

Is there a place for Clinical Biomechanics in Manual Therapy Teaching and Practice?

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Before considering the relevance of Biomechanics in Manual Therapy, it is worth to reflect on the concept of Clinical Biomechanics itself. Biomechanics comprises a huge field of area's dealing with the physics of biological structures. This may range from the study of fluid dynamics, over finite models of bone and tissues to biomechanical models of the human body and body segments for the study of human motion. Within physics distinction has to be made between dynamics, kinetics and kinematics. And while it may be important to understand the impact of forces on the resulting kinematics, especially joint kinematics seem to be of high importance for understanding the clinics of Manual Therapy.

It is well know that joints are very complex anatomical systems and bones cannot be represented by simple solids of revolution to understand their kinematics. As a consequence intra-articular kinematics cannot be represented by a simple set of convex-concave rules. Therefore it is of utmost importance to try to understand what is going on inside the joints of the human body.

When one tries to understand human kinematics, one has to deal with several concepts that are unfortunate often misinterpreted and may lead to unnecessary controversies in clinical discussions. It is thus important to understand the differences between for example 'general, functional anatomical, local and bone embedded reference frames' and to understand the differences between 2D and 3D approaches in motion analysis. From this point of view it is important to understand the different concepts that are used in clinical biomechanics to analyze joint motion. Results from different approaches like a 6-Dof analysis versus contact areal analysis or Finite Helical axis concepts cannot simply be interchanged. Even calculated angles have to be interpreted with care as the methodology by which they were estimated may have huge impact on the outcomes. As such results of different studies have to be interpreted with high caution.

What is the impact of such knowledge on our Manual Therapy teaching and practice? Trying to understand complex joint kinematics from a 3D-aspect may seem to cause interpretational problems when applying them in combined motion techniques. Using complex mobilization techniques is not a simple question of adding up different motion components. Teachers, students and practitioners need to start thinking and feeling 3D. Recent studies in joint kinematics, e.g. in the cervical spine have demonstrated that often very specific techniques induce very unintended and uncontrollable kinematic effects.

Finally, understanding the kinematics of MT-interventions is of high relevance to estimate their possible risks and benefits. And a detailed knowledge of vulnerable structures, anatomical complexity, and especially human anatomical variation is imperative for this field of Science.