Review Article

How to get an efficient swim technique in triathlon?

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ABSTRACT

Cala A, Cejuela-Anta R. How to get an efficient swim technique in triathlon? *J. Hum. Sport Exerc.* Vol. 6, No. 2, pp. 287-292, 2011. Both in swimming and triathlon, depending on the event, the athletes have to swim the same distance (1500 meters) but the goal is different. In swimming, the goal is to be the fastest (winning the race). In triathlon, the goal is to make the first group saving as much energy as possible. Thus, the main objective of this manuscript is to find out how coaches can make the athletes to achieve an efficient swim technique that requires less amount of energy during a triathlon competition. The triathletes need to develop a more efficient and economic swim technique by reducing the speed fluctuations within the swim stroke. Basing on the "kayak principle", there are some strategies they can be adopted during the training sessions to achieve a continue propulsion through the stroke. The use of different drills based on the "feeling of the stroke rhythm" as well as the available equipment, can help to achieve technique that requires less amount of energy to swim at the same pace. However, there are also some considerations to take into account during a normal training session, as other sets, aids or equipment can affect the coordination between arms as well. **Key words:** INTRA-CYCLE VELOCITY, SWIMMING ECONOMY, TRAINING.

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E-mail: antonioc@nzasni.org.nz
Submitted for publication February 2011
Accepted for publication March 2011
JOURNAL OF HUMAN SPORT & EXERCISE ISSN 1988-5202

doi:10.4100/jhse.2011.62.08

INTRODUCTION

Both in swimming and triathlon, depending on the event, the athletes have to swim 1500 meters. The distance is the same, but the goal is different. In swimming, the goal is to be the fastest: to win the race. In triathlon, the goal is not to be the fastest: the goal is to make the first group saving as much energy as possible, as the race is not over when they exit the water.

When the athlete swims in the water, his speed increases and decreases within the swim stroke. This is what the biomechanists call intra-cycle velocity. Swimming at the same speed, the bigger those variations are, the more energy is required (Barbosa at al., 2005). To swim faster using the same amount of energy, a swim technique that minimizes the intra-cycle velocity variations is needed, creating a smoother and constant movement. When walking, the humans maintain a natural constant rhythm. It is the most economic way to get around. When swimming crawl, the situation should be similar. As the muscles of one side of the body are shortening and contracting, those on the other side are simultaneously relaxing, lengthening and storing energy (Tureski, 1997).

Quadruped animals use a similar stroke frequency to gallop at different speeds. They speed up by taking larger strokes, not by increasing the frequency. In an attempt to go faster, athletes often increase stroke frequency which usually results is less range of motion. When animals go faster they usually increase their range of motion (Tureski, 1997). However, at the highest velocities triathletes tend to increase their propulsive phases to a lower extend than swimmers. They also increase their recovery phase, in contrast to the swimmers (who reduce it). This suggests some technical limitations in triathletes who reach a stroke rate too high and reducing their technical efficiency at maximal velocity (Millet & Vleck, 2011). During a race, increasing the stroke frequency can help to protect the triathletes against the rest of participants during a race. So, a higher stroke frequency can be beneficial for them in that case. But, on the other hand, an increase of the frequency leads into a higher energy cost (Craig & Pendergast, 1979; Zamparo, 2006) and, as a consequence, the stroke becomes less economic as well.

It seems to be clear that triathletes need to train the swim technique differently than the swimmers as the goal is also different. Therefore, the main objective of this manuscript is to find out how coaches can make the athletes to achieve an efficient swim technique that requires less amount of energy during a triathlon competition.

METHODS

To achieve a consistent intra-cycle velocity in crawl, reducing its variations within the stroke, it is important to understand the “kayak principle”. This principle is based in the theory of moving the arms simultaneously placing them in opposite direction, as the paddle of a kayak (Toureski, 1992). Following this principle, it is possible to get continuous propulsion. So, there are no stops within the stroke. If one arm is moving, the other one should be moving as well. Chollet et al. (2000) proposed a method to evaluate the arms coordination denominated “index of coordination” (IdC) that is the time lag between the beginning of the propulsion of one arm and the end of propulsion of the opposite. When the propulsion is continuous there is not time in between and the IdC is equal to zero. This is called “opposite stroke”. The coaches normally call it “swim rhythm” or “arms coordination”.

In training, there are different strategies that can help to improve the arms coordination achieving the mentioned kayak position. There is a wide diversity of technique drills, equipment and the way the sets can be swam. A good combination of all of them can make the triathlete to improve his swim rhythm considerably and, consequently, to achieve a more economic and efficient swim technique.

The main mistake on technique the triathletes present is swimming with a "catch-up stroke" (Hue at al., 2003). This is, swimming with an IdC close to -10±5 (Chollet et al., 2000). In other words, one hand enters into the water when the other one is still at the first part of the underwater stroke. In this way, the arms are not placed in an opposite position (kayak principle) and, as a consequence, the propulsion is not continuous. One of the reasons that cause this mistake is the long aerobic sets performed at a low-pace speed during the training sessions. In this situation, the triathlete tends to glide too much during the first part of the stroke, producing a stop in that arm. At the same time, the opposite arm performs the recovery without any stops. When this arm enters into the water, the other one is still at the beginning of the stroke due to the long glide. Thus, the arms position is not opposite as it should be.

Therefore, it is important to eliminate any stops of the arms during the stroke to get a constant swim speed. Arms movement should be similar to the ratios of a wheel. They can go faster or slower, but always in opposite placement and they never stop. To get the rhythm of the stroke fixed, the following training progression is suggested:

1. *Swimming against a rope.*

The triathlete needs to wear a belt that has a rope attached to the side of the pool. In this way, the athlete doesn't move through the water and he feels the tension of the rope. If the stroke rhythm is consistent and there are not stops within the stroke, the triathlete will feel a constant tension of the rope and the body will be placed in the same spot. On the other hand, if the coordination is not right, the rope will present different tensions (different peaks within a stroke cycle) and the athlete's body will be moving back and forward. The faster the swim, the easier is to get a good rhythm. Using the index of coordination, Seifert et al. (2007) showed that when the speed increased from 1.47 to 1.92 m.s-1, the inter-arm coordination of elite front crawl males switches from a catch-up mode (IdC~ 10±5 %) to a superposition mode (IdC~ 3±6 %). But the triathletes have coordination problems swimming at slow paces, so swimming at supra-maximal speed is not recommended to fix the rhythm in this case. It also exists a similar training to this one: resisted training with a bungee. The main advantage of the rope is the athlete can feel the differences in tension better than with the bungee, due to the elasticity of the second one.

2. *Swimming with a sponge/parachute.*

In this case the rope is attached to a sponge or parachute. The triathlete is able to swim with a resistance behind him, which doesn't affect the swim technique. As in the previously drill, the athlete can feel the tension of the rope, smaller stimulus now, with the added bonus of moving the body through the water.

3. *Swimming with a sponge/parachute and finger paddles.*

It seems to be a small variation but the finger-paddles represent a very important aid to the swim technique. They are small paddles placed on the fingers area and provide extra feeling when the hand entries in the water. As a consequence, they make the athlete to generate propulsion earlier in the stroke avoiding any stops or long glides.

4. *Pulling (swimming only with arms).*

Kicking is one of the reasons that can impair the timing of the stroke. It is common the best kickers are always the ones who have issues with the arms coordination. Using a pull-buoy to keep the legs together, pulling facilitates to fix the stroke rhythm.

5. *Normal swimming.*

It is always important to finish with a normal swim (full stroke), to transfer those new feelings to the whole stroke. Freestyle should be arms-dominated rather than a kick-dominated stroke. Legs would only play a role to maintain the body position. A very strong kick could affect the arms coordination and would culminate in an additional energy cost. In triathlon, it is important to reserve the legs for the upcoming segments of cycling and running.

RESULTS AND DISCUSSION

When the triathletes swim with a consistent "stroke rhythm", they are able to swim at the same speed expending less energy and taking less number of strokes. In other words, they make the swim easier and they cover a longer distance in each stroke. Although there are strategies to improve the swim rhythm, there are also some considerations to take into account during a normal training session. There are some sets, aids or equipment that can affect the coordination between arms and, as a consequence, impairing the stroke efficiency.

Long aerobic sets swam at slow paces by the triathletes are one of the main factors affecting the rhythm. It is quite difficult for the athletes to keep their attention focused on technique during those sets. As soon as they get tired, rhythm is the first thing to lose. To avoid this situation coaches usually provide verbal feedback to the athletes during the set. Also, performing a "pre-set" focused on technique just before the main set works really good as well and provides to the triathlete a feeling reminder of the good stroke timing. An example of this pre-set could be:

12x50 @ 1' (focused on rhythm)
3. Sponge + finger paddles
3. Sponge
3. Pulling + finger paddles
3. Swim

Another aspect affecting arms coordination in freestyle is when the athletes are extremely focused on the high elbow position during the first part of the stroke. A good body-roll is needed to maintain a consistent rhythm, so high levels of flexibility are required to achieve that high position of the elbow. Triathletes usually present lower levels of this quality comparing to competitive swimmers and because of this, triathletes tend to swim with a flatter body position and presenting a "catch-up stroke" as less flexibility is required due to the flatter position of the body. Therefore, the drills teaching the high position of the elbow where both arms are extended to the front (flat body position without body roll) are not recommended. As an alternative, keeping the arm that is not pushing water next to the body is a better option.

Breathing is another factor affecting the swim rhythm (Seifert at el., 2008). Keeping a superposition stroke when the athlete always breaths on the same side, seems to be easier to achieve when swimming at high speeds (Seifert et al., 2008). However, in a triathlon race the athletes need to perform different breathing patterns (front and side breathing) to keep themselves orientated and to control the other competitors. For

that reason, practicing the different breathing patterns during the training sessions is essential to minimize the speed fluctuations that could happen during those technical actions.

Finally, it is important to make a good choice of the equipment to use during training. Some studies have reported the influence of big paddles on the swimming stroke (Sydney at al., 2008). Big paddles make the athlete to swim faster but not with a proper technique because of 2 reasons. Firstly, they slow down the underwater part of the stroke (due to the bigger resistance the hands present to the water) but not the recovery. So it is very common to swim in a "catch up stroke" when using them as the recovering arm "catches up" the other one at the front part of the stroke. Secondly, the triathletes don't have enough strength in the muscles which produce shoulder internal rotation to move the paddle, so they tend to use the latissimus dorsi muscle (more powerful than the other ones) placing the elbow in a very low position losing efficiency at the beginning of the stroke.

The other equipment affecting swim technique is the fins. The athletes tend to "over kick" when wearing them as the swim speed increases. That makes the stroke "kick dominated", rather than "arms dominated". When freestyle is dominated by the kick, the arm coordination is harder to maintain and the arms tend to adapt their frequency to the kick and not the other way around. As a result, the triathlete loses the swim rhythm.

CONCLUSION

The triathletes need to develop a more efficient and economic swim technique by reducing the speed fluctuations within the swim stroke. Basing on the "kayak principle", there are some strategies they can be adopted during the training sessions to achieve a continue propulsion through the stroke. The use of different drills based on the "feeling of the stroke rhythm" as well as the available equipment, can help to achieve technique that requires less amount of energy to swim at the same pace.

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