

The time has come to stop using the audible pop caused by thrust manipulation as a criterion of success

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Abstract

High velocity, small amplitude thrust manipulation has been shown to be beneficial and is indicated to reduce pain, improve joint mobility, and reduce disability. Thrust manipulation of the spine often results in a popping sensation. The exact mechanism responsible for the audible pop remains elusive. Current clinical guidelines indicate that clinicians should use research evidence to guide clinical decision making. The effects and/or benefit of the audible pop during spinal manipulation has been the subject(s) of several previous studies. Such studies evaluated and failed to demonstrate any direct effect of an audible pop's presence on the subjective reported pain levels, improvement in joint mobility, a change in nervous system activity, and a change in patient perceived disability. Based on current evidence, it seems abundantly clear that the audible pop cannot be used as a criterion (by clinicians and researchers) to determine if the spinal thrust manipulation was successful. Despite the current evidence, the research community continues to ignore this and uses the audible pop as a standard for the success of a spinal thrust manipulation. Additionally, the thrust manipulation will be repeated a second time if no audible pop is obtained or switching to the opposite spinal segment and attempted twice to achieve the audible pop. This potentially results into multiple capsular stretch maneuvers and makes comparison post intervention unreliable. The audible pop is not correlated to therapeutical success; stop using it for that.

Physical therapists use a variety of treatment interventions to treat movement disorders of the spine. One such intervention is joint manipulation. Joint manipulation can be defined as the passive movement of a joint, which includes the high velocity, small amplitude thrust maneuver [1].

Historical evidence identifies that joint manipulation as an intervention can be traced back to Hippocrates in 400 BCE (Pettman, 2007)[2]. Especially in the 19th century, the use of manipulation expanded rapidly and is currently used by various practitioners such as physical therapists, manual therapists, osteopaths, chiropractors, and massage therapists. High velocity, small amplitude thrust manipulation has been shown to be beneficial and is indicated to reduce pain, improve joint mobility, and reduce disability [3, 4].

Thrust manipulation of the spine often results in a popping sensation, sometimes just felt by the patient and clinician, and sometimes it results in an audible popping sound perceived by both patient and clinician. Although the exact mechanism responsible

for the audible pop remains elusive, several hypotheses attempt to explain the sound. The fact that audible sounds only occur in synovial joints implies a possible causative relationship between joint movement, joint capsule, and synovia [5].

Currently, the most plausible theories are the cavitation collapse and tribonucleation theories [5, 6]. In the cavitation collapse theory, it is theorized that the audible sound is associated with the release of gas (nitrogen) from the synovial fluid due to the rapid reduction in intraarticular joint pressure caused by the high-velocity maneuver [7]. The tribonucleation theory is also based on the rationale that joint capsules rapid elongation is the result of a sudden decrease in internal joint pressure [5, 6]. However, this sudden drop in pressure causes the edges of the joint cartilage to bow directly into the joint space. When the intraarticular pressure is low, gas (carbon dioxide) is released from the synovial fluid. This gas release will normalize the intraarticular pressure in the now enlarged joint space [6]. At this point, the joint cartilage will slap back against their bony surfaces creating the audible pop [5].

Current clinical guidelines indicate that clinicians should use research evidence to guide clinical decision making. The effects and/or benefit of the audible pop during spinal manipulation has been the subject(s) of several previous studies. Such studies evaluated any direct effect of an audible pop's presence on the subjective reported pain levels, improvement in joint mobility, a change in nervous system activity, and a change in patient perceived disability. Bialosky et al [8] were not able to demonstrate that the audible pop was correlated with a reduction in hypoalgesia directly following the thrust manipulation [8]. This was supported by Flynn et al [9]. finding of no correlation between the audible pop and a decrease in pain. Based on a retrospective analysis by [7], it was concluded that the audible pop did not contribute to any significant change in autonomic nervous system activity and was not related to the reported reduction in pain following the manipulation [7].

These findings of Cleland et al further support this [10]. They identified that the audible pop was also not related to any change in pain. Additionally, they did not find any correlation between the audible pop and any change in ROM following the manipulation, and there was no correlation with the reported decrease in self-reported disability rating. It is worth noting that these studies evaluated different (more objective) constructs of how the audible pop might have contributed to the positive effects of thrust manipulation of the spine, and repeatedly, there was no evidence to support the notion that the audible pop has any clinical usefulness. Despite this lack of therapeutic relevance of the audible pop the subjects that undergo a spinal manipulation seem to correlate the audible sound during a manipulation to the fact that something good must have happened and that the manipulation was successful. The relationship between patient expectation (positive and/or negative) and treatment outcomes has been previously demonstrated [11].

Based on this relationship it is necessary to further evaluate the effect of the audible pop on the subjective conscious awareness in a patient undergoing a thrust manipulation resulting in an audible pop. In conclusion, based on current evidence, it seems abundantly clear that the audible pop cannot be used as a criterion (by clinicians and researchers) to determine if the spinal thrust manipulation was successful. Despite the current evidence, the research community continues to ignore this and uses the audible pop as a standard for the success of a spinal thrust manipulation [4, 12, 13].

This is a misrepresentation of the evidence and is misleading practitioners. What should be used as a measure of success was the reason the manipulation was considered in the first place. An example of such measure can be a pretest and post-test comparison of active range of motion assessment (assess for movement pattern and pain with motion). An improved motion pattern would be a valid indication of the manipulation effect. Additionally, it is important during patient care that clinicians who use thrust manipulation educate patients that the presence of an audible pop doesn't make the treatment more or less effective. This will better align patient expectations with current research evidence. The benefit of the high velocity, small amplitude thrust maneuver is the actual stretch on

the joint capsule and the local and central effects (mechanical and/or neurophysiological) this has. It is time for researchers to stop selectively using research evidence and stop misleading clinicians by using the audible pop as a criterion when designing research methodology and reporting effects of thrust manipulation. Also, they should not arbitrarily repeat the thrust manipulation a second time if no audible pop is obtained, or by switching to the opposite spinal segment and attempt to achieve the audible pop twice on that side. This results into multiple capsular stretch maneuvers and makes comparison post intervention unreliable. The audible pop is not correlated to therapeutic success; stop using it for that.

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