

## IMPORTANT ASPECTS OF ATTACK ACTIONS IN BEACH VOLLEYBALL

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**Abstract:** The game of beach volleyball has developed over the past years to become more spectacular with game actions that can leave the audience speechless, explosive players, attack and defense actions that can capture the attention of spectators for a long time. Spiking is a fundamental skill in both indoor and beach volleyball, being appreciated by the public as one of the most spectacular moves in beach volleyball, but also is appreciated by coaches as the most efficient modality of obtaining points. The present paper tries to identify the essential aspects of attacking actions: entering the attacking position, anticipating the setting and adapting to it, detachment step for attack, the arms swing, the heel-toe-finger movement, the "bow and arrow" attack movement.

**Key words:** beach volleyball, attack actions, phases of the attack in beach volleyball.

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### INTRODUCTION

Spiking is a fundamental action in volleyball, both beach and indoor, which generates the most intense and pleasant feelings experienced by a volleyball player. We can consider the attack as the culmination of the entire volleyball game system that encompasses all the defining motor qualities for a volleyball player. According to Zhang (2000), not all actions have the same effect on the game. Service, attack, and blocking allow the team to score directly while receiving, setting and diving follow other technical actions.

However, we must be aware of an essential aspect: although the spiker desperately wants to finish the rally by sending the ball with power into the opponent's court, this is closely related to how the setter manages to put in the situation to attack the ball. There are, of course, situations in which the attacker, out of a desire to complete a spike, spectacularly makes mistakes and offers the opponents point (he is blocked by the opposing player, sends the ball into the net or off the court), often because reception from his teammate was not a perfect one for a killing attack. However, the following must be very well aware: no matter how difficult the teammate's set for the attack was, it is never his fault that the spiker completely missed the attack.

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In beach volleyball, the spiking ability is often used as a fundamental offensive tactic. This technique must be used skillfully to obtain the maximum possible points (Mesquita, Moreno & Teixeira, 2003; Mesquita & Teixeira, 2004, Lacerda & Mesquita, 2003). In this context, players use their ability to spike in their attack tactics based on the space discovered in the opponent's court (Kiraly, 2000). In beach volleyball is also an important psychological factor; sports psychology is a branch that applies psychological concepts to sports or exercise. These values are often used to improve efficiency. The sport psychologist is interested in helping every sport participant reach his or her potential as an athlete (Sopa, 2021, Popa et al., 2020).

It is the duty and obligation of the spiker to adapt to a not precisely perfect setting of his teammate. If the setting was too far outside, the attacker moved too fast towards the net. If the setting was too low or too high, it means that the attacking player did not follow the rule of the three attack steps (approach step, directional step, and double beating to get off the sand) because if he had followed it, he would have managed to adapt to the setting offered by his colleague. Another fundamental rule is that an attacker must not use the spiking option with power in all situations but can also use the cut shot or line.

A powerfully executed shot must take place only when the player is sure that he has observed the free space in the opponent's court and is convinced that the opponent's block will not reach it; otherwise, he must execute a cut shot and be convinced that the ball, if is not reached by opponents, will land in the opponent's court, not outside it.

The attack in the game of beach volleyball can be presented as a succession of chained technical elements that ultimately lead to hitting the ball at the highest possible point and in the most challenging way to be recovered by opponents. Scientists discovered that group cohesion has a considerable influence on the performance and other fundamental factors in team sports life (Pomohaci & Sopa, 2018).

The primary data of modern volleyball is obtained using statistical procedures that can identify the strengths and weaknesses of the opponent team. Coaches use this data to develop other teams and achieve the desired results (Szabo & Magdas, 2014, Szabo, 2015a, Szabo 2015b, Szabo & Sopa, 2015, Szabo et al., 2019; Szabo & Sopa, 2018).

From an interdisciplinary point of view, we want to emphasize the importance of proprioception (Szabo et al., 2020, Szabo et al., 2020b, Szabo & Sopa 2020), strength motor skill (Tulbure et al., 2020), biomechanics, and psychomotor skills (Szabo et al., 2020c, Szabo et al., 2020d), as well as modern smart means in the game of beach volleyball (Szabo et al., 2019b).

#### ***Entering the attacking position***

The first thing a striker needs to do to increase his chances of success after executing the shot is to follow a well-developed training routine through many repetitions that will help him reach the same favorable position every time for the attack success are as high as possible.

The results of several investigations confirmed the importance of the context of the attack. The authors found that effectiveness is a primary factor in beach volleyball and is dependent on factors such as blocking or receiving an attack or service (side-out or counter-attack). Mesquita and Teixeira (2004) and Zetou and Tsigilis (2007) found that the effectiveness of attacks was different during the side-out and counter-attack phases. During the side-out phase, it is dependent on the effectiveness of the reception, while in the counter-attack phase, it is dependent on other small game space factors (Giatsis, 2003; Giatsis and Papadopoulou, 2003; Giatsis et al., 2004; Giatsis & Tzetzis, 2003; Grgantov et al., 2005) or blocks actions (Giatsis, Tili & Zetou, 2011; Tili & Giatsis, 2011)

So, first of all, the attacker must arrive after the reception, while the ball follows its trajectory towards his teammate who is set for the attack, in the same starting point of the attacking momentum.

It must be somewhere 3 meters from the net and near the sideline if the player is on his strong side (a right-hander on the left or a left-hander on the right) and if he is on his weak side. Relative to positioning in the field (a left-hander on the left or a right-hander on the right) about one meter inland.

***Anticipating the setting and adapting to it***

The two partners must know each other well and are confident in the qualities of the setter.

If the attacker is in the privileged position of having a player by his side who constantly sets the ball in a position favorable to the attack, then after the reception, the attacker can execute the routine that all players have vis-à-vis the attacking momentum. However, what happens if even the best setters have the misfortune to step on a dune or in a pit formed on the ground and become unbalanced at the moment of the setting? The set sent to the attacker will be different in one way or another from those sent in ideal conditions with which the attacker is accustomed, and then the latter must adapt his attack momentum after that. If a player has an inconsistent teammate who sends the sets differently from each other, the attacker has the obligation that when the ball is in the air, even before it touches the hands of the setter, to execute that pre-jump actions before the approach step and to be prepared to go in any direction to attack. Thus, if the ball is too high, the attacker can move towards it quickly and coordinate with its downward trajectory. If it is too low, it can start in a fast momentum and reach it before it falls under the upper band of the net and is in an impossible position to attack. Also, if the pass is to the left or the right than the attacker expects, he can use the directional step to adjust his attack position to take advantage of any chance and score on the scoreboard.

The attacker needs to adapt to the setting received from his teammate so that the ball is always hit from the front to give it maximum strength and allow him to see where his opponents are placed. In the court on the defensive phase.

In beach volleyball, a significant number of landings after the attack are observed, related to high forces in the joints of the lower limbs (Bisseling et al., 2007; Edwards et al., 2012; Lindner et al., 2012). Such high forces can cause acute and excessive injuries, such as ruptures of the anterior cruciate ligament or patellar tendinopathies, respectively (Bahr & Reeser, 2003). Bahr and Reeser, 2003, reported 54 acute injuries (30% knee, 17% ankle, and 17% finger) to 178 professional beach volleyball players interviewed during a 7-week interval of the regular season. More than a third of players (67 out of 178) reported excessive injuries (back pain 19%, knee pain 12%, and shoulder pain 10%) for which they received medical care. Much of the reported injuries and conditions of overuse can be related to high loads on injured joints during jumps and specifically during landing actions (Eerkes, 2012). Also, the correlation between body mass index and the apparition of spine, knee, and feet deficiency in the youth population was studied by many authors (Szabo & Sopa, 2018).

***Detachment step for attack***

The attacking momentum is executed in 3 successive steps (the approach, directional, and detachment, the force step). The force step is perhaps the most important of the three steps of the momentum for the attack.

The attacking momentum can be executed in some cases and more than three steps when the attacker must move quickly from the bottom line to the area where he will attack, but each time the speed movement will end precisely in the position from which it must begin its three steps of attack momentum. Therefore, the detachment step must be performed in the following way: after the directional step (step 2 of the momentum) has reached a favorable position towards the ball, the attacker must transform all the energy accumulated through the two steps, close and directional employing the third, the detachment step with double beating, from the energy used for the horizontal movement into energy for the vertical detachment.

This aspect must follow the following routine: when transitioning between steps two and three (valid for right-handers), the attacker takes a big step with support on the left foot. The arms are pulled back, the palms are facing the sky, the legs are bent at the joints of the knees and ankles, the torso is bent forward, and the body position becomes low. Then comes contact with the sand for the first time, with the right foot followed at a close distance but slightly shifted forward by the left foot. Make that sudden stop instead of pushing hard on your feet and throwing your hands hard vertically.

The aspect related to the detachment from the sand is vital and much different from the one in the hall. Particular emphasis is placed on the transfer of weight from the heel - sole - toes - detachment. Without this obligatory routine to be used by all attackers, the attacking momentum is not correct, and the result can be a wrong detachment that cannot make the attacker spike the ball from the highest possible point, as he wants. For left-handed attackers, the routine is the same, only that the starting moment of the momentum is reversed; they step for the first time with their left foot, not with their right.

***The swinging of the arms***

It is imperative to swing the arms from back to front and finally up, as we mentioned above. The arms must be left very far back with the help of the muscles, even pushed as far as mobility allows with the palms to the sky and then, with maximum effort to be pulled forward and upward so that the mechanical work generated by this chain of movements allows the ball to be hit at a point as high as possible. In the images below, you can see in detail how this sequence of movements is performed.



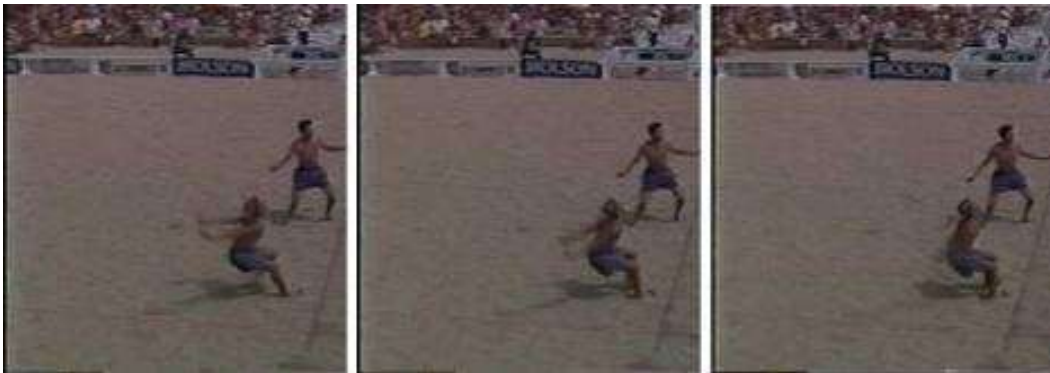
**Figure 1.** The phases of the attack (Mauro, 2012)



**Figure 2.** The moment of initiation of the detachment step (Mauro, 2012)



**Figure 3.** The moment of swinging the arms in the specific phase of detachment phase with heel - sole - toes – movement of the feet (Mauro, 2012)



**Figure 4.** The final momentum of the double-step with feet closed (Mauro, 2012)

#### ***The Heel-toe-finger movement***

It is essential to understand the role of this motor act that transfers the horizontal displacement energy into the vertical detachment energy. This mode is the only one valid for the game of volleyball, both sand and indoor. Executing this movement correctly, with the feet close to each other at the moment of detachment and with the left foot slightly offset from the right, we manage to detach exclusively vertically. Any deviation from this rule makes our detachment from the sand vertically and horizontally, which will make the landing be accompanied by touching the net or entering the opponent's side and automatically losing the point.

Although some kinematic differences have been reported between beach volleyball and attack volatility for indoor volleyball (Tilp et al., 2008), athletes in these sports use similar techniques during service movements, diving, setting, attacking, blocking, and defense. However, there are tactical differences, e.g., the number of players (beach volleyball team: two, indoor volleyball: six) that affect landing movements and strategies. This classification could lead to a different amount of “land and go” and “land and stop” movements, as classified by McNitt-Gray, 2000, who reported different lower limb loads. Other differences in movement conditions are due to differences in court size and playing surface. The biomechanical differences of playing surfaces and their influence on the risk of loading and injury, and coordination (Moritz & Farley, 2006) have already been studied. The sand surface decreases the maximum vertical reaction forces on the ground during the jump takeoff phase by 8% (Giatsis et al., 2004) compared to the rigid surface. As far as we know, no data are available on the forces during sand landings compared to inland terrain. However, Mills et al., 2010 calculated that low stiffness and increased damping, such as

the sand surface compared to the inner surface, reduce the reaction forces of the soil and subsequently the bending moments of the knee and thigh during movements and landings.

### **The „bow and arrow” movement of the arms**

After the proper detachment, the attacker reaches the position where he is raised in the air with his hands pointing towards the ball following a downward trajectory and will be hit in the next few moments. For the shot to be correct and efficient, we need the maximum force and the appropriate technique in hitting the ball. The arm swinging movements of 96 professional beach volleyball players were examined at the 2017 World Beach Volleyball Championships; experts classified the movements into two categories, bow and arrow technique and alternative techniques (Seminati et al., 2015). Also crucial in discovering the efficiency of attack is the statistical analysis of the game (Szabo & Sopa, 2020; Szabo et al., 2019; Sopa & Szabo, 2019).

The next phase of the bow and arrow movement for the attack is when the left hand remains to follow the ball and when the attacking movement is triggered, the left hand is pulled down strongly while the right hand goes straight from the elbow and rises to the ball which will be hit hard and short, the wrist remaining flexible, the movement of hitting resembling a whipping of the ball. Good jumping ability and static and dynamic balance can ease the attack and give many other opportunities (Sopa, 2021; Sopa & Pomohaci, 2021).

This mechanism is achieved through the abdominal muscles that contract strongly when the left arm has a downward trajectory and the right upward, ending with a firm ball hit. Another essential aspect is the way the shoulders open to the net and the ball's position. This aspect, in a specific language, means that the shoulder line will rotate to the right (if the attacker is right-handed) and will become almost perpendicular to the net, the torso next to the movement of hitting the ball with the arms, performs a rotational movement around the spine, which will generate additional force for the attacking blow.

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## Important aspects of attack actions in beach volleyball

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Submitted:  
July 20 2021

Revised:  
November 09 2021

Accepted and published online  
December 07, 2021