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Reply

In reply:

We appreciate the responder's interest in our study. Our study was not intended to show flaws in any particular radiographic technique. All techniques that use an overlap/under lap approach to assess the atlantooccipital (A-O) articular misalignment are susceptible to inherent measurement flaws due to structural asymmetries. The reader was informed that the procedures used in our study did not directly transfer to real-life radiographic measurements but were used to show that there can be an inherent asymmetry that may lead to false positives or false negatives (ie, existence of misalignments when there are none or apparent aligned vertebrae that are actually misaligned).¹

We would first like to point out that the references provided to support the Blair theory in the responder's letter are opinion papers, based on observations of bony specimens, rather than quantitative research on bony specimens as we have done in our study.¹⁻³

One reason for not using a view that mimicked the Blair protractor view in our research for assessing how well the A-O margins line up is because the Blair protractor-type view assesses only part of the A-O margin, that is, the anterolateral aspect, leaving other

parts (ie, the medial margins) of the joint unanalyzed. This is no small shortcoming because the spinal cord would be affected by medial A-O margins, not lateral A-O margins.

Regarding the concern about the possibility that cartilage was left on the bone in our study, the soft tissue around the outer portion of the bone, including the fibrous joint capsule, was removed. The articular surfaces of both the atlas and the occipital condyle were exposed. These surfaces are protected by a smooth thin layer of hyaline cartilage that is in intimate contact with the underlying bone. It is likely that, if the hyaline cartilage layer was removed, it would have created distortion of the joint surfaces and would have rendered the surfaces unusable for measurement. Care was taken to evaluate the joint surfaces for natural distortion of the joint surface (ie, osteoarthritis). To disturb the surface hyaline cartilage would create a pseudodegenerative joint condition. The soft tissue (ie, cartilage, ligaments, muscle) remains present on a radiograph even if not observed directly, so it is prudent from a research prospective that areas of measurement be as close to real life as possible. Overlap/under lap of the A-O joint surface may or may not contain a substantial amount of soft tissue (ie, hyaline cartilage). To answer this question requires further study.

Again, we appreciate the responder's interest in our study.

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