In front crawl swimming, head movements should be coordinated with body roll to reduce the tendency for swimmers to lift their head out of the water for a breath (Maglischo, 1993). Costill et al. (1992) introduced that swimmers recover their arm higher and more linearly on the breathing side and use somewhat lower and more lateral swing over the water on the non-breathing side. Payton et al, (1999) did not find significant alterations of the timing in male front crawl swimming. The aim of the present study was to determine the effects of breathing on the three – dimensional underwater stroke kinematics of female front crawl swimming. Ten female freestyle swimmers performed 6 front crawl swimming trials of 25 m at a constant speed under breathing and breath-holding conditions. The underwater motion of each subject’s right arm was filmed using two S-VHS cameras, operating at 60 fields/s, which were positioned in front of two underwater viewing windows. The spatial coordinates of selected points were calculated using the DLT procedure with 30 control points and after the digital filtering of the raw data with a cut-off frequency of 6 Hz, the hand’s linear displacement and velocity data were calculated. The analysis of the data revealed that when swimmers performed the breathing trials, the time to complete the arm stroke, the backward hand displacement relative to the water and the lateral displacement of the hand in the X – axis during the downsweep were significantly increased, while peak backward hand speed during the insweep and the displacement of the hand during the push phase were greatly reduced. Moreover, the total displacement of the hip during the total duration of the underwater pull stroke was significantly increased by an average of 6%. The results of the present study revealed that breathing action and body roll affects the movement pattern and stroke mechanics. When female swimmers performed the breathing action they increased significantly their timing of the total underwater pull without any change during the insweep and push phase. These results have to be taken into account by coaches in order to better understand the technical effects of stroke arm position, breathing action and co-ordination.

References

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