Quantitative Analysis of Rolling Over Movement in Normal Adults:
Classification of Patterns by Cluster Analysis

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Purpose: Rolling over movement is an important part of bed mobility skills and in rehabilitation is often done in evaluating physical therapy and teaching. However, it is different from other basic motions like sit-to-stand and gait; the kinematic characteristics of normal rolling over movement based on quantitative data are not well understood. Thus, the purpose of this study was to classify the patterns of rolling over movement of healthy individuals and to clarify its kinematic characteristics of each movement pattern.

Methods: Thirty healthy male subjects were measured in three trials of rolling over by using three dimensional motion analysis systems. After analyzing the joints angle of trunk in using one trial data of three trials, the movement patterns were classified by means of cluster analysis; in addition, the characteristics of each movement pattern were clarified by statistical analysis.

Results: The findings showed that rolling over movement in healthy individuals could be classified into three movement patterns, and the characteristics of each movement pattern were clarified.

Conclusion: In rolling over movement, which was difficult to do major classification based on quantitative data, by analyzing the trunk motion, in particular trunk rotation and flexion-extension, it is possible to determine major classification of patterns. And, we were able to show the normal movement of rolling over movement by the kinematic characteristics of three movement patterns.