

THREE-DIMENSIONAL MOTION ANALYSIS FOR THE STUDY OF SCAPULAR KINETICS USING TELEMEDICINE

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Background and objectives: Alterations in scapular kinetics are referred as scapular dyskinesias (SD). SD are frequently observed in individuals with shoulder pain and in the *overhead* athlete, even before the latter develops full-blown pathology. Their early diagnosis allows effective prevention, thus avoiding crucial suspension of physical activity¹. The most widely used classification is Kibler's, which is, however, characterized by poor sensitivity and necessitates the presence of the experienced eye of an upper extremity specialist. To solve this, a highly accurate and easily applicable 3D motion analysis system can be used, providing data usable by a specialist at a distance of time or space.

Materials and Methods: Patients and athletes, including those at the highest level, were analyzed in both outpatient settings and sports events of international importance. All subjects underwent motion analysis with SHoW Motion 3D kinematic tracking system (SM) (NCS). Following the repeated execution of a standardized humeral flexion-extension and abduction-adduction movement, the device provided data regarding the 3 rotational movements of scapular kinetics: anterior/posterior tilting (around a horizontal axis passing through the scapular spine), protraction-retraction (around a vertical axis), and upward-downward rotation (around an axis perpendicular to the scapular body)². The analysis of the data obtained was carried out on-site in the patients evaluated on an outpatient basis, while in the other settings it was done at different time and place, even with the contribution of several virtually connected specialists.

Results: The experience developed so far with SM demonstrates how such a device allows perfect analysis of scapular kinetics even by specialists viewing the data at a time and place different from that of acquisition. This is made possible by easy access to the online platform that ensures rapid analysis and usability of the collected data. These are also presented objectively in the form of graphs and values, thus also resolving the large intra- and intra-operator variability characteristic of Kibler's classification.

Conclusions: Through appropriate technology, a thorough study of scapular kinetics can be performed even at a distance. This, together with the objective assessment provided by the system, allows a timely diagnosis of SD and the performance of appropriate follow-up to immediately initiate and then continue the right rehabilitation and/or surgical treatment.

Bibliography:

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