Original Article

Analysis of time-out use in female water polo

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ABSTRACT

The study seeks to examine the use of time-out in water polo. For this, was analyzed it uses by coaches women's category in Water polo World Championship held in Melbourne, Australia 2007. All matches were recorded by a digital video camera, located in a central and elevated position on the halfway line. Subsequently, several observers unrelated to this study, which had been previously trained, analyzed all downtime analysis using the software Polo Análisis Banquillo v1.0. The variables observed were the quarter of play, the momentary results, the reason to apply, under front and rear situational, the immediate effect and the final score. It is observed that women's water polo coaches make more use of time-out in the last period, with an adverse score, after a temporary expulsion, being equal to pass to inequality, no goal is achieved and its requested further by the losing team. **Key words:** HIGH PERFORMANCE, TEAM SPORTS, STRATEGY, TACTICAL, TIME-OUT, WATER POLO.

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INTRODUCTION

A coach, and his technical staff, have to make decisions in training and in competition. In the first context it may be easier. However, in the second situation, the importance of the decisions to be adopted is much greater, either before, during or after, emphasizing the importance that acquires the information that it transmits to its players (Guzmán & Calpe-Gómez, 2014). Obviously the resolutions more complicated by the tension of the moment are during the competition. In those moments should analyze if what was previously planned is occurring, both on your team and on the adversary. Should also think if something does not go according to the initial idea, how can modify it and counteract it. The ability of the coach to read, interpret and act appropriately in the face of these changing situations can be decisive in achieving victory (Gilbert, Trudel & Haughian, 1999) a better performance of the athlete and his social and emotional well-being (Fernández, Gil, García, Carrasco, Claver & Villar, 2013). In this sense, there are studies that have analyzed the cognitive processes of coaches during the course of matches (Debanne & Fontayne, 2009; Hastie, 1999; Jiménez & Lorenzo, 2010; Zetou, Kourtesis, Giazitzi & Michalopoulou, 2008) and the message they transmit to their players (Calpe, Luján, Francisco & Grijalbo, 2013).

On the other hand, the most direct way of transmitting this information is by requesting a time- out (TO). Hence, the use of the TO becomes the best instrument available to the technical staff to introduce modifications (Bar-Eli & Tractinsky, 2000; Sampaio, Lorenzo & Ribero, 2006) during the match. The TO is a strategic resource that coaches have to influence the dynamics of the game. Without intention to elaborate an axiom it could be said that it is a temporary interruption of the action of game requested by the trainer.

But in relation to the investigations carried out there are few examples (Guzmán & Calpe-Gómez, 2014). In this sense, studies exist that have analyzed the causes and objectives (Duke & Corlett, 1992; Gómes, Jiménez, Navarro, Lago-Penas & Sampaio, 2011; Herrera, Ramos & Mirella, 1996; Moreno, Moreno, Cervelló, Ramos & Del Villar, 2004; Zhang, 1993) the contents of the communication that occurs in that temporal space (Bar-Eli & Tractinsky, 2000; Beal, 1989; Botelho, Mesquita & Moreno, 2005; Cloes, Delhaes & Piéron, 2003; Estrada & Pérez, 2008; González, 2007; Iglesias, Cárdenas & Alarcón, 2007; Moreno, Santos & Del Villar, 2005; Pina & Rodrigues, 1993) and effects on the dynamics of the game (Duke & Corlett, 1992; García-Tormo, Valladares & Morante, 2003; Kozar, Whitfield, Lord & Mechikoff, 1993; Mace, Lalli, Shea & Nevin, 1992; Moreno et al., 2005, 2004; Roane, Kelley, Trosclair & Hauer 2004; Saavedra, Mukherjee & Bagrow, 2012; Sampaio, Drinkwatter & Leite, 2010; Wang, Chen, Lee & Hsu 2010; Zetou et al., 2008).

However, in the aquatic modality analyzed there have been no previous studies on TO use. Hence, the aim of the present study is to know the factors associated with the use of TO by female water polo coaches of high level.

MATERIAL AND METHODS

Participants

The present study analyzed all TO request during the XII Water Polo World Championships in 2007, held in Melbourne, Australia. The Organizing Committee of the competition provided the necessary permits to carry out this study. In addition, due to the nature of the analysis, since the TO filming was done in a public context, it was not necessary to seek the approval of any ethics committee. The sample is made up of the total of 149 TO request in the female category.

Measures

In this study, seven variables and their categories were analyzed:

1-Period: (a) 1st quarter, (b) 2nd quarter (c) 3rd quarter, (d) 4th quarter and (e) extra time. For subsequent analyzes, only the occurrence of necessary cases was considered, quarters 2, 3 and 4.

2-Momentary score: (a) in favor, (b) against or (c) tie.

3-Reason: (a) temporary expulsion, (b) after goal or (c) with the aim of approaching.

4-Previous situational framework: (a) numerical equality, (b) transition, (c) numerical inequality.

5-Later situational framework: (a) numerical equality, (b) transition, (c) numerical inequality.

6-Immediate effect: (a) goal or (b) no goal.

7-Final score: (a) winner, (b) loser and / or (c) tie.

Procedures

Observational methodology was used (Anguera, 2003) through a descriptive and correlational design. For this, each one of the matches, of the XII Water polo World Championship, all the TO requested were recorded. Filming was done with a digital video camera (JVC, GZ-MG50E, JAPAN) located in a centered position and elevated above the midfield line, for later analysis by several observers not linked to the study and previously trained through the software Polo Análisis Banquillo v1.0 (Argudo, Fuentes, Alonso & Ruiz, 2005). The inter-observer reliability was verified using the kappa index (León & Montero, 2003) reaching a value greater than .85.

Analysis

The data recorded through the Polo Análisis Banquillo v. 1.0 (Argudo et al. 2005) were exported to the statistical package SPSS 20.0 for Windows, in order to be treated statistically, with the confidence level set at 95% (p<.05). The $\chi 2$ test was used to know the TO application moment and the cause for which it is requested, as well as the later impact on the game. All analyzes were accompanied by their respective contingency tables. These being: analysis of frequencies and percentages. For those cases where there is a minimum number of observations (at least five per box in the contingency table) the Chi-Square test was performed to determine the degree of relationship between two variables expressed in frequencies or percentages.

RESULTS

In order to determine if there are significant differences in the dissimilar quarters with respect to the other variables considered, the chi-square test was applied. The contingency table (Table 1) indicates that there are two boxes with a frequency less than five. Since these two boxes belong to the category of "tie", the Chi-square test is applied only considering the variables "in favor" and "against". The results show the absence of statistical significance, (chi-square = 1.314, p = .518).

Table1. Contingency table with descriptive values considering the quarter, variables and categories.

	Momentary score						Reason						Result				Final score						Previous situational framework				Later situational framework			
	In favor		Against		Tie		Expulsion		After goal		Approaching		Goal		No Goal		Winner		Loser		Tie		Equality		Transition		Equality		Transition	
	Frec	%	Frec	%	Frec	%	Frec	%	Frec	%	Frec	%	Frec	%	Frec	%	Frec	%	Frec	%	Frec	%	Frec	%	Frec	%	Frec	%	Frec	%
2	10	18,9	16	22,5	4	23,5	28	26,4	1	10	1	4	12	24	18	19,8	10	17,5	20	26	0	0	18	18,8	11	25	2	5,9	28	26,2
3	10	18,9	18	25,4	3	17,7	27	25,5	3	30	1	4	17	34	14	15,4	12	21,1	17	22	2	28,6	20	20,8	11	25	4	11,8	27	25,2
4	33	62,3	37	52,1	10	58,8	51	48,1	6	60	23	92	21	42	59	64,8	35	61,4	40	52	5	71,4	58	60,4	22	50	28	82,3	52	48,6
	53		71		17		106		10		25		50		91		57		77		7		96		44		34		107	

Regarding the variable "reason", it can be observed that the "expulsion" causes the highest number of TO, followed by the "approach" and "after goal" category. On the other hand, the contingency table (Table 1) shows how in four boxes, there are fewer than five observations. Therefore, since there would be only one row (4th quarter) the chi-square test cannot be applied. However, it is clear how in the 3rd and 4th quarters more TO are requested for "expulsion" and with the intention of "approaching" the goal, against the 1st and 2nd quarter. If the "after the goal" option is considered, the TOs are anecdotal (1 TO in the 2nd quarter, 3 TO in the 3rd and 6 TO in the 4th).

On the other hand, and since there is only one observation in “numerical inequality” variable, the analysis is developed considering the variables "numerical equality" and "transition". The results show the absence of statistically significant relationships (chi-square = 1.378, p = .502). While analyzing the subsequent situational framework, the results of the contingency table show an insufficient number of observations in the "numerical equality" option for the 2nd and 3rd quarter. Given that only a sufficient number of "numerical equality" and "numerical inequality" registers are recorded in the last quarter (28 vs. 52) if the chi-square test is performed (a single row, the 4th quarter) so they are obviated from the analysis.

In contrast to the previous variables, it is possible to observe how a large number of observations exist in all the boxes of the contingency table, which allows the application of the chi-square test without previous filters. In the case of the contingency table (Table 1) it can be seen how the TO frequencies are similar in the "goal" and "no goal" options considering quarters 2 and 3. However, in the fourth quarter there is more than twice the frequency (21 vs. 59) where the TOs are taken in the "no goal" versus "goal" option. Finally, we can observe as if the total frequencies are considered (considering the three times together) there are twice as many cases when TO is requested when the option is "no goal" than when it is "goal". The differences described in the contingency table are confirmed in the chi-square tests, since significant values are found (chi-square = 8,322; p = .016).

Finally, the contingency table (Table 1) shows how the decision to request TO is made mostly in the "loser" option followed by "winner". The lowest frequency of occurrence occurs in the "tie" option. At the descriptive level, it can be seen how in the three quarters considered there is a greater number of times that the losing teams request TO than the winning teams. These differences are clearly observed if the total frequencies are analyzed according to the "winner" and "loser" options (57 versus 77 respectively) a considerable difference being found if the "tie" option is considered, where only 7 TO are requested. From the perspective of frequencies, it can be observed that the low number of frequencies in the case of the variable "tie", prevents the chi-square test including this option. Therefore, this test is then performed for the three quarters considered, taking into account only in the analysis, the "winner" and "loser" option. Despite the differences observed at the descriptive level between the two options, the chi-square tests showed no statistical significance (Chi-square = 1,579; p = .454).

Table 2. Chi-square values based on the momentary marker, the previous situational frame, the achievement or not of a goal and the final result of the match.

	Momentary score			Previous situational framework			Goal vs. No goal			Final result		
	Value	gl	Sig.	Value	gl	Sig.	Value	gl	Sig.	Value	gl	Sig.
Chi-square of Pearson	1,314[a]	2	0,518	1,378[b]	2	0,502	8,322[c]	2	0,016	1,579[d]	2	0,454
Verisimilitude reason	1,322	2	0,516	1,369	2	0,504	8,202	2	0,017	1,602	2	0,449
Linear association	0,887	1	0,346	1,288	1	0,256	3,584	1	0,058	1,55	1	0,213
No. of valid cases	124			140			141			134		

a. (0%) have an expected frequency of less than 5. The minimum expected frequency is 11,11.
b. 0 (0%) have an expected frequency of less than 5. The minimum expected frequency is 9,11.
c. 0 (0%) have an expected frequency of less than 5. The minimum expected frequency is 10,64.
d. 0 (0%) have an expected frequency of less than 5. The minimum expected frequency is 12,34.
gl, degree of freedom; and sig, Asymptotic (bilateral) significance.

DISCUSSION

The objective of this work was to know the factors associated with the use of TO that make female water polo coaches of high level. Since the notational study of this sport, and specifically the analysis of TO, represent one more tool that has the trainer, to achieve a higher performance (Napolitano, Tursi, Di Tore & Raiola, 2013).

In this sense, it is observed that the use of TO focuses on the last two quarters, which coincides with the studies of Gomes, Volossovitch & Ferreira (2014) Kozar et al. (1993) Mechikoff, Kozar, Lord, Whitfield & Brandenburg (1990) and Valle, Antúnez, Sáez, García & Cañadas (2012). These results are in line with Apitzsch (2009) Gomes et al. (2014) Ortega, Palao, Gómez, Ibáñez, Lorenzo & Sampaio (2010) and Valle et al. (2012), in which it is also stated that the use of the TO is made mostly by the teams that are losing and they also can not reverse the situation even by requesting a TO (Ortega et al., 2010).

This would lead to a subsequent analysis of the “reasons” why a coach uses a TO Antúnez, Ureña & Escudero (2001) and Saavedra et al. (2012) have several causes: breaking a positive sequence of actions of the adversary team, finding a successful resolution of an action at a particular moment in the match, introducing tactical modifications and changing the team's emotional dynamics. Some of them coincide with those of the present study, where it is observed how TO be requested in quarters 3 and 4 by "expulsion" and / or with the intention of "approaching" the rival goalpost. It is also observed the existence of a positive influence of the use of TO in the first part of the match (1st and 2nd quarter) in the same line of other studies (Ortega et al., 2010; Valle et al., 2012). However, this trend becomes negative in the second part of the match (3rd and 4th quarter) as presented Antúnez et al. (2001) and Valle et al. (2012).

As for the new lines that open as a result of this work can be discussed the need to study and analyze the action after the TO, both the team that requests the TO and the team that does not request it. On the other

hand, new research should consider analyzing the TOs of the first 24 minutes and the last 4 minutes of play to check for differences in frequency of occurrence, changes in message, reason for request or result, that causes, as well as the perception of players and coaches (Gomes et al., 2014). Finally, new work should contemplate analyzing the coaches' discourse in TO as well as the variables analyzed in this study (momentary score, final result, previous and subsequent situational framework and reason for request).

CONCLUSIONS

There is a predominance of TO application by women's water polo coaches during the last two quarters of the match. It is mainly requested by teams that are momentarily losing, being benefited by a temporary expulsion of the adversary, in order to take advantage of the 20" of superiority attack with the equipment placed and organized for the deployment of an offensive sequence tried out. The immediate effect is not the desired because no goal is achieved and also the teams end up losing the game.

FUTURE PROSPECTS

This work is part of a longitudinal study, which aims to compare how the regulatory changes made during the last few years affect the game, so it is intended to compare these results with those obtained at the XVII World Water Polo Championship to be held in July 2017.

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