to perform a greater number of fast passes that result in a goal determines the difference between winners and losers in a water polo match (Lupo et al., 2011).

In view of these aspects, the analysis of players’ behaviour in terms of their success may allow coaches to understand the behaviour of the winners and help them to simulate this behaviour during training periods, in order to win future matches. Therefore, the aim of the present investigation was to analyse the shots made during the matches at the Olympic Games of London 2012, with regard to the situation of play and success in the match, in order to discover possible patterns associated with the victory of one team.

**METHOD**

**Variables**

The variables used in the present study related to shots were: (1) the situation, (2) the offensive arrangement, (3) the defensive arrangement, (4) previous action before the shot, (5) the shooter, (6) the type of shot, (7) the zone of the goalkeeper with respect to the goal posts, (8) the zone of the goal where the shot is thrown, and (9) the outcome.

Regarding the situation, the numerical equality (even), numerical superiority as a power-play (due to the exclusion of a defensive player), transitions and counterattacks were considered in the current research. In terms of the offensive final arrangement, systems of 3:3 and 4:2 were considered in even situations. In the even 3:3 system, there are three players along the two-metre line (two players in front and external with respect to the posts of the opposite goal, and one centre forward) and the other three players at the five-metre line (two players in front of the opposite goal and one centre player). In a 4:2 arrangement, there are two attackers in front along the two-metre line, generally the centre forward and a second centre forward, and two players externally (wing) with respect to the posts of the opposite goal, while at the five-metre line there are two players in front of the posts of the opposite goal (flats) (Lupo et al., 2011) (Figure 1).

In power-play situations, there is a slight change with respect to an even situation; players may be oriented towards one side of the court to facilitate the entrance of players who are in another part of the court, as in the case of the 3:3 system (Lupo et al., 2014). However, this arrangement may vary to include a semicircle, or the right or left side of the court, according to the position occupied by the team’s best shooters (García et al., 2012). In case of the 4:2
system, players at five-metre line are try to move away to find a better angle for shooting towards the goal; both aim to score a goal (Figure 2). An additional category called “others” was included for transition and counterattack situations where no tactical system is defined.

With regard to the defensive arrangement, this also varies according to situations of equality or numerical superiority. Following Lupo et al. (2014), in equality situations the types of defence established were: (1) pressured (Figure 3a), (2) zone 1-2 (Figure 3.b), (3) zone M (Figure 3.c.), (4) zone 2-3-4 (Figure 3.d), and (5) zone 4-5 (Figure 3.e).

Figure 1. Offensive positions in 3:3 and 4:2 arrangements in even (Adapted from Lupo et al., 2014)

Figure 2. Offensive positions in 3:3 and 4:2 arrangements in power-play, respectively (Adapted from Lupo et al., 2014).

Figure 3. Defensive arrangements in even situations (Adapted from Lupo et al., 2014).
As in offensive arrangements, there is also a different defensive arrangement in power-play situations in water polo; these differentiate between cluster, where players are placed in front of the opposite goal, all raising their arms at once (Figures 4a and 4b according to the offensive arrangement), and anticipating, where defenders are placed among players in a dynamic situation to try to steal the ball (Figures 4c and 4d depending on the tactical offensive arrangement) (Lupo et al., 2014). Pre-shot actions can influence the outcome of the shot (e.g., entrances). Therefore, the following variables were considered: (1) a shot, (2) a pass, (3) an entrance and (4) a foul, taking into consideration the possible roles of the offensive players (Lloret, 1998).

Identifying the player that is going to shoot and the type of shot that is going to be performed is important for goalkeepers to position themselves in the goal and to be able to stop the shot. The six possible player positions were taken into account: (1) P1 (left-hander wing), (2) P2 (left-hander flat), (3) P3 (centre or point), (4) P4 (right-hander flat), (5) P5 (right-hander wing), and (6) P6 (centre forward) (Lupo et al., 2010) (Figure 5). It should be noted that some authors consider that this system works in inverse order (e.g., Snyder, 2008). The types of shot analysed were: (1) drive, (2) back, (3) off-the-water, (4) bounce, (5) lob (Argudo, García, Alonso, & Ruiz, 2007a; Lupo et al., 2010, 2011, 2014) and (6) others. The position of the opposite goalkeeper at the time of the shot was categorized as: (1) centre, (2) right, and (3) left.

In line with previous studies in other sports such as football (e.g., Palau, López-Montero, & López-Botella, 2010), it appears to be important to know the trajectory of the ball, so that the goalkeeper can stand in the goal; for this reason, the goal was divided into: (1) Z1
(upper right), (2) Z2 (lower right), (3) Z3 (lower centre), (4) Z4 (lower left), (5) Z5 (upper left) and (6) Z6 (upper centre), while (7) ‘other zones’ was the indicator used for shots which had been blocked but where the ball’s trajectory could not be observed. Finally, the outcome of the shot was divided into: (1) goal, (2) post/crossbar, (3) outside, (4) stopped by the goalkeeper, and (5) blocked by the players (Argudo et al. 2007a, 2007b; Escalante et al., 2013, Tucher et al., 2014).

Sample

Nineteen matches of the Olympics Games (London, 2012) were analysed according to the situation of play (even, power-play, transition and counterattack) and match success (winners and losers). National team players train six to nine times per week in 120 minute sessions (these sessions do not include gym sessions, which can range from two to five times a week) (Lupo et al., 2014).

Data analysis

Following the methodology used in previous studies, only one experienced observer analysed all the videos (Lupo et al., 2009, 2011, 2015; Tucher et al., 2014). To assess the reliability and consistency of the observations carried out, the observer scored a single match twice, obtaining values of agreement (Cohen’s kappa) which were higher than .80 (García et al., 2012; Alcaraz et al., 2012). A descriptive analysis (mean and standard deviation) was performed for each of the variables mentioned above. A t-test for independent samples was used to show the differences between winners and losers in each play situation (numerical equality, numerical superiority, transition and counterattack). Statistical analyses were carried out using SPSS v.23 (Institute Inc., Cary, NC), establishing the significance level at $p \leq .05$.

RESULTS

The results of the present study are shown in Table 1. In even situations, significant differences emerged in terms of success in the ‘M’ defensive arrangement ($t = 2.345; p = .02$), in a central role ($t = 2.339; p = .02$), pass previous action ($t = 2.562; p = .01$), foul ($t = 35.474; p = .02$) and goal ($t = 29.994; p < .001$) in the 3:3 final arrangement. Non-winners presented lower values of these variables than winners. In the 4:2 final arrangement, a difference was found between winners and non-winners only in terms of the blocked shot ($t = -2.592; p = .01$) and consequently in the ‘other’ goal trajectory ($t = 21.530; p = .04$) which was linked with blocked shots; winners had fewer blocked shots than losers.

A main effect was found in the ‘other’ type of shot ($t = 2.15; p = .04$) in the power-play situation in the 3:3 final arrangement; winners used more of these types of shot than losers. No differences were found in the power-play situation in the 4:2 final arrangement. No effect was found in shots performed during transition. A main effect was found in the ‘other’ final arrangement ($t = 2.323; p = .03$), central goalkeeper position ($t = 2.966; p < .001$), displacement previous action ($t = 2.181; p = .04$), P6 (centre forward) ($t = 2.899; p = .01$) and Z3 ($t = 2.177; p = .04$). Non-winners performed fewer actions in terms of counterattacks and fewer displacements compared to winners; furthermore, non-winners used the ‘other’ type of defensive arrangement more than winners. Non-winning goalkeepers were in central position with respect to the goal more often than winners, while winners shot more towards the Z3 than non-winners. Moreover, the P6 (centre forward) shot more in counterattacks in winning teams than in losing ones.
<table>
<thead>
<tr>
<th>Even 3:3</th>
<th>Even 4:2</th>
<th>Power-play 3:3</th>
<th>Power-play 4:2</th>
<th>Transition</th>
<th>Counterattack</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Winners</strong></td>
<td><strong>Losers</strong></td>
<td><strong>Winners</strong></td>
<td><strong>Losers</strong></td>
<td><strong>Winners</strong></td>
<td><strong>Losers</strong></td>
</tr>
<tr>
<td>M = SD</td>
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<td>M = SD</td>
<td>M = SD</td>
<td>M = SD</td>
<td>M = SD</td>
</tr>
<tr>
<td>Pressing</td>
<td>2.79±1.93</td>
<td>4.00±2.11</td>
<td>2.37±1.07</td>
<td>1.21±0.93</td>
<td>0.26±0.81</td>
</tr>
<tr>
<td>Zone 1-2</td>
<td>1.58±1.26</td>
<td>0.89±0.83</td>
<td>0.16±0.17</td>
<td>0.22±0.43</td>
<td>-</td>
</tr>
<tr>
<td>Zone 2-3-4</td>
<td>4.63±1.48</td>
<td>4.11±1.45</td>
<td>0.84±1.34</td>
<td>1.01±1.24</td>
<td>-</td>
</tr>
<tr>
<td>Zone 4-5</td>
<td>0.85±1.13</td>
<td>0.82±1.19</td>
<td>0.05±0.23</td>
<td>0.17±0.08</td>
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<tr>
<td>Zone M</td>
<td>1.42±0.84</td>
<td>0.93±0.84</td>
<td>0.63±0.09</td>
<td>0.56±0.08</td>
<td>-</td>
</tr>
<tr>
<td>Cluster</td>
<td>3.56±0.00</td>
<td>4.33±0.00</td>
<td>0.42±0.43</td>
<td>4.33±0.00</td>
<td>-</td>
</tr>
<tr>
<td>Anticipating</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.37±0.66</td>
</tr>
<tr>
<td>Other</td>
<td>0.86±1.11</td>
<td>2.66±0.56</td>
<td>0.85±1.26</td>
<td>0.78±0.81</td>
<td>0.11±0.32</td>
</tr>
</tbody>
</table>

**Defensive arrangement**

<table>
<thead>
<tr>
<th>Goalkeeper position</th>
<th>Centre</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
<td>11.47±3.32</td>
<td>9.37±3.17</td>
<td>2.79±1.10</td>
</tr>
<tr>
<td>Feul Displacement</td>
<td>0.63±0.90</td>
<td>1.37±1.01</td>
<td>0.21±0.55</td>
</tr>
<tr>
<td>Shot</td>
<td>0.05±0.23</td>
<td>0.02±0.20</td>
<td>0.02±0.20</td>
</tr>
</tbody>
</table>

**Previous action**

<table>
<thead>
<tr>
<th>Type of shot</th>
<th>Drive</th>
<th>Bounce</th>
<th>Backhand</th>
<th>Off-the-water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressing</td>
<td>3.65±1.20</td>
<td>2.61±1.73</td>
<td>0.58±0.96</td>
<td>0.37±0.60</td>
</tr>
<tr>
<td>Displacement</td>
<td>0.42±0.77</td>
<td>0.37±1.16</td>
<td>0.11±0.46</td>
<td>0.17±0.38</td>
</tr>
<tr>
<td>Other</td>
<td>0.95±0.23</td>
<td>0.11±0.32</td>
<td>0.00±0.00</td>
<td>0.00±0.00</td>
</tr>
</tbody>
</table>

**Objective analysis**

<table>
<thead>
<tr>
<th>Power-play position</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
<th>P5</th>
<th>P6</th>
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</thead>
<tbody>
<tr>
<td>Pressing</td>
<td>1.47±1.22</td>
<td>3.26±0.54</td>
<td>3.53±1.15</td>
<td>2.42±1.26</td>
<td>1.16±1.15</td>
<td>1.79±1.33</td>
</tr>
<tr>
<td>Displacement</td>
<td>0.49±1.01</td>
<td>0.58±0.91</td>
<td>0.68±0.89</td>
<td>0.74±0.87</td>
<td>0.70±0.88</td>
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</tr>
<tr>
<td>Other</td>
<td>0.74±0.87</td>
<td>0.79±1.03</td>
<td>0.69±0.63</td>
<td>0.39±0.11</td>
<td>0.26±0.45</td>
<td>0.26±0.45</td>
</tr>
</tbody>
</table>

**Outcome**

| Goal | P | 2.42±1.89 | 0.85±1.05 | 0.94±0.87 | 2.21±1.58 | 1.42±1.12 | 1.57±0.97 | 2.00±1.41 | 0.14±0.38 | 0.00±0.00 | 1.60±0.97 | 0.89±0.69 |

*Note: *Shows differences between groups (winners vs. losers).
DISCUSSION

To our knowledge, this is the first study that analyses the shots performed in women’s matches in the Olympic Games of London 2012 according to their context, final and defensive arrangements, previous actions, shooter, zone of the goalkeeper with respect to the posts, zone of the goal to which the shot is thrown, and outcome. All of these aspects were examined according to the success of the match (i.e., winning or losing) in order to discover a possible pattern associated with winning the match. The analysis of the behaviour of competitors according to their team’s success was performed in order to understand the behaviour of winners and to help coaches to simulate this in training in order to win future matches.

According to previous studies (Lupo et al., 2011), our results shown a higher occurrence of goals scored during even situations; this may be attributable to the higher velocity of shots and the time required to prepare this during even rather than power-play situations (Alcaraz et al., 2012). In addition, in even situations the majority of shots were performed using the 3:3 final arrangement (77.8%; n = 509) while in the 4:2 arrangement only 20.3% of these shots were performed (n = 133). This higher proportion of shots was related to the higher number of goals scored (80% of the total scored in even situations) in the 3:3 final arrangement (n = 128).

According to previous studies (Garcia, Argudo, & Alonso, 2012), the 4:2 final arrangement was the one most often used in power-play situations (65%; n = 206) compared to the 3:3 final arrangement (34.7%, n = 110). The opposite of the even situation was found in a power-play situation, where 65.19% of the shots were performed using the 4:2 final arrangement (n = 206) and achieved 64.18% (n= 86) of the goals scored in this situation. Finally, counterattacks give rise to an advantageous situation for scoring (Lupo et al., 2011, 2013) and this is reflected in the 45.2% of goals scored (n = 28) from the shots in this situation (n = 62). In transition, only 4.8% of the shots scored showed an attempt to score in this unfavourable situation, i.e., shots from the other goal performed by the opposite goalkeeper in the final seconds of the quarter.

In terms of success, our results show that in even situations and using the 3:3 final arrangement, the losing team had fewer shots performed by the central player (P3), passes and fouls as actions prior to the shot, and goals than winners; winners used more ‘M’ defensive arrangements than losers. In a previous study (Tucher et al., 2014), winners shot more towards the goal from Positions 2, 3, and 4. This could be due to winners performing more shots outside the five-metre area than losers (Tucher et al., 2014) or to the capability of better shooters to be accurate and score in winning teams, especially after a five-metre offensive foul and posterior shot; however, most of the shots resulting in goals were made from the centre position (Tucher et al., 2014). Coaches should take in consideration the danger of these players, and use an accurate defence in order to avoid situations in which the opposing centre player is in a favourable position to shoot towards the goal.

Regarding previous actions in even situations with a 3:3 final arrangement, the differences between winning and non-winning groups could again be due to the superior ability of the winners to effectively finalize their offensive strategies. Winners performed a higher number of actions than losers (Lupo et al., 2011), who may lose the ball and thus score less than winners. Similar conclusions were drawn by Lloret (1998) who highlighted the superior ability of winners to score. In view of this, coaches of losing teams should enhance the effectiveness of the shots performed by their players, as well as improve their blocking skills, as this could improve the chances of victory for the losing teams (Argudo et al., 2007b). Another difference between teams was that winners used the ‘M’ defence more often than losers; this can be associated with a strong centre forward (Position 6) and the need of a double mark defence on it (Lloret, 1998). At the same time, the ‘M’ defence, with two defensive players in front...
of goal, allows a larger goal area to be covered in order to block shots. This appears to be a behaviour associated with victory in the match, and coaches should incorporate this within the team’s tactical strategies.

With regard to the even 4:2 situation, winners blocked fewer shots than non-winners and thus had fewer shots using “other” trajectories. Previous studies of men’s water polo matches have investigated the shots blocked according to the position of the player; flats blocked 40% of the shots, and centre positions the remaining 60% of the shots (Tucher et al., 2014). The fact that the winners blocked fewer shots than losers shows the high level of ability of their goalkeepers to prevent the opposing team from scoring. In line with Lupo et al. (2012), no differences emerged between groups in terms of goals achieved; the match victory depended on the ability of water polo players to score goals and prevent goals being scored against them (Tucher et al., 2014). From the results of the current study, we can conclude that in numerical equality the only arrangement that promoted goal scoring was 3:3. However, it should not be forgotten that best players must be able to shoot from various court positions and modify their tactics according to the opponents’ characteristics (Lupo et al., 2010; Tucher et al., 2014).

With regard to power-plays, in the 3:3 final arrangement winners used more “other” types of shot (e.g., pop shots) than losers. These results are unexpected since in a power-play, players in Positions 2, 3 and 4 (perimeter players) are in a better position to shoot (Lupo et al., 2014). The results obtained could be due to the identification of a player in a good position to score, who performed another shot (e.g., a pop shot) after a previous action as a displacement to goal to create more opportunities to score a goal. No differences were found in the power-play using the 4:2 arrangement, and this seems to indicate similar tactics between teams. Numerical superiority gives a favourable situation for scoring due to the absence of a player who is excluded. Although there were no differences between teams, more detailed future analyses are needed of the tactical schemes used in a numerical superiority situation initiated with a 4:2 system (see Napolitano, Tursi, Di Tore, & Raiola, 2012) in order to be able to establish a pattern associated with victory.

On the other hand, transition situations are characterized by the recovery of possession of the ball and advancing to the opposite goal to create an offensive arrangement in order to score (Argudo et al., 2007b). Therefore, a shot during the transition means that the shooter is not in an optimal position to perform it, since she is not close to the opposite goal. The rarity of situations during the match in which shots were attempted during the transition may explain why there were no differences between winners and losers.

Counterattacks are another favourable situation for scoring, especially for players in Positions 1, 5 and 6, who can swim rapidly to the opponent’s goal and score. In line with previous studies (Escalante et al., 2013; Lupo et al., 2012a), the current results show that losers performed fewer actions in counterattack compared to winners. These results could be due to an effective defence, who can protect the ball and prevent a counterattack from the opponent (Lupo et al., 2012a). The goalkeepers of losing teams were positioned in the middle of the goal more often than winners during opponents’ counterattacks, due to the advance of a player in Position 6 to the centre of the court. However, this colocation did not prevent goals by the winning teams. This may be due to the ability of winning players to block or stop the opponents’ shot (Tucher et al., 2014). The contribution of the centre forward in scoring goals arises from its privileged position in front of the opposing goal at the two-metre line, as has been demonstrated in situations of numerical equality (Lupo, et al., 2012b). However, the results of the present research show that the position of this player is dangerous in any match situation.

In the present study, the efficiency of the shot was not considered in terms of the shooter,
the goal area towards which it was aimed, or the type of shot made; therefore, future studies should carry out these analyses to determine which players are potentially more dangerous, and which are the most effective techniques in water polo attacks to be imitated by winning teams, and how these can be countered by opponents.

CONCLUSION
Despite the limitations of the present study, it has provided information on shots used in specific play situations in high-level female water polo matches (Olympic Games). This information will enable coaches to develop training programs consistent with the demands of the match, as well as to develop technical/tactical strategies that will allow losing teams to defeat their opponents in future, adapting the numerical situation and the tactical system to the weaknesses of their opponents.

PRACTICAL APPLICATIONS
The results of the present study allow us to recommend as practical applications the use of the 3:3 final arrangement in even situations and 4:2 in situations of power-play, since these are the most effective, allowing the realization of the largest number of passes in the shortest possible time, in addition to avoiding loss of possession of the ball, and facilitating precise shots that allow the play to result in a goal. Similarly, coaches should involve the central players (Positions 3 and 6) in the completion of actions, in situations of both equality and numerical superiority, as these have a privileged position within the court in terms of scoring goals. Finally, players should seek to take advantage of weak attacks, so that by stealing the ball they can initiate a new counterattack. These three situations appear to determine the behaviour of winning teams, and thus coaches should design defensive strategies to avoid allowing opposing teams to score against them.

REFERENCES


