

IMPROVING THE TECHNIQUE OF SWIMMING IN FREESTYLE

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Abstract:

The presented technical exercises in this paper include training to help improve the technique in a freestyle, resulting in a more economic and effective movement of the swimmer in the aquatic environment. First of all, we put out the technical exercises aimed at the correct positioning of the swimmer's body while swimming in a free float; roll of the body; twelve kick switch arms. We also present in our contribution selected technical exercises focused on freestyle kicks - vertical kicking; single leg kicking and arm - catch up, shark fin, the weightless arm, dead arm freestyle. The contribution was implemented by the project KEGA 054PU-4/2015 "Implementing blended e-learning in the preparation of trainers and teachers of physical and sports education".

INTRODUCTION

Swimming in the position on the breast using alternate movements of the limbs is one of the oldest methods of human locomotion. Technique of free style has evolved from a biomechanical point of view until this swimming style has become the fastest among the four swimming styles. The freestyle is characterized by the horizontal position of the body with alternating work of the arms and lower limbs, which allow to maintain a uniform velocity of the engaging force (propulsion) with minimal resistance. The contribution was implemented by the project KEGA 054PU-4/2015 "Implementing blended e-learning in the preparation of trainers and teachers of physical and sports education".

Body position

One of the most important elements of swimming technique is the correct body position. The body of the swimmer should be in a horizontal position with a water level from the head to the feet. This position in swimming provides the smallest resistance of the water environment, which means that the water molecules become less turbulent. The result is less leakage of laminar flow molecules on all sides. The turbulence spreads in the direction of flow and passes back to laminar flow at a certain distance beyond the swimmer. Based on the correct position of the body (the starting angle of the body - 0 - 10 degrees, varying from the speed of swimming) is the position of the head (in the extension of the body), straight back and lower limbs, which are close to each other when performing the kicks [2, 3, 6].

Lateral position of the body

The lateral balanced position of the body has a swimmer when through center of his body we can lead a straight line, regardless of whether the body is dialing to the right or left. The lateral balance position of the body is conditioned by rotation of the body around the longitudinal axis, in accordance with movements of arms, shoulders, trunk, hips and lower limbs. This means that the hips and lower limbs will perform rotation from side to side, while rotation of the swimmer's body in arms propulsion in freestyle is natural. The rotation of the

body helps breathing, arms recovery, prevents lateral forging of the body, reduces the frontal resistance, which significantly contributes to the increase of the propulsive force [1, 2, 5]. The aim of the selected technical exercises below is to improve the position of the body to ensure a stable body position at the water level when swimming freestyle.

Float

The purpose of floating is to learn how to regulate body weight while floating on the water level, to understand the importance of proper body position and to improve the feeling of water.

Approach

1. Engage position on your breast, face down with your arms close to your body with hold breath. Do not try to move forward.
2. Note your body position. Most people start lower limbs lead to the bottom of the pool, disturbing the horizontal position of the body at the water level.
3. Start correcting this inappropriate body position by looking down to the bottom of the pool and not forward. For many people, this simple action will improve your body's position as the lower limbs begin to move to the water level.
4. Consequently, it is necessary to focus on the position of the spine, which should be as straight forward as possible. In this position it is necessary to engage abdominal muscles. Learning how to achieve and maintain the correct position of the head and the spine is a very important swimming skill that is applicable in all swimming ways.
5. Once you have a stable body position at the water level (horizontal), the hips and lower limbs begin to point toward the water level. This horizontal body position is best suited for freestyle.
6. Stand up, swing and re-engage with the horizontal body position at the water level with the face down this time with your arms extended forward. Look at the bottom of the pool with a balanced back and stable body flesh (Figure 1, 2).

Problems

1. Lower limbs descend towards the bottom - for some people this effect may be due to the fact that the muscles of the lower limbs are too hypertrophied or have too low a percentage of fat. That's why exercise is very important to them.
2. How to breathe - This exercise is done with restrained breathing. If necessary, simply breathing into the water, stand up and start again.

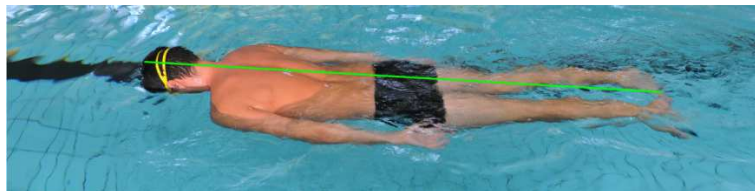


Figure 1 Downhill Float

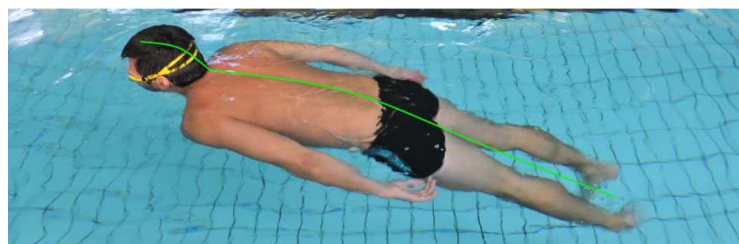


Figure 2 Ø Uphill Float

Roll of the body

The aim of body rotation is to maintain the body's horizontal position and the correct position of the trunk during rotation.

Approach

1. Engage your breasts position.
2. Try to keep this body position and turn your hips and shoulder one quarter to the right. Stay in this position for 5 seconds.
3. Keep head and trunk in one line. Turn your hips and shoulder one quarter to the right (turn to the back). Stay in this position for 5 seconds.
4. Roll once again one quarter, i.e. on the side and hold in this position for 5 seconds.
5. The last is the starting position on the breasts so try to keep it for 5 seconds.
6. Stand up, take a breath and repeat this technical exercise counter clock-wise (Figure 3).

Problems

1. I can not twist a quarter (on the side) - the initial impulse should come from the hips of the body and then from the shoulder.
2. Lower limbs fall down to the bottom - if necessary, try to do a very easy kick exercise.
3. How to breathe - breathe once you are on your back.

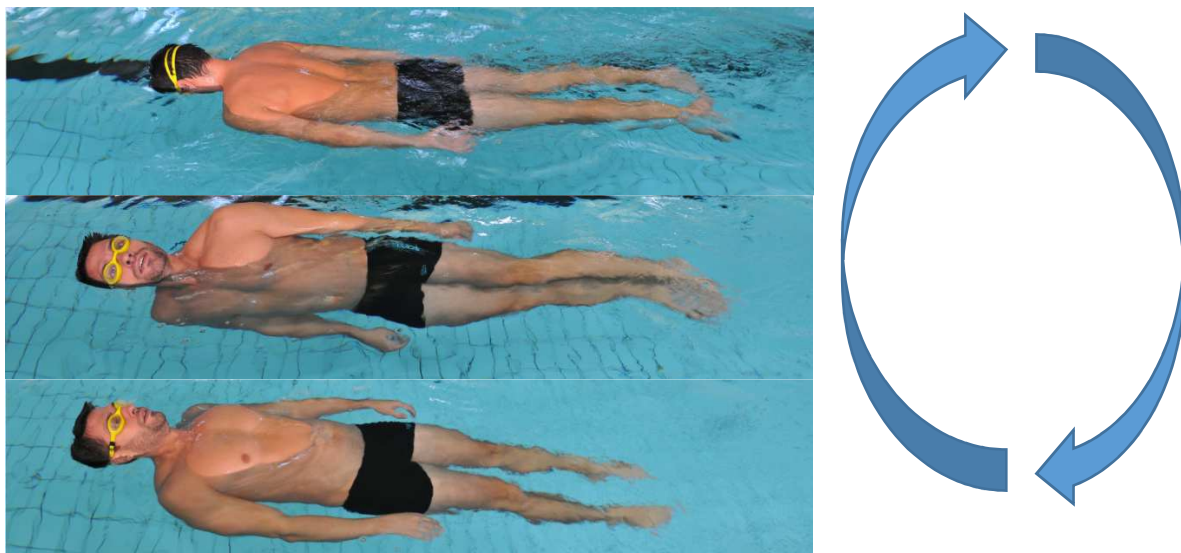


Figure 3 Roll of the body

Twelve kick switch arms

The purpose of exercising twelve kicks with arm swing is to learn to maintain the correct position of the body during swimming and to be able to identify the longest position of the body.

Approach

1. Engage your breasts position. One arm is located next to the body at the water level, and the other in the extension of the shoulder axis below the water level.
2. Start doing freestyle kicks, but not from the top to down, but diagonally.
3. If you have taken the correct body position, most of face will still be dipped in water. If necessary, rotate your body, swing and take your starting position again in water. Create a certain rhythm of breathing.
4. Perform twelve kicks.

5. During the last kick, move the arm located next to the body over the water forward, the other engages under water and stops next to the body.
6. Perform twelve kicks with rotation and arm exchange until you reach the end of the swimming pool (Figure 4).

Problems

1. Swimming is not straight - try to balance the body and stretch your arms.
2. Freestyle kicks are not diagonal - this problem is usually the result of the hips, that are not in the flush with the shoulders.

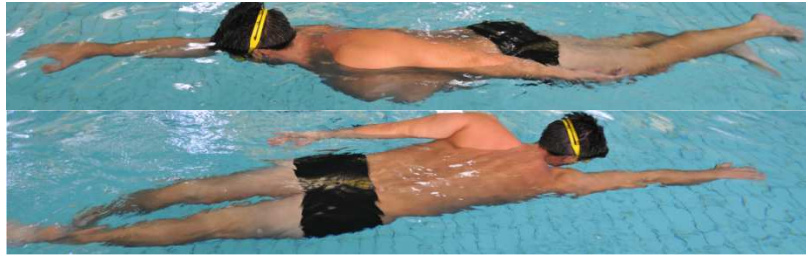


Figure 4 Kick switch

Freestyle kick

Compared to the propulsion force of the arms, their share of the total propulsion force in the freestyle is minimal. The use of the propulsion force of the kicks of lower limbs is dependent on the length of the swimming discipline, because their oxygen consumption is four times bigger as swimming with arms. The freestyle kicks provide, in particular, the correct hydrodynamic position of the body, a stabilizing and coordinating function, and reduce fluctuation of swimmers instantaneous speed. In the freestyle kick of the lower limbs, they perform alternate movements in the vertical plane and, due to the rotational movement of the body and arms, the lower limbs move in a diagonal direction. Because lower limbs movements require an excessive amount of energy, it is important that their movement is relaxed [4, 7, 11]. The aim of the following exercises is to learn how to economically perform lower limb movements, which have to improve kicking during crawl.

Vertical kicking

The aim of vertical kicks is to understand the importance of foot speed, engage the right muscles during freestyle kicks and improve the feeling of water.

Approach

1. Find the depth of water you need to get vertical movement with the lower limbs. Start with small movements of the arms to the sides to keep the head above the water. Work of trunk is also important here.
2. Ensure a stable body position (without moving forward and backwards) and start moving the lower limbs forwards and backwards, approximately between 30-40 cm. The fingers should point towards the bottom of the pool with a slight sliding of the feet into the inside.
3. Focus on the muscles involved in the movement. We should feel the quadriceps femoris when moving the limb forward. When moving the limbs backwards, we should feel the joining of the musculus semimembranosus, semitendinosus, biceps femoris and gluteus maximus, medius and minimus.
4. Lower limbs should be cut off with a slight knee bend during the kick. If you increase the speed of kicks back and forth, do not lift the knees upwards (such as cycling).
5. Start kicking even faster. Try to get a kick like feeling like you do not have bones. Try to hold this position with your head above the water level for about 30 seconds.

6. If you think that you have achieved smooth motion with the lower limbs, stop the movements with your arms. Cross your arms over your chest, put your arms on your shoulders. Try to hold this position with your head above the water level for about 30 seconds.
7. If you have mastered the previous point, try to move your arms to the extension, while the elbow is right angled. Try to hold this position with your head above the water level for about 30 seconds (Figure 5).

Problems

1. Sink to the bottom of the pool - align the lower limbs, aim your fingers to the bottom of the pool and make kicks faster.
2. Move the body up and down - perform a smaller range with the lower limbs while moving forward and backward. Increase the frequency of kicks.
3. Movement of the whole body - relaxed lower limbs. Try a smaller knee bend. Try to make the initial impulse from the hip and thigh muscles, which are larger and stronger than the foreleg muscles.



Figure 5 Vertical flutter kick

Single leg kicking

The aim of the exercise is to make an effective freestyle kick and to improve freestyle kicks under water.

Approach

1. Grasp the swim plate with your hands over the upper part so that the forearms of the arms are leaning against the plate. This creates a certain support for the arms holding the face above the water level. Keep the plate in a parallel position with the water level.
2. Start doing crawl kicks but only with the right lower limb. Leave the left lower limb free to swim. Perform 30 energetic kicks, followed by a short break.
3. Try again so that movement moves from the hip and not just the knee. Note that if you improve your skills, start crawling kicks very quickly, energetically without interruption. Also note that it is much more energetic to make a kick down.
4. After a short rest, try the same movements with the second lower limb (Figure 6).
5. You can also try a more complicated variation. Bend the left lower leg in the knee (90 degrees) so that the heel is above the water level. The second lower limb has to make very fast kicks without pause, so the movement moves out of the hip joint. After 30 kicks change the lower limbs (Figure 7).
6. After a short rest, start freestyle kicks. Use the experience from previous exercises.

Problems

1. Position of the body with the plate is oblique - push the plaque plate with your arms while trying to keep it parallel to the water level.
2. I'm not moving - try to make a stronger kick, but not bigger, just more energetic.



Figure 6 Single leg kicking



Figure 7 Advanced single leg kicking

Freestyle arms

The main part of the propulsive force at the freestyle creates arms. The movement of the arms is uniform, alternating and consists of two phases - the phase of the propulsion below the water level and the recovery phase above the water level. During one cycle, the arms perform both phases. The arms propulsion consists of several diagonal sliding movements. We can divide arm movements into the following stages – entry and stretch, catch, propulsion (pull and push phase), release and recovery. Freestyle is affected by the number of kicks. The most commonly used rhythm is six beat kick, with six kicks per set. Another rhythm can be a two-beat kick, where two kicks are performed on one set of the arm. From the point of view of coordinating movements, this rhythm is more economical than others, especially for swimmers in endurance swimming disciplines [2, 8, 9, 10]. The aim of the following exercises is to learn how to perform arm movements economically to improve the active phase of propulsion and the passive phase of recovery during freestyle.

Catch up

The aim of the exercise is to practice long propulsion, feel acceleration during the propulsion, and recovery the arm with high elbow.

Approach

1. Bounce of the wall. Take a floating position with freestyle kicks. The arms are in extension of the shoulder axis.
2. The left arm starts to propulsion. Right arm waits for the left in extension. Arms movement starts with fingers, palm is facing down and push the water backwards. The arm moves further along the "S" path towards the hip, while the arm movement is accelerated.
3. The right arm is extended and the left is located next to the body. This is followed by the release and recovery of the arm above the water level to the starting position (extended shoulder axis) next to the right arm. Next, the same movement is followed by the right arm.
4. Arms propulsion repeat. Breathing is performed as required for either a single propulsion or one-and-a-half propulsion cycle.

5. Perform the exercise several swimming lengths. Try to watch the body accelerate during the arm's propulsion underwater, in the pull and push phase. Push the arm backwards, so you can use the full length of the propulsion. Note that one arm is always on the front and is guiding and the other is in propulsion (Figure 8).

Problems

1. Do not move - the hand position and the palms do not point down and back along the "S" slider path. Elbow should be in water in high position. The propulsion phase should be accelerated and end at the lower limb.
2. During the breathing, the arm drops down - during rotation of the trunk when breathing try to extend the arm, which is at the front.

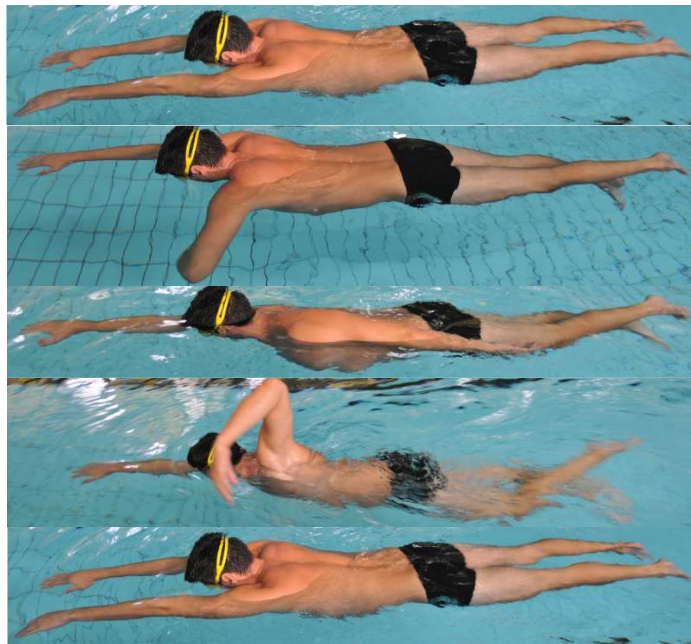


Figure 8 Catch up freestyle

Shark fin

The aim of the exercise is to improve the recovery phase, high and relaxed elbow.

Approach

1. Bounce off the swimming pool wall and start swimming in the position slightly on the side, where one arm is located in the extension of the shoulder axis and the other is located next to the body. Start doing freestyle kicks.
2. While maintaining the body position during freestyle kicks, move your hand to the side and lift the elbow up to the position of the shark fin. Hold in this position for at least 5 seconds, with your arm relaxed. Then, return the arm back to the starting position.
3. Repeat this movement with one arm a few times and try to get the most perfect shark fin. Note that if you want to reach the highest shark fin, you have to lie slightly on the side.
4. After ten shark fins, change your arms (Figure 9).

Problems

1. Do not reach high elbow - make sure you swim slightly on the side. If you do not swim in this position and you do not have enough shoulder flexibility, you will find it difficult to perform a shark fin.
2. I dive - Increase the freestyle kicks frequency.

3. The arm is not relaxed - repeat the exercise several times, focusing especially on the position of the body with high relaxed elbow.

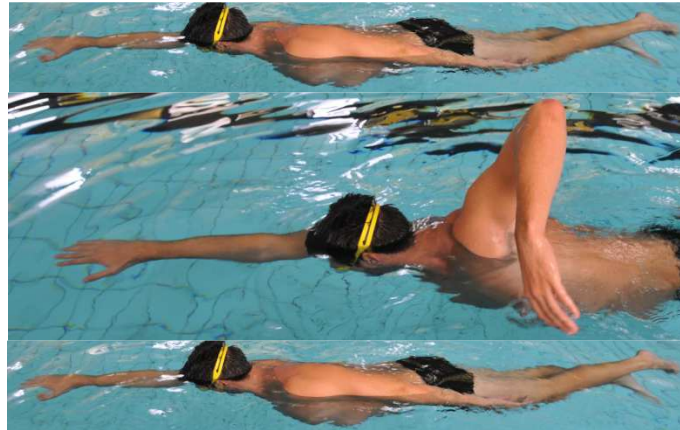


Figure 9 Shark fin

The weightless arm

The aim of the exercise is to keep the arm stretched during the breathing, to learn the correct timing during the breathing and to turn not only the head but also the trunk during the breathing.

Approach

1. Bounce from the swimming pool wall and start swimming freestyle. Arm propulsion should be relaxed with rhythmic breathing for one propulsion phase.
2. Approximately in the half-way of the pool, when your mouth chop the water and the breathing comes, try to stay in that position for some time. During this time, start to see where the extension arm is. If the arm starts to fall downward during the breathing, it then acts as an anchor, losing half of propulsion that could push you forward (Figure 10).
3. To avoid a heavy arm it is necessary (Figure 11) to start to swim slightly on the side, with the breath on the side where the arm is located next to the body. The second arm is in extension under the water level in the extended shoulder axis. Perform freestyle kicks with your face under water several times in a row. Take a look where the arm in extension is.
4. Now try it with propulsion of your arm. Again, start swimming on the side, which is your breathing side. The arm performs the release and recovery phase (the face starts to rotate below the water level and the shoulder and the hips begin to rotate). Then there is an exchange of arms. If the arm reaches the end of the propulsion phase of pushing, the face again rotates and the breathing begins.
5. Note the position of the front arm that should be stretched (under the water level) throughout its length during the breathing. Repeat the exercise until the shoulder is in the optimal position during the breathing.
6. After learning this exercise, start swimming a few freestyle lengths. Swim slowly and focus again on the arm that is found during the breathing in front. Repeat the exercise until you remove the heavy arm.

Problems

1. The arm is still heavy - go back to the technical training of 12 kicks with an exchange of arms that is aimed at capturing the water.
2. Lack of time on breathing - Focus on earlier rotation of the body, in the pushing phase.

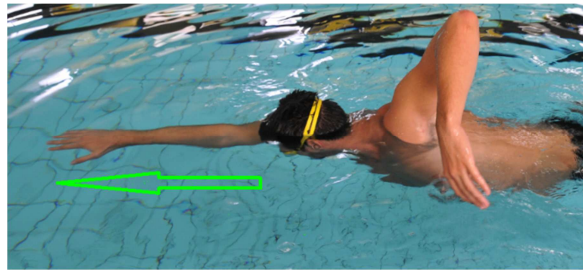


Figure 10 Weightless arm

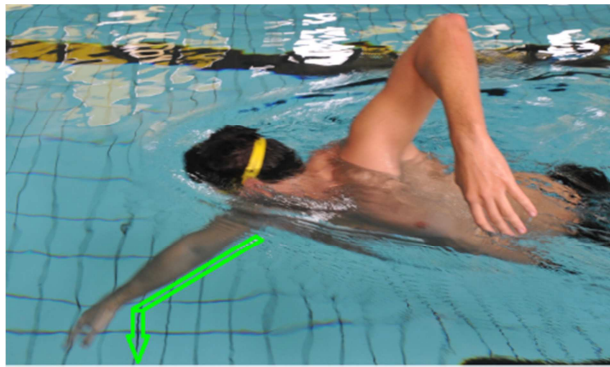


Figure 11 Ø Heavy arm

Dead arm freestyle

The aim of the exercise is to feel the propulsion of the arm during exhalation, to move in the water during exhalation and to learn the right timing of breathing.

Approach

1. Bounce from the swimming pool wall. Take a floating position with freestyle kicks, one arm is in extension and the other is close to body.
2. Start swimming freestyle, but only with one arm. Before each propulsion, focus on the arm that is in the extension, which stay in the extended shoulder axis. During propulsion, focus on the entire length of the propulsion, while the propulsion is guided from front to back with an elbow higher than the hand on the "S" path.
3. Breathe in the side where your arm is close to the body. The rotary movement comes from the hips and arms, not just from the head. Breathing begins when the propulsion arm is in extension. During the breath do freestyle kicks. During re-breathing the shoulder should be over water. When you rotate the face into the water you will feel that the shoulder and hips have rotated downwards.
4. Continue to swim with one arm until the end of the swimming pool, focusing on arms propulsion, body rotation and breathing. Change your arms back and repeat the exercise. Continue with the exercise until the body rotation improves with breathing (Figure 12).

Problems

1. Breathing Problem - During one arm swimming, it is necessary to rotate the body in the hips and shoulder. The re-breathing will not be optimal if the body position at the water level is too flat.
2. Large head bow in the starting position - Create a correct floating position of the body in the position on your breasts with a slight turning of the body to the side. Improve the freestyle kicks.

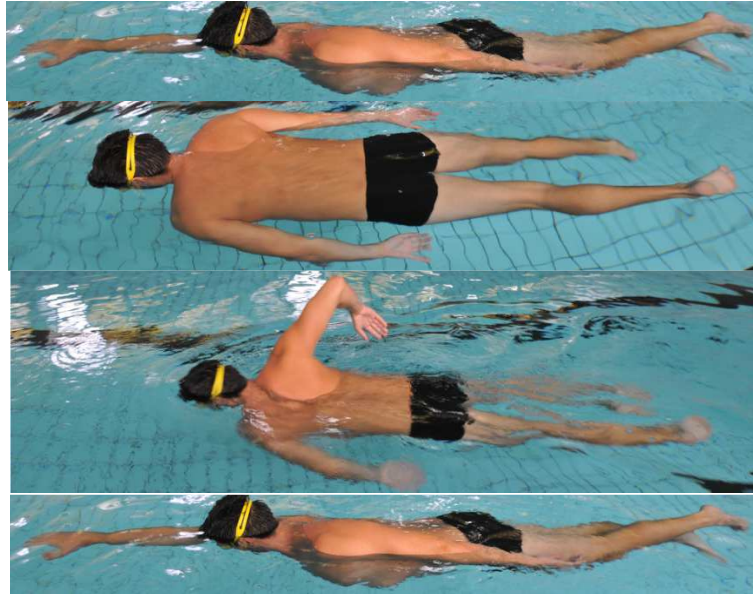


Figure 12 Breathing toward the dead arm

CONCLUSION

Freestyle is one of the fastest swimming methods, yet there is no uniform technique in freestyle for everyone because it is linked to the biomechanics of the human body as well as to the length of the swimming discipline. The most important driving force in the freestyle is arms propulsion, while without right execution of kicks and master the basic swimming skills, which are an integral part of each swimming technique may not be effective. The presented technical exercises in this paper include exercises designed to help improve technique in a freestyle, the result of which is to be more economic and efficient movement of the swimmer in the aquatic environment.

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