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Cracking the Cracked Knuckle

John Gaetano

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Introduction

It may be in genuine consideration for another's health, or it may be a selfish attempt to alter the behavior of another. Regardless, many have been warned that the continuation of this custom, whether it ranges from the casual offender to those bordering on ritualism, will inevitably suffer long-term sequelae. The 'old wives' tale' that prolonged habitual knuckle cracking leads to arthritis may now be considered a myth. However, in addition to an examination of the current literature as to the effect of this behavior, the author will attempt to unravel, or perhaps further tangle another issue: What is the cause of the sound created after one has cracked a knuckle? The reader may be thinking this to be an exercise in futility as this question has long been solved. However, it has been this author's experience to find two distinct camps in the belief of the etiology of the crack.

Examination of the Cause

The majority of those who have offered an explanation for the cause of the sound, have upheld that the cracking sound can be explained by a collapse of synovial fluid vapor cavities that result from the negative pressure induced by metacarpal-phalangeal (MCP), proximal interphalangeal (PIP), or distal interphalangeal (DIP) joint distraction (1). Several authorities who have studied the effects of knuckle cracking rely upon this common explanation, however the paucity of evidence to support this theory is remarkable.

Alternately, some hold on to what they believe to be a more anatomically appropriate explanation. That is, when the MCP, PIP, or DIP joint is flexed or extended with the right amount of force, the annular and cruciate ligaments, which cover the fibrous synovial sheaths of these joints, snap back into their original location after being stretched over their joint during flexion. The 'recoil' of these stretched ligaments causes an impact on the synovial sheath that is responsible for the sound we hear.

There are several questions that may provide support or evidence against either theory. First, why can some individuals crack their knuckles easily, while others cannot, despite the force applied? There seems to be a period in which one 'trains the joint' to initiate a crack when the joint is manipulated repeatedly in the same fashion. While neither theory seems to intuitively explain the question, the following question shall be considered.

What is likely to account for the 'refractory period', for lack of a better term, of knuckle cracking? That is, what is responsible for time needed in between cracking the same joint? If we take our first theory, the question seems difficult to answer. But perhaps there is time needed for the 'reconsolidation' of synovial fluid, or the constituents thereof, to reacquire a state that will allow the 'collapse of synovial fluid vapor cavities' upon flexion. The second theory may provide a more plausible explanation. With the stretching of the ligaments over the joint, it seems reasonable that the tissue is in a stretched state and needs time to 'retighten' before it will be ready for another crack. In addition, the stretching of the ligament could plausibly explain the sensation of relief after an individual cracks his knuckle, or any joint for that matter. However, it should be noted that this sensation might be satiation of a psychological compulsion. While no evidence currently exists to support this question, the scenario leads us to our last question.

Could a MCP, PIP, or DIP joint be cracked in a recently deceased individual, prior to the onset of rigor mortis? And if so, could the joint be cracked multiple times? It seems logical that should one be able to crack the knuckle of a recently deceased person, this would not rule out either theory. However, if subsequent cracks were possible, it will be left for the reader to speculate upon which theory would be supported.

Examination of the Effect

The claim that cumulative damage occurs during knuckle cracking is not without a plausible theory. Castallenos and Axelrod submit that the sudden rapid increase in intrasynovial tension exposes the joint to high impact stresses, and that these mechanical stresses are analogous to the mechanism responsible for the erosion of ship propellers and blades of hydraulic machinery. Therefore, knuckle cracking might provide similar damage to the human joint (2). One study has opened the door further for this theory by examining MCP joints distracted in a controlled manner using a motorized device, which simultaneously monitored the load on the joint and its extension. The study concluded that that in many cases, the energy contained in a crack signal, expressed as a ratio of the articular cartilage volume, exceeded a known level needed to produce articular cartilage damage (3).

To further examine the potential harmful effects of knuckle cracking, several studies have attempted to analyze the effects of knuckle cracking in the clinical setting. Castallenos and Axelrod examined 300 consecutive outpatients for a self-reported history of knuckle cracking combined with a thorough examination of hand function. 74 patients with a history of habitual cracking (mean, 35 year history) were compared to 226 non-crackers for the prevalence of various hand-joint pathologies. No significant differences were found between the two groups (2). Swezey and Swezey utilized standard anterior-posterior hand x-ray to detect the presence of osteoarthritis between a group of 13 knuckle crackers and 15 non-knuckle crackers, and found no significant differences between the two groups. Despite a relatively small pool of data, it appears that there is no correlation between knuckle cracking and the development of arthritis.

One report, although primarily anecdotal, is extraordinary and merits mention. For 50 years, a rheumatologist, Dr. Donald Unger, cracked the knuckles of his left hand at twice a day, and left those on the right as a control. After 50 years, the knuckles on the left were cracked at least 36,500 times, while those on the right cracked rarely and spontaneously. There was no arthritis in either hand, and no apparent differences between the two hands after 50 years (4).

It should be noted that the above studies share evidence that knuckle cracking does reduce grip strength as a long-term effect. It seems reasonable that prolonged stretching of the ligaments and their snapping back into place could lead to this end, while it is more difficult to conceive that repeated extravasation of vapor from the synovial fluid to lead to such sequalae.

Conclusion

It should be made clear that it is likely that the proposed theories do not universally apply to the cracking of all joints on the body, and that certain injuries, or pathological processes may provide an entirely different etiology of cracking.

The above discussion shows that there is inadequate proof of the mechanism of a cracked knuckle. Despite raising more questions than providing answers, the discussion of the cause and

effect of habitual knuckle cracking remains relevant, as many patients may approach their physician with concerns related to this habit.

References

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