

Original paper

Approaches used by a physiotherapist in synchronized swimming for an adult with cerebral palsy

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Abstract

Relatively unknown sports for people with impairments, such as synchronized swimming, are given less medical support. As a result, people with impairments may develop a misuse syndrome or secondary condition. In this study, we report the use of synchronized swimming as an intervention for a female with cerebral palsy supported by a physiotherapist. We highlight that it is important for physiotherapists or other supporters of people with impairments to consider the characteristics of the person's physical disability and activities of daily living, and give them appropriate advice before undertaking any sporting activity.

Key words: Sports for people with impairments, cerebral palsy, support by physiotherapists

Introduction

The history of sports undertaken by people with impairments differs depending on the disability, e. g., deafness, physical impairment, and mental disability. The first Paralympic Games was held in 1960 in London due to the efforts of Dr. Ludwig Guttmann, who proposed that "It's ability, not disability, that counts". Today, the Paralympic Games remain a major international sporting event, which attracts mass media attention. On the other hand, a large number of sports for people with impairments are not included in the Paralympic Games, including recreational sports, such as aquatics programs, which are generally popular among children and adults with impairments. Although many studies on swimming for spinal cord injury victims exist, only a few have been published on swimming and patients with cerebral palsy (CP). Indeed, aquatic exercises have been demonstrated to be effective for reducing muscle tone or improving the cardio-pulmonary function and gross motor function in

patients with CP. Moreover, a study on children and adolescents with CP reported that performing motor skills in the water can potentially increase confidence and lead to less resistance when attempting difficult tasks. However, despite these positive results, few studies have been conducted on synchronized swimming and patients with CP or other impairments.

While synchronized swimming is a sport undertaken by people with impairments, it is not generally recognized by the medical profession. Therefore, few reports to date have investigated synchronized swimming for people with impairments. In this study, we report the approaches and advice, according to movement and risk management, provided by a physiotherapist for a female with athetoid cerebral palsy participating in synchronized swimming.

<What is synchronized swimming for people with impairments?>

Synchronized swimming for people with impairments was initiated in Kyoto, Japan in 1983.

Synchronized swimming involves synchronization with water, music, and people (Morita, 2011). Similar to the competition events of synchronized swimming, several types of performances exist for people with impairments, including solo, duet, trio, and team performances. The most prominent feature of synchronized swimming, which no other sport for people with impairments has, is equality. That is, regardless of the age, sex, and presence or absence of disability, the same performance is given by all participants.

Both people with and without impairments enjoy synchronized swimming as a sport. Even if a person has a severe disability, they can still swim utilizing the properties of water, or if it is difficult to swim by oneself, they can be paired with a healthy team member. These healthy team members are usually elderly people or members of their family. Relatively few people with impairments currently pair with physiotherapists. Moreover, both people with and without impairments can start synchronized swimming even if they cannot currently swim. While practicing synchronized swimming, they will learn to swim and gain freedom in the water. Synchronized swimming requires various motions to swim, maintain balance, and add unique technical movements (figures), such as rotation, spin, or float. In addition, a successful performance can build confidence, and practicing the performances helps swimmers to maintain or improve their physical functions.

An annual synchronized swimming festival is held in Kyoto for people with impairments as an opportunity to present their progress and achievement. This annual event celebrates its 25th anniversary next year. The number of participants has increased year by year. Currently, over thirty groups compete in the solo, duet, and team events in the festival (Fig. 1). Five judges give criticism after each performance, and three winners are selected. An annual solo competition is also held, in which participants perform in each classification of impairments, and their scores are ranked. This competition is only in its third year, and while it currently has only a small number of participants, more are joining each year.

Subject and Methods

We explained the purpose and methods of this study orally to the subject and obtained approval.

History

The subject was a 34-year-old female diagnosed



Fig. 1 Team performance

with athetoid cerebral palsy. She developed cervical spondylosis as a secondary condition. The subject's height was 156 cm, her weight was 68 kg and her Gross Motor Function Classification Score (GMFCS) was 4. As for her activities of daily living (ADL), the subject uses an electric wheelchair outdoors and moves on all fours when indoors. It is possible for the subject to stand up when grasping some support. She has toileting independence. Regarding the function of her upper limbs, she can eat using a spoon; however, she needs help changing her clothes because of her hypertonia.

With respect to her motor function, her muscle tone shows high spasticity while active both in water and on land, particularly her upper limbs move involuntarily. She mainly uses her left arm with left neck rotation because of the asymmetrical tonic neck reflex. During movement in the water, her right upper limb shows flexion, while her lower limbs show an extension pattern. While floating on her back, the spasticity of her upper limbs relaxes; however, the lower limbs still show hypertonia.

The subject started synchronized swimming at the age of 13 years. At the age of 26 years, she paired with a physiotherapist and participated as a duet in an annual synchronized swimming festival held in Kyoto. The team practice took place in 1-h sessions, two or four times each month. At the baseline, she could swim breast and back stroke without support, but only slowly. She could perform the following technical movements (figures): scouring (scour with arms while floating on one's back) and floating and tab (flex both legs while floating on the back) (Fig. 2). However, the spin and rotation movements were difficult to independently perform. She practiced spinal rotation for 6 months with her physio-



Fig. 2 Practice for duet performance



Fig. 3 Repeat the isolated movement in a relaxed position.

therapist. As a result, she could voluntarily rotate her body backward in 2014.

As for rehabilitation, the subject underwent sessions during childhood, but discontinued them after high school. At the age of 26 years, she attended physiotherapy sessions again (once every month in a hospital) because she became aware of a decrease in her motor function. At the age of 32 years, she also started home occupational therapy once a week.

Approaches for synchronized swimming

The subject's hopes were to : (1) relax her body in the water and (2) increase the possible synchronized swimming techniques she could perform. The aims of the physiotherapist were to reduce the subject's spasticity, to teach the subject the difference between voluntary and involuntary pattern movements, to facilitate the subject's use of trunk muscles, and to increase the subject's satisfaction or confidence via synchronized swimming. Regarding ADL, the physiotherapist's Main aims were to reduce the body weight by exercising and maintain her ability to perform daily activities.

Specific approaches were as follows :

(1) Approaches in the water :

To achieve relaxation in the water, while the subject was floating on her back, the physiotherapist would move the subject's trunk (passively swing left and right) to reduce spasticity. To increase the possible synchronized swimming techniques, the subject would repeat the isolated movement consciously (Fig. 3), and the physiotherapist would give advice on abdominal muscle facilitation exercise because the lower tone of the abdominal muscles can cause hyper-tonia of the legs.

(2) Exercises on land :

The physiotherapist suggested facilitation exercise for abdominal muscles and neck stabilization exercise for cervical spondylosis.

(3) Support for daily life :

The symptoms of cervical spondylosis and obesity had become more severe as the subject aged. Simultaneously, her complaints increased regarding her difficulty in movement and frequency of falling while performing indoor activities. The subject was given the following advice from the physiotherapist : to use a wheelchair indoors for safety and to exercise to prevent muscle weakness.

Results and Discussion

Motor function

Overall, the subject has not shown acute deterioration and has maintained her motor function for 7 years. A physiotherapist in a hospital evaluated the motion of the subject as slow when she did not undertake synchronized swimming practice for a while. The physiotherapist who paired with this subject for synchronized swimming confirmed this evaluation. That is, the subject moves smoothly and shows better performance when she practices synchronized swimming every week. With even a single absence, the spasticity increases and movement is slowed. The flexion pattern of the right arm is also marked and difficult to relax.

Recent problems

The subject has used an electric wheelchair since her late teens. Her body weight started increasing in her early twenties. In her late twenties, she complained of symptoms of cervical spondylosis, which has recently worsened.

Regarding the cervical spondylosis, an attending physician suggested an operation and did not recommend synchronized swimming. The reason for not recommending this sport is because swimming has some risks, such as slipping on a wet floor and changing clothes without help. However, the doctor allowed the subject to continue synchronized swimming practice under certain conditions, whereby the physiotherapist managed the risk and provided the intervention.

A large number of people with CP show a decline in motor function over the age of 30, and cervical spondylosis tends to appear at a young age (Sekiya et al., 1992). This subject is over the age of 30 years, and thus, her motor function had declined, resulting in obesity, and inactivity. Therefore, to maintain and increase physical health an exercise program is the key. Exercise on land has an inherent risk of falling; indeed, the subject has fallen down several times recently. However, in the water, the subject will never fall, and buoyancy can reduce the effects of gravity and increase postural support. Moreover, aquatic exercise eliminates the body mass load, which reduces the muscle tone, and thus, is more appropriate than on land. Despite this, it is impossible to relax the muscle tone when swimming; rather it forces more spasticity and fatigue. On the other hand, during synchronized swimming, there are many chances for people to float and relax; therefore, it is possible to exercise and relax at the same time. In addition, synchronized swimming can provide marked satisfaction when completed or if the patient achieves success during a performance.

A large number of volunteers are required at centers that offer sports for people with impairments. Unfortunately, relatively unknown or unrecognized sports have few volunteers are insufficiently considered by physiotherapists and other health care workers. For this reason, people with impairments may develop a misuse syndrome. If the disability is severe, people with impairments may try to adjust to the sporting environment offered to healthy people, which in turn, increases their risk of injury or secondary conditions. Therefore, if supporters can understand the characteristics of their disability or motor function accurately and give appropriate advice, people with impairments will be able to enjoy sports for a long period.

Other than the Paralympic Games, physiotherapists can give appropriate advice for people with impairments for participating in recreational sports. This advice should reflect the person's

ADL. Indeed, Okuda (2005) reported that physiotherapists should engage in risk management or conditioning for people with impairments and should prepare the environment in which they can perform the sports safely. These remain key challenges for physiotherapists in the future. At the same time, physiotherapists should positively participate in the competition or recreational activity for ongoing management. Even as a volunteer in these sporting centres, physiotherapists are specialists on motor function and are responsible for maintaining current knowledge and skills. To prevent unnecessary risks to people with impairments, physiotherapists should make an effort to keep their skills up-to-date.

Conclusion

In this study, we reported the intervention for a female with cerebral palsy via synchronized swimming supported by a physiotherapist. We observed that the task of the physiotherapist was to perform risk management to prevent secondary conditions and provide interventions reflecting the ADL. We propose that in the future, physiotherapists should play a key role in all sports played by persons with impairments, including synchronized swimming.

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