

Sergio Rigardo

*Physiatrist, Master Teacher "Sports Physiotherapy", University of Pisa
Director Physiokinesitherapy - LARC Group, Turin*

The interaction between "Water" and "Dry Land" rehabilitation therapies

The interaction between water and dry land therapies represents the added value in the development of a rehabilitation plan for pathologies of different origins. Only by adjusting water rehabilitation programs to dry ones is it possible to achieve a "complete treatment", and this is often the weak point of the project, which risks to fail if the integration is not well studied.

Many pathologies exist that can benefit from the combination of kinesi-hydrokinesitherapy (KT + IKT), and the association between the various therapies can boost the effectiveness of each of them. If we consider that the treatment in water is administered only to patients with specific clinical conditions and that only a few specialized centers have a rehabilitation pool, then it is necessary to include hydrokinesitherapy in the rehabilitation project with well-codified methods and timings. When the rehabilitation program evolves slowly and obstacles become increasingly difficult to overcome, and if the patient is suitable for treatment in water, then a method needs to be studied in order to arrange over time the dry treatment and that in water. It is then important to know not only "what to do" but "how" and "when to do it". What needs to be exploited in water are the physical characteristics of the fluid that facilitate tissue relaxation, lymphatic and vascular drainage, articular decongestion and gravity drain, but also the specific antalgic effects (Fig. 1).

Rehabilitation protocols in water as well as on dry land are currently available, but they do not consider the integration of the two operating modes. Rehabilitation proposals can vary greatly, depending on the patient's conditions and according to the objectives set for the short and medium / long-term.

In ideal conditions, the program is agreed between the physiatrist and therapist in accordance with the patient and does not follow rigid schemes, but is subject to daily variations. Too often, the modes of treatment being created are fixed, so they are comfortable but

not forward-looking, and are therefore inadequate to keep up with the evolution of the techniques of orthopedic surgery. Water allows to reset most of the information received by the body through the variation of gravity action, the contact with water, the flotation, the temperature etc. Water allows to explore a three dimensional space through movements that some disabled people cannot perform on the ground. Water activates a massive "bombardment" of stimuli for the training of proprioceptive, visual, auditory perceptions; skin receptors are overstimulated, both by the effects of turbulence and heat and by hydrostatic pressure; an improvement in breathing and balance is also achieved, and this is an aspect of rehabilitation not to be neglected (Fig. 2). Sometimes, during the rehabilitation treatment, postural adaptations, misalignments and / or functional compensations, developed by the patient during the evolution of the rehabilitation process need to be faced. If these adaptations go against the rehabilitation objectives, it is then necessary to reset them, thus nullifying and confusing the expectations of the patient, by providing a set of additional stimuli, whose



Figure 1.



Figure 2.

elaboration will allow for the reconstruction of the correct motor sequences. As terrestrial creatures, we develop subconscious adaptations to the effects of gravity on earth that are practically useless in water and vice versa, but if these adaptations are structured in a KT / IKT integrated rehabilitation protocol, they can decisively influence the evolution of the rehabilitation process and shorten recovery times. In fact the reconstruction of specific motor sequences, the improvement of deep sensitivities, etc., undergo a substantial increase both for an abundance of different stimuli and for the possibility of experimentation in environments with different gravity (Fig. 3). The hydrokinesitherapy session can be shortened or prolonged depending on the desired effect, and can also be held before or after work in the gym. In case of stiff joints, for example, it is preferable to hold it before KT, in order to exploit water to “relax” the tissues and prepare them to work in the gym also through better vascularization. When the rehabilitation program draws to a close, workloads become challenging: this is when working in the pool can be useful to decongest the joint, relax muscles and allow the patient to close the treatment with a positive



Figure 3.

condition of freedom. Hydrokinetics allows to prepare the joint to the work of the therapist in the gym; immersion in fact produces an automatic vascular and lymphatic drainage. The periarticular tissues relax and stretch, so that manual maneuvers can work in depth. Even muscle injuries benefit significantly from work in the pool. After remaining in hot water, even for a fairly short time (20/30 minutes), the muscle-tendon apparatus is in a condition of hypotonia, being therefore more prepared to receive a massage or do some stretching. The pool is in this case a preparation for work in the gym or on the table. When instead the progression in the return to load-bearing activities and to walking needs to be dosed, water allows to perform the first exercises with reduced body weight, by varying the depth level of the pool and the degree of immersion of the body. The concession of the load is then decidedly anticipated in patients who, for example, would have had to refrain for much longer from it because of fractures or cartilage lesions. In this respect, instead, water is the fundamental part of the rehabilitation program. Separate considerations should be made for the shoulder. Here, the increase in the articular range of motion in the first few weeks is almost always higher in the pool, both with passive exercises and with “active” ones controlled by the very presence of water, compared to the dry kinesitherapeutic maneuvers administered by the therapist. For shoulder pathologies, in the initial stages, water is once again the fulcrum of the rehabilitation program, while dry therapy allows to monitor the progresses obtained and to integrate them with specific exercises. One can also choose to divide the exercises, by allocating a group of proposals only to work in the gym and another one only to work in water. In tendon diseases, for example, it is advisable to first carry out load-bearing activities in water, in order to protect the muscle-tendon apparatus from dangerous overloads. For the same reason, in pathologies that involve a very long rehabilitation program (ligament reconstructions, severe fractures), the first dynamic activities can be facilitated and anticipated in water. This can be useful, even more so, every time an athlete has to get used again to the rhythm of training and competition. The abilities to stand upright, walk in all directions, jump and rotate in water must be acquired as a fundamental basis to achieve autonomy and to prepare the person to swimming. All activities should start with the stable “curled up” position and, progressively, with the improvement of control, the “opening” of the body in a “stretched” position can be encouraged (Fig. 4). Flotation can be used as a force in water to help movement and act against gravitational effects. To understand flotation, the patient may be asked to push objects less dense than water itself underwater and to observe their return to the surface as soon as they are released. When the patient has learned to breathe out into the water and to control rotation, underwater activities integrated with dry activities may be introduced. These activities will

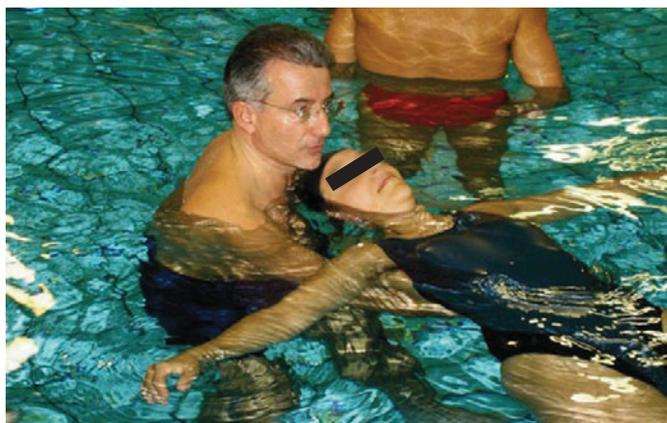


Figure 4.

still require a good breath control and breathing should never be held. Also, in order to look for objects in water, patients have to keep their eyes open under water, and this is another very important skill for every swimmer. It is only after reaching the so-called “integrated aquatics”, that is, the ability to develop specific motor sequences

resulting from the integration of dry and water activities, that the patient can begin to use those same sequences to reconstruct complex actions like walking in water and swimming within the limits of his abilities. There is no limit to the activities that can be devised in the pool to achieve integration between KT and FKT, the important thing is to respect the principle that the rehabilitation program must be clear, known, shared and evolving, so that every water activity of the patient is aimed at achieving the objective and has a specific therapeutic content. Another favourable aspect is that of a group therapy, both dry and in water, because the patient takes further advantage of the socialization, emulation and competition that derive from it, and is also often called to work longer and to focus more. In short, a true interaction between dry and water therapies must, in any case, provide for a mutual coordination and completion of rehabilitation proposals. The inclusion and the continuation of aquatic therapies should not follow strict protocols, but should answer our needs of outcome and especially those of the patient. To do this, maximum cooperation is necessary between the various professionals who interact in the rehabilitation process.

References

- Arms W, Pope MH, Johnson RJ, et al. *The biomechanics of anterior cruciate ligament rehabilitation and reconstruction*. Am J Sports Med 1984;12:848.
- Bracco D. *Ergonomia e tecnologia aggiornano le tecniche e le metodiche in idrochinesiterapia*. Europ Med Fis 1984;20:173-7.
- Davis BC, Harrison RA. *Hydrotherapy in practice*. Hedimburgh: Churcill Livingstone 1988.
- Franchimont P, Juchmes J, Lecomte J. *Hydrotherapy-mechanism and indications*. Pharmacol Ther 1983;20:79-93.
- Gasco P, et al. *Analisi della dinamica del movimento applicata alla riabilitazione in acqua*. Atti XVI° Congresso nazionale SIMFER 1988, vol. I, Chianciano Terme.
- Gazzi A, et al. *L'idrochinesiterapia: suoi benefici effetti per diminuire la resistenza dei tessuti molli*. La Riabilitazione 1981;14:102-9.
- Harrison RA. *A quantitative approach to strengthening exercises in the hydrotherapy pool*. Physiotherapy 1980;66:2-60.
- Iannilli M, Dalla Corte G, Ballotta M, et al. *Nostra esperienza di trattamento riabilitativo in piscina terapeutica*. In: Atti del Convegno triveneto della Società Italiana di Medicina Fisica e Riabilitativa. Lamone 26/9/1998:1-444.
- Marenzi R. *Effetti dell'acqua in riabilitazione*. In: Zorzi GA, ed. *Riabilitazione 2000: l'era dell'acqua*. Pordenone 2000, pp. 21-29.
- Mazzaro E, Armani S, Boccardo S. *Ruolo della acquaticità in idrochinesiterapia*. Giorn Ital Med Riab 1996;10:7-9.
- Mercanton G, Padey A. *L'expérience de 3000 épaules en balneothérapie*. Kinesithérapie Scientifique 1997;368:7-12.
- Messina B, Grossi T. *Elementi di idrologia medica*. Roma: Universo Ed. 1983.
- Napletan JC. *Water on the knee*. Rehab Manag 1993;6:80-2.
- Ortolani M, Atzori B, Cardani R. *Elementi di biomeccanica del gesto terapeutico in idrochinesiterapia*. Giorn Ital Med Riab 1993;1:4-14.
- Phyonen T, Keskinen KL, Hautala A, et al. *Human isometric force production and electromyogram activity of knee extensor muscles in water and on dry land*. Eur J Appl Physiol 1999;80:52-6.
- Rigardo S, Matti A, Lesina MR. *Idrochinesiterapia degli esiti di meniscectomia*. Il Fisioterapista 1996;1:7-9.
- Skinner AT, Thomson AM. *La rieducazione in acqua*. Roma: Marrapese Ed. 1985.
- Speer FP, Cavanaugh JT, Warren RF, et al. *A role for hydrotherapy in shoulder rehabilitation*. Am J Sport Med 1993;21:850-3.
- Tovin BJ, Wolf SL, Greenfield BH, et al. *Comparison of the effects of exercise in water and on land on the rehabilitation of patients with intra-articular anterior cruciate ligament reconstructions*. Phys Ther 1994;74:710-19.
- Walk EE, Himel HN, Batra EK, et al. *Aquatic access for the disabled*. J Brun Care Rehabil 1992;13:356-63.
- Webels A. *La ginnastica in acqua*. Roma: Ed. Marrapese Ed. 1995.

CORRESPONDENCE

Sergio Rigardo
srigardo@libero.it