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Application of Computer-Assisted Neutral Zero Method of the Shoulder Joint in Vojta Therapy

L. Pogrzeba[1], H. Orth[2], B. Maurer-Burkhard[2], M. Wacker[1], B. Jung[3]

[1]HTW Dresden, Dresden, [2]International Vojta Society, Lübeck, [3]TU Bergakademie Freiberg, Freiberg, DE

Introduction: The neutral zero method (Neutral-Null-Methode, NNM) provides a standardized and well known assessment test to evaluate the range of motion. We conducted motion recordings of patients before and after Vojta treatment, automatically evaluating the range of motion using NNM. Our goal was to estimate the short-term effects of the rehabilitation based on digitally measured shoulder angles. *Materials and Methods:* The patients (n=13, 4 women) were instructed to perform the exercises for abduction, flexion, extension, pronation, and supination in a standing position while facing the recording device (Microsoft Kinect). Both arms should be moved simultaneously in a slow speed until the threshold of pain. The observing therapist paid attention to the proper execution of the exercises concerning body posture, speed, and evasive or compensatory movement. A recording system consisting of a Microsoft Kinect Sensor, a mid-class laptop computer and our specifically designed software ensured the consistent order of the exercises and calculated the values for mobility at the shoulders. The recordings were conducted directly before and after a Vojta treatment and were accompanied by a survey of the health condition (anamnesis). *Results:* In this field study we show the suitability of a 3D recording system for motion measurements according to the NNM procedure and have developed our own measurement protocol. This protocol comprises about 5 minutes per measurement, and reports the maximum shoulder angles. In addition it provides to the therapist accurate insights into the spatial and temporal progression of the exercise execution. Even when compensatory spinal movement occurs our software calculates shoulder mobility robustly. *Conclusion:* Compared to the orthopedic NNM we measured the patients' movement contact-free, without a goniometer, and continuously based on documented motion data. Due to the simple but precise and fast analysis method, our procedure seems very promising for a wider use in practice. It is sensitive to the assessment of motion involving compensatory movements and accurate at quantitative (angular) measurements. Furthermore it uses a threshold corridor to detect deviations from the zero-level and evasive movements, thus ensuring objective, consistent measurements for further analysis and comparison of the treatment progress.