**EFFUSION, STRENGTH, AND PLYOMETRIC PROTOCOLS**

The effusion protocol details actions to undertake based on the athlete’s modified stroke test grade (table 1).

*Table 1: Effusion protocol*

|  |  |
| --- | --- |
| **Grade** | **Decision** |
| 0 | None |
| Trace | Reduce running and/or jumping activities by 50% for one week |
| 1 | No running and/or jumping activities for one week |
| 2 | No running and/or jumping activities. Refer to orthopaedic surgeon or other health care personnel for assessment |
| 3 | No running and/or jumping activities. Refer to orthopaedic surgeon or other health care personnel for assessment |

*Strength protocol*

The athlete performs 3 strength training sessions (table 2) per week, with a 1- or 2-day break between each session. For every exercise, the number of sets and repetitions prescribed should be performed on the involved leg. For the uninvolved leg, one set with the same load is performed. Rest between sets should last at least 90 seconds. All exercises should be performed to exhaustion in the final set. The load is increased once the athlete has more than 2 repetitions in reserve.

*Table 2: Exercises, sets, and repetitions for the three weekly strength training sessions*

|  |  |  |
| --- | --- | --- |
| **Session 1** |  |  |
| Exercise instructions | Sets | Repetitions |
| Forward lungeStart in a standing position and let yourself fall forwards. Softly brake the movement with the front leg before you push forcefully backwards. Increase the load by using dumbbells or a weight bar on the shoulders. | 3 | 8 |
| Explosive/fast step-upPlace the front foot on a box. Push forcefully down onto the box so that you quickly move into an upright position standing on the box. Increase the load by using dumbbells or a weight bar on the shoulders. | 3 | 6 |
| Bulgarian split squatsPlace the front leg in front of you and rest the back leg on a box. Squat deeply with the front leg and push forcefully back up. Increase the load by using dumbbells or a weight bar on the shoulders. | 4 | 4 |
| **Session 2** |  |  |
| Exercise instructions | Sets | Repetitions |
| Heavy step-upPlace the front foot on a box. Lean slowly forward and push down onto the box so that you move into an upright position standing on the box. Increase the load by using dumbbells or a weight bar on the shoulders. | 3 | 6 |
| Unilateral leg extensionKnee extension in a smooth and slow movement. Start with the knee bent as much as possible and kick slowly up. Do not rest in the lower position, but keep the movement going. Increase the load by increasing the weights lifted on the machine. | 4 | 4 |
| One-leg squat on a BOSU ballStart in an upright position on one leg. Stand in the middle of the flat side of a BOSU-ball. Squat deeply and slowly. Increase the load by squatting deeper | 3 | 8 |
| **Session 3** |  |  |
| Exercise instructions | Sets | Repetitions |
| Eccentric leg extensionStart with both legs extended. Release one leg and count slowly to five as you lower the other leg down to the finish position. Increase the load by increasing the weights lifted on the machine. | 4 | 4 |
| Unilateral leg pressStart in a deep position with one foot on the footplate. Push in a smooth motion through the midfoot. Do not pause in the top and bottom positions, but keep the movement going. Increase the load by increasing the weights lifted on the machine. | 3 | 6 |
| Sideway lungeStart in a standing position. Let yourself fall to the side. With the outer leg, softly brake the movement before you forcefully push back. Increase the load by using dumbbells or a weight bar on your shoulders. | 3 | 8 |

*Plyometric protocol*

The athlete performs 3 sessions (table 3) per week, with a 1- or 2-day break between each session. For every exercise, the number of sets and repetitions prescribed should be performed on the involved leg. Perform the exercise on the other leg in the rest between sets. Rest between sets should last at least 30 seconds. If the exercise feels easy, increase the speed and the height/distance of the hop/jump. Session 3 can be performed in a gym, during practice with the team, or outdoors. If there is no access to a jumping rope, this exercise can be replaced by doing quick ankle hops on one and two legs.

*Table 3: Exercises, sets, and repetitions for the three weekly plyometric training sessions*

|  |  |  |
| --- | --- | --- |
| **Session 1** |  |  |
| Exercise instructions | Sets | Repetitions |
| Continuous hops over hurdlesStart standing on one leg with six hurdles in front of you. Hop rhythmically forward over each hurdle without stopping. The final landing is soft and held for 2 seconds. Increase the difficulty by increasing the speed and height of the hops. | 3 | 6 |
| Sideways hops with step boxPlace two step boxes 50 cm apart. Start on one box standing on one leg. Hop sideways down and bounce up on the other box. Hop back without stopping. Try to make as little noise as possible. Increase the difficulty by increasing the speed and height of the hops. | 3 | 6 |
| Single leg stair hopsStart at the bottom of a staircase. Hop continuously upward with large, soft, and powerful movements. Try to make as little noise as possible. Increase the difficulty by increasing the speed. | 3 | 6 |
| Split jumps on BOSU ballsPlace two BOSU balls next to each other. Start in a deep position with one foot on each BOSU ball. The back foot should be in line with the front foot. Jump up and switch legs in the air. Practice large and soft landings without adjusting too much with your arms and upper body. Increase the difficulty by looking straight forward or holding a ball above your head.  | 3 | 12 (6 landings with each leg in front) |
| **Session 2** |  |  |
| Exercise instructions | Sets | Repetitions |
| Single leg horizontal hop and stopStart on one leg. Perform three fast hops forward and stop sharply and softly. Increase the difficulty by increasing the speed. | 3 | 6 |
| Single leg horizontal hop with 90 degrees turn and stopStart on one leg. Perform three fast hops forward. Before the last landing, turn 90 degrees in the air so that you land sideways. Hold the landing position for 2 seconds. Turn three times to the left and three times to the right in each set. Increase the difficulty by increasing the speed.  | 3 | 6 |
| Skating jumpStart on one leg. Perform a long sideways jump and land softly and controlled on the other leg. Control the position before you jump back onto the first leg. Increase the difficulty by performing the exercise on two BOSU balls. | 3 | 12 (6 landings each leg) |
| **Session 3** |  |  |
| Exercise instructions | Sets | Repetitions |
| Jump rope with one and two legsJump with a slow and steady rhythm. Try to make as little noise on landing as possible. Perform some jumps on one leg and some jumps on two legs. Increase the difficulty by increasing the speed and the jump height. | 3 | 30 seconds |
| Run with foot plantMove across the field/court. Run at a slight angle and perform controlled right and left cuts in alternating order. Maintain knee over toe position during the cut. Increase the difficulty by increasing the speed. The exercise can be seen here: <https://fittoplay.org/sports/handball/handball/>  | 3 | 50 meters |
| Triangle runRun three steps at angle forward and to your left. Stop firmly with your left foot and back up quickly one or two steps. Repeat the movement forward and to your right, and stop with your right foot. Make your way steadily across the field/court. Increase the difficulty by increasing the speed. The exercise can be seen here: <https://fittoplay.org/sports/handball/handball/> | 3 | 50 meters |