

Two case studies of virtual reality therapy effect on CRPS patients in Occupational Therapy out patient clinic

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Abstract

CRPS diagnosis is treated by qualified Occupational Therapist in Soroka medical center for decades. In this case study report, we will suggest short term protocol based on innovative rehabilitation VR technology, and conservative treatment in ADL apartment. The fundamental approach in Occupational Therapy for chronic pain includes playfulness, mirror therapy, conservation and improvement of the upper extremity functional abilities. We will focus on two case studies of short-term intervention, including innovative VR rehabilitation technology, and functional treatment in ADL Occupational therapy department.

Keywords— CRPS, Virtual Reality, Occupational Therapy, Protocol of intervention, VR rehabilitation, ADL apartment

Immersive VR is considered a fourth-generation computing system and differs from third generation systems (Kinect) in its ability to fully control and monitor both the patient environment, and to generate closed biofeedback loops for rehabilitation. Oculus Rift station with touch controllers was used in this study .It's intended for tracking motion and movement kinematics and guiding patients in the performance of physical and cognitive exercises according to the treating medical practitioner's guidelines .All data from the study's training is collected in real-time to a medical server, including raw motion data and event marks from within the game. VRHealth software-only medical devices are cleared for marketing in the U.S. by the Food and Drug Administration (FDA), Europe (EC certification) and Israel (AMAR).

I. INTRODUCTION

Complex Regional Pain Syndrome (CRPS) is a health condition causing unexplained pain after a minor orthopedic trauma in the extremities. The pain might additionally lead to limb contractures, and abnormalities of sensation, changes in the autonomic nervous system, joints range of motion, bones and skin appearance (1).

Today, Occupational therapy provides long-term rehabilitation, to out-patient diagnosed with CRPS. Most of the treatments last longer than 12 months and spread over 24 treatment sessions.

Current case studies will examine innovative short-term approach, including main elements given today, by using ADL apartment and Virtual Reality (VR) technology.

VR technology can be used for treating CRPS, by isolate the user from the outside world, and easily engage the patient into alternative Virtual Reality (2). Sato et al (3) used VR as advanced method of Mirror Therapy on small CRPS participants group, showed feasibility of better results in short term VR intervention.

A. Aim

The case studies examine a short-term intervention for CRPS, allocate to VR therapy intervention: mirror therapy, encourage proximal movements, increasing usefulness of affected hand, and engage mood of playfulness. The ADL apartment will complete the functional and occupational goals of intervention.

The intervention will take place in out-patient Occupational therapy clinic, at Soroka medical center in Be'er-Sheva, Israel.

II. METHOD

Two patients, with medical referral due CRPS, will be followed prospectively in short term intervention.

The short-term treatment series will include 4 steps in 10 treatment sessions:

Step 1: Evaluation meeting.

Step 2: "Bottom up" approach, by using inhibitory splint and VR therapy games. Oculus Rift immersive VR technology will be used in the intervention, using VRHealth Ltd. Medical software intended for rehabilitation training and evaluation.

Step 3: "Top down" approach, to use global perspective on patient's activity, by practicing in ADL apartment.

Step 4: Final evaluation and draw-up written instructions of self-care.

Measurement in this study is using the following tests: ADL changes in performance by the Canadian Occupational Performance Measure (COPM), active range of motion of the elbow, wrist, and digits by goniometer, hand grip strength by dynamometer, superficial sensation by monofilaments, pain and function by Patient Rated Wrist-Hand Evaluation (PRWHE). Data will be collected also by the VR software.

III. CONCLUSION

This pioneer case studies, expected to lead to a full-scale prospective Randomized Controlled Trial (RCT) research. In the future we hope to engross an ordered protocol of VR therapy intervention aimed for CRPS.

IV. BIBLIOGRAPHY

- [1] A. Goebel, C. H. Barker, L Turner-Stokes et al. "Complex regional pain syndrome in adults: UK guidelines for diagnosis, referral and management in primary and secondary care," RCP. London, pp. 4-29, 2012.
- [2] A. S. Won, C. A. Tataru, C. M. Cojocaru, E. J. Krane, J. N. Bailenson, S. Niswonger, and B. Golianu, "Two virtual reality pilot studies for the treatment of pediatric CRPS," *Pain medicine*, vol 16, pp. 1644-1647, August 2015.
- [3] K. Sato, S. Fukumori, T. Matsusaki, T. Maruo, S. Ishikawa, H. Nishie, K. Takata, H. Mizuhara, S. Mizobuchi, H. Nakatsuka, M. Matsumi, A. Gofuku, M. Yokoyama, and K. Morita, "Nonimmersive virtual reality mirror visual feedback therapy and its application for the treatment of complex regional pain syndrome: an open-label pilot study," *Pain medicine*, vol 11, pp. 622-629, 2010.