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CORR Insights

CORR Insights®: "Knuckle Cracking": Can Blinded Observers Detect Changes with Physical Examination and Sonography?

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Where Are We Now?

The study by Boutin and colleagues investigates previously unexplored variables in relation to knuckle cracking such as QuickDASH scores, swelling, weakness, joint laxity, and ROM immediately before and after knuckle cracking. The study provides evidence that routine habitual knuckle cracking does not have acutely adverse effects on clinical swelling, grip strength, or ROM.

It has long been known that distraction of two highly congruous joint surfaces in continuity through a viscous (synovial) fluid creates negative pressure, causing the formation of a bubble from gases dissolved in the liquid, a process called cavitation [7]. Unsworth and colleagues [7] simulated knuckle cracking in vitro by distracting a highly congruent polymeric ball and socket joint simulator, and attributed the sound to the collapse or bursting of the bubble. The sonographic imaging in the present study adds support to previous work that demonstrated that the sound is produced by formation, rather than collapse, of a bubble. This mechanism represents the consensus among researchers.

Where Do We Need To Go?

The long-term consequences of habitual knuckle cracking are not known. Only one large-scale study addressed this question retrospectively [1]. That study had many limitations, including several confounding variables. It also relied on the long-term memory and recollection of study participants.

Therefore, many questions still need to be investigated. Most importantly, are there long-term effects of knuckle cracking and, if so, what are they? Why do some people habitually crack their knuckles while others do not, and still others cannot? Is the (short-term) improvement in ROM, shown in the present study, different based on how knuckles are cracked, (in hyperflexion, hyperextension, or distraction)? Is the change in ROM different as a function of why individuals crack their knuckles? Can knuckle cracking perhaps

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This CORR Insights® *is a commentary on the article* "'Knuckle Cracking': Can Blinded Observers Detect Changes with Physical Examination and Sonography?" *by Boutin and colleagues available at:* DOI: 10.1007/s11999-016-5215-3.

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have long-term beneficial effects on joint mobility, or does the lifelong ability to crack one's knuckles reflect relatively (albeit slightly) more ligamentous elasticity?

In the current study, the Beighton score was higher in habitual knuckle crackers compared to noncrackers, though the difference was small and associated with $p = 0.19$. It is likely more difficult to distract tighter joints enough to create sufficient negative pressure to produce a crack. Therefore, the authors' observed difference in laxity, albeit small, is consistent with expectations from the known mechanism. However, the difference in laxity is likely subtle and would not be detected by the Beighton score. More sensitive and direct methods that can target such subtle differences in laxity with higher resolution should be developed.

How Do We Get There?

The greatest challenge in considering these questions is to change gears in our approach to research. As academicians in orthopaedics (and clinical sciences in general), we are indoctrinated to consider hypothesis-driven, prospective, randomized, controlled trials. The holy grail of clinical investigations seems to be coming up with a hypothesis and using a trial to test it. Many also are erroneously convinced that unless a difference is associated with $p < 0.05$, they should dismiss the observation [3].

One prospective, controlled longitudinal study tried to answer the question of whether knuckle cracking causes arthritis over the course of 50 years. Although the study involved only one subject, the author, it was sufficiently thought-provoking and highlighted the difficulty of considering longitudinal studies in addressing such a clinical question [5, 6]. On the other hand, further useful information may be obtained from additional observational investigations, as was done in the present article. For example, a hypermobility scoring system may be developed specifically for the hand, and designed to provide a more sensitive measurement of laxity in the metacarpophalangeal joints than the Beighton score. Furthermore, a complete characterization of joint stiffness should include a hysteresis response curve of torque against rotation, rather than only ROM. Devices to measure bending moment (torque) and ROM have been developed and used in patients to assess hysteretic curves for the knuckle and other joints of the hand [2, 4, 8]. These types of measurements, if applied in relation to knuckle cracking as well as the development of arthritis, may provide further insight into the prognosis for knuckle crackers.

The approach to revere only randomized prospective studies negates the critical importance of observational investigations. Observational sciences, such as astronomy, are much older than hypothesis testing, and they provide the basic data by which we can appropriately form and test a meaningful hypothesis.

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