The effects of virtual reality-based physical therapy in stroke patients

Charyong Kim\textsuperscript{a}, Won-Kyu Min\textsuperscript{b}

\textsuperscript{a}Hartnack, Berlin, Germany
\textsuperscript{b}Severance Rehabilitation Hospital, Yonsei University Health System, Seoul, Republic of Korea

**Objective:** Final goal of nerve advancement therapy is to provide maximum ability to function independently in life to patients. This paper appraises and describes basic concepts of the virtual reality (VR) based exercise program to improve functional movement for neurologically impaired patients.

**Design:** Review article.

**Methods:** Stroke patients from the physical therapy department while wearing comfortable clothing receive therapy and also VR based motion therapy administered by the therapist in charge. After evaluation of stroke patients, therapy includes an exercise program that is suitable for use with stroke patients; stroke patients wear head-mounted display while in front of the computer, where the camera is located; they follow the action on the screen and the computer perceives the operation of the stroke patients according to subject accomplishment.

**Results:** According to obstacle condition of stroke patients using the method, which is various environments after setting, in stroke patients, there is a possibility of presenting suitable therapeutic environments. The display presentation of the method, which is identical, causes difficulty for all stroke patients. According to subject accomplishment, stroke patients result in execution of repetition training and deepening study, which leads to mobility.

**Conclusions:** The VR based rehabilitation training programs is a difference of the existing video training program, is immediate feedback and compensation method. It will provide rehabilitation training services for the family of the patient whose condition could be improved with rehabilitative therapy where it is a continuous circumstance as a matter of the social welfare facility therapy.

**Key Words:** Rehabilitation, Stroke, Virtual reality exposure therapy

**Introduction**

Nerve advancement therapy can generally be used for improvement of the duplication obstacle for stroke patients [1-7]. Therapy consists of Phelps early rising regulation system, Rood nerve physiological school registry access methods, and the opinion of Fay and Domon-Delacato on nerve muscular reflections, and Bobath motion control and a functional motion accomplishment nerve advancement therapy, which emphasizes a exercise element, and Kabat proprioceptive neuromuscular palpation laws and Vojta laws, Brunstrom legal etc. using a concrete method [8]. Nervous disease therapy involves normal attitude controls and muscle activity palpation, inhibition descriptions below action stimulation for and palpation of the collective motion, which uses resistance motions, and is applied for nerve advancement therapy, which emphasizes the reflective activity in compliance with outside stimulation mainly from physical therapy fields of our country.
The final goal of nerve advancement therapy is to provide the patient with the maximum ability to function independently in life. The organization of the central nervous system (CNS) is complicated, and is composed of many systems and a lower system. Lower part of the system will adapt to changes in environment and will cause changes of centrality stimulation; therefore, there is a possibility of directly influencing the structural organization of the CNS. Consequently, change of nerve structures of the sense exercise form the normality and abnormality of the systematization, which is the possibility of making systematization or non-systematization is possible; the operation is controlled according to nerve and musculoskeletal system conditions. Centrality and centrifugal characteristic selective operation of the trunk and limbs, which has connection with posture adjuster mechanics, rehabilitation does not prompt the compensation, but is the learning process which recovers exercise control function. The electric generation of the cell associated with this learning process changes according to subject in exercise control re-studying duration.

Methods

Stroke patients undergo the limit of palsy side upper extremity functions, and, in particular, the decrement or disappearance of one piece of upper extremity function decreases the rotary ability from the trunk, restricts the operation of the different regions, and causes inefficiency, by causing functional disturbance of the upper extremity for hemiplegia patients when performing functions of daily life and becomes the cause of the greatest obstacle. In comparison of the upper extremity in the summer solstice and the time of nerve school registry, recovery is slow and miserable [9], it compares weight in the summer solstice function ambulation and it is minor because the operation being demanded is more complicated. In addition, for the upper extremity, it can’t be thought separately for attitude maintenance, gravity and the ability to move, and the trunk which reacts effectively in distal part operations with ability. Therefore, it will be able to think therapy method which may secure the stability of the trunk it uses. The problem point has been proposed in various clinical research studies; however, studies on the therapeutic effects of the existing therapeutic arbitration method and the necessity of a new arbitration method have been reported [10-13]. This stands for the patient where the recovery of motor function is possible. With impairment of sensory function in planning of activities of daily living and obstacles in daily life the disability may occur. Sensory function judges an ability and the situation, in order to understand the work performed in our daily life environment, which is a function, and it decides and adapts to the environment where ones is placed [14]. In general to be a territory where the power of concentration and memory is basic, planning power (planning) and systematic hour height ability (organization) and problem solving ability (problem solving), abstraction ability etc. is included to the high position level and it is inaudible and must become the foundation, the integration of language and hour perception ability. It stands in the patient where the recovery of motor function is possible, impairment of stamp function becomes the element of rehabilitation with difficulty, and impairment of this function makes an obstacle that would bring about independent functional accomplishment [15]. Consequently, impairment of stamp function bypasses the problem of stamp function itself, and recovery and attention power of motor function, memory and perception power; stamp functions show significant growth in order to operate with the obstacle element, which is important in problem solving power etc. various branch territory. Becoming like this rehabilitative therapy foundation, plasticity (plasticity) of the brain, namely, applies the ability of functional re-recovery with the maximum and prompts the reconstitution (reorganization) of the impaired brain organization. Cognitive-rehabilitative therapy, which is used with a computer, was started in compliance with actively and they are universally received these days [16].

In cognitive-rehabilitative therapy, the computer program knows only therapy pliability and control of therapy for shortening of hours; the measurement is objective; in the patient, the feedback (feedback) is immediate, and there will be a possibility of adjusting patient necessity according to the level selected and there is a strong point, a degree of difficulty it will be able to control. Zoljan and Siev [17] reported on cognitive-rehabilitative therapy focuses on uses of computer to study the attention concentration and memory of 40 patients with cognitive-rehabilitation training brain injury. From one research study on the object memory and problem solving ability, they reported clear improvement from attention power concentration.

In addition, there is virtual reality (VR) training, which it is used mainly in the clinic. In VR, computer hardware and software are similar and the user experiences a great disaster