

## The Pseudosubluxation of C2 or C3

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The term "subluxation" is at times misunderstood; mainly because its definition is different depending upon the individual using the term. To make matters worse, there is such an entity as a pseudosubluxation. This further muddles the terminology. For the purpose of discussion, we will define the term of a radiographic subluxation simply as a state of disrelationship between contiguous vertebrae due to either trauma or disease or both. Regarding traumatic injuries of the cervical spine, a subluxation generally can be demonstrated radiographically in the lateral projection. Most experts will agree with the findings of displacement of more than 3 mm of one vertebral body in relationship to the adjacent segment.

To confuse the terminology, the pseudosubluxation occurs when there is an anterolisthesis of C2 or C3 in patients under the age of 15 or 16. This entity, the pseudosubluxation, has been reported as common in young patients and is considered to be of no clinical significance. Several articles have reported the entity in children up to the age of 14 or 15 as a normal finding. This pseudosubluxation appears exactly like a subluxation except that it only occurs at the C2/3 or possibly the C3/4. When present, the upper vertebral segment will subluxate anterior in relation to the lower segment, usually not more than 2 mm.

The problem arises when a young patient has been injured in an auto accident and presents with all the symptoms of a hyperflexion sprain. How does one differentiate a subluxation complex from a pseudosubluxation? This differentiation is not easy but there are a few rules one can follow. It has been stated that the pseudosubluxation is due to the immature musculature in infants and in children, or possibly improper positioning of the patient. There are, of course, true subluxations at the C2/3 level, in children, the same as adults. The important point is to be able to differentiate the two. L. E. Sischuk, M.D.<sup>1</sup> has performed studies on 500 children up to the age of 14 and has arrived at the following technique for differentiating the pseudo from the true subluxation.

On a flexion view of the cervical spine, a line is drawn through the anterior cortex of the posterior arches of C1, C2, and C3. In the normal situation, or when a pseudosubluxation is present, the line is considered normal if it touches the anterior aspect of the cortex of C2 or comes within 1 mm of the cortex of C2. If a true subluxation exists, the posterior cervical line will miss the posterior arch of C2 by 2 mm or more. If the line misses the arch by 1.5 mm, and the patient has suffered from a traumatic incident, a true subluxation complex most likely exists.

On adult patients, this procedure is not necessary to document a subluxation. However, if there is a C2/3 anterior subluxation evident radiographically on a young patient, I would highly recommend performing this procedure. The reason being that if the case ever went to court, the defense could argue that the subluxation at the C2/3 level was a pseudosubluxation and therefore not a result of the injury.

### References

1. L.E. Swischuk, M.D., Radiology vol 122, page 759, 1977.

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