

Kinematic Analysis of a Volleyball Swing Block

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Introduction

According to Ficklin, in volleyball, the skill of blocking in which a player or players jump and extend their hands to block an attack is crucial to team success (Ficklin,2014). Blocking is a very complex and lateral movement that is done by volleyball players on every level. There are multiple blocking techniques that are taught throughout a player’s career. The specific blocking technique that was used for this kinematic analysis was a swing block. Swing blocking is when a volleyball player uses specific footwork along the net while swinging and extending the arms in order to penetrate and block the opponent’s attack. This blocking technique has proved to be very advantageous. According to Neves, the swing blocking technique results in greater jump heights and hand penetration, relative to the traditional blocking technique (Neves, 2011). Effective swing blocking can heavily influence how well an opponent hits as well as the overall game. The main purpose of the kinematic analysis of the swing block is to assess the sequence of this movement and identify the key movements that allow the swing block to be executed efficiently.

Figure 1: Athletic Position



In figure 1, the volleyball player is in the athletic position to begin the swing blocking movement. Her knees are flexed at a 146.3° angle. Elbow flexion is also evident. The elbows are flexed at 113.7°. Her weight is slightly shifted forward into the frontal plane and a small lumbar curve of the spine can be seen as well. Her starting position can be improved by being more intentional. In the ideal athletic position for this movement, the knees should be flexed more as well as her elbows. This allows the volleyball player to move quicker and maximize the vertical jump when blocking. A drill that could help improve this is practicing the starting position and having someone critique it until the ideal starting position becomes more natural for the player.

Figure 2 & 3 : Lateral Movement & Initiation of Swing Block



In Figure 2, the volleyball player takes an initial step that is lateral. This lateral step allows her to move to where the ball is being hit. Her elbows are still flexed as she turns. Within this key movement, we see more lateral movement in the transverse plane. Her hips and upper body begin to rotate as she executes this movement. In Figure 3, the initiation of the swing block occurs. According to the Tal, the swing block utilizes a full arm swing where the arms are initially swung backward and then moved forward with elbows fully extended throughout the entire blocking motion. In the figure, her arms are fully extended behind her. Internal rotation of the shoulders is evident as well as adduction of the scapula. The knees are flexed at a more extreme angle in order to maximize jump in the next phase of movement. In Figure 2, the initial lateral step is small. This step is a directional step and it should be fairly large in order to cover distance. A drill that could improve this is one where a volleyball player repeatedly takes the initial step and focuses on taking a large step. With repetition and time, this key movement can be improved.

Figure 4: Block Formation and Vertical Jump



In Figure 4, the volleyball player has jumped vertically and formed the block. Her hips, knees, and ankles are fully extended. Her arms are also extended over her head. External rotation of the shoulder blades is evident as well as upward rotation of the scapula. The lines on the photo show that she is aligned vertically when forming the block. Her arms, head, and lower part of the body are aligned almost perfectly. Due to this, this allows for a good set up and effective block. Many drills can help maintain blocking form. One simple drill that can help this particular part of the blocking sequence is simply jumping off the ground off of two feet. While the volleyball player jumps, a coach can make sure the arms are extended fully over the head as well as full extension of the lower part of the body.

Figure 5: Block Penetration



Figure 5 is the side view of the the previous figure. From this view, triple extension can be seen more clearly. The hips, knees, and ankle are fully extended. The ankle is slightly plantar flexed. The core is actively engaged during this movement. The anterior and posterior muscles of the core are providing stability so she can execute the block efficiently. According to Tal, several characteristics that define an effective block include, quickness in getting off the ground, getting the hands above the net, jump height and hand penetration. Hand penetration is more visible in this image. The arms are fully extended and pressed firmly over the net to counter the opponent’s attack. There are many drills that can be done to improve arm penetration over the net. One drill that can be done is the tennis ball drill. This drill utilizes 2 people. One person will stand on a box holding tennis balls in both hands, over the top of the net. While the other person jumps up and takes the balls out of the person’s hands. This drill forces volleyball players to form an effective block as well as penetrate over the net.

Figure 6: Landing



In Figure 6, the volleyball player is landing after the swing block. The knees and hips are noticeably flexed. She is landing in the same athletic position she initially started the movement in. The main difference is that the knees are significantly more flexed when landing in order to absorb the force acting upon her during this movement. The bending or flexion of the knee also helps protect the knee joint. The knee in the initial starting position of this movement is at a 146.4° while the angle of her knees when landing is 115.7°. These are some major differences. There aren’t many drills to help with landing after hitting or swing blocking. Many volleyball players tend to land on one foot which puts them at a greater risk for injury. A volleyball player just has to be conscious of body position when executing this movement.

Conclusion

- The swing block is a movement that utilizes the entire body. The body moves in all planes to create a lateral and rotational movement towards a common goal of blocking the incoming ball.
- A larger lateral step in figure 2 would have made for a more optimal jump and covered more distance between the ball and player.
- The block formation and block penetration over the net was done well in this sequence. The hands are pressed above the net and the core is actively engaged.

Works Cited

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