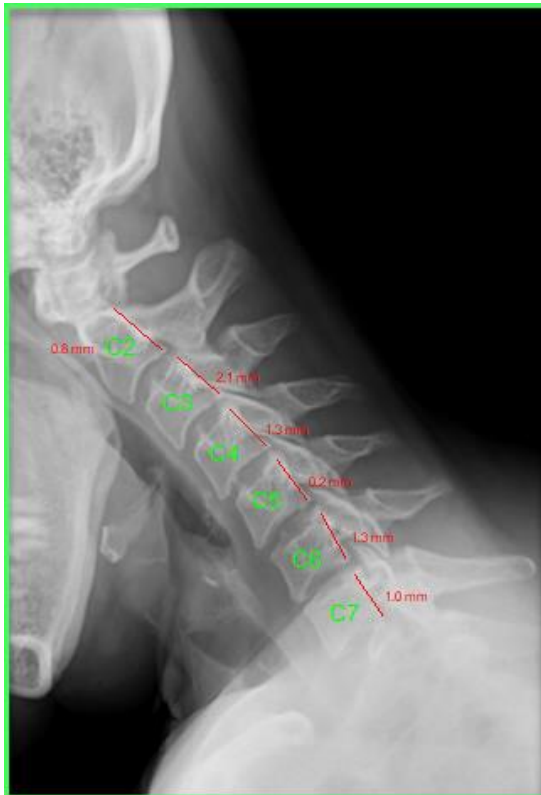


Vertebral Translations



The Translation is for the Flexion/Extension views. On the images the translation measure appears in red.

When you create the AOMSI report you can add Relative and or Linear Translations – depending upon what Edition you are reporting.

Reference Figure B and C Translation Calculation Method for the difference between the Relative and Linear Translations.

Figure B: Relative Translation Calculation Method



Figure B shows the location of the lines to be drawn. A dot is placed at the posterior superior corner of the lower vertebra, and a separate dot is placed at the posterior-inferior corner of the upper vertebra. The distance (A) is measured as illustrated by Figure B, using two parallel lines. The A-P sagittal plane diameter is measured at the mid-level of the superior vertebral body (B). Distance A is then compared to distance B; by the following formula: Relative Translation is a % that equals 100 times measured translation (A) divided by the measured superior mid-vertebral body diameter (B); then, the percentage is determined for comparison to the cervical spine relative translation threshold value for AOMSI (>20%). Relative Translation Measurements are obtained in flexion and separately in extension.³⁻⁸ The patient's measurements and calculations are compiled in the Relative Translation Measurements table.

Figure C: Linear Translation Calculation Method



The method for measuring linear translation is to measure distance A as shown in Figure C, which is the same as the Relative Translation measurement for determining the distance A. On the patient's radiographs of the cervical spine motion segments, a dot is placed at the posterior superior corner of the lower vertebra, and a separate dot is placed at the posterior-inferior corner of the upper vertebra. The distance (A) is measured as illustrated by Figure C, using two parallel lines. Measurements are obtained in flexion and separately in extension.^{3,5-6} The patient's motion segment measurements are displayed in the Linear Translation Measurements table.

Examples of the Findings:

Discussion of Findings:

The patient's relative translation measurements on the Flexion view do not exceed the threshold measurements for a ratable finding for AOMSI based on the *AMA Guides*®¹⁻⁵. The measurements for relative translation on the Flexion view were within the normal range.

The patient's relative translation measurements on the Extension view do not exceed the threshold measurements for a ratable finding for AOMSI based on the *AMA Guides*®¹⁻⁵. However, the motion segments C3-C4, C4-C5 and C5-C6 measurements are significantly out of the normal range, are indicative of irregular motion and demonstrate some evidence of ligament injury for relative translation on the Extension view with an AOMSI measurement of 14.9%, 10.4% and 11.4% respectively.⁹⁻¹⁵

Discussion of Findings:

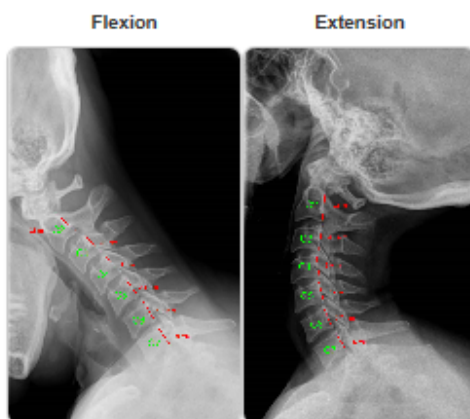
The patient's linear translation measurements on the Flexion view do not exceed the threshold measurements for a ratable finding for AOMSI based on the *AMA Guides*® 5th Edition^{1,3,5}. However, the motion segments C3-C4, C4-C5 and C6-C7 measurements are indicative of ligament injury for linear translation on the Flexion view with an AOMSI measurement of 2.1 mm, 1.3 mm and 1.3 mm respectively.⁹⁻¹⁵

The patient's linear translation measurements on the Extension view do exceed the threshold measurements for a ratable finding for AOMSI based on the *AMA Guides*® 5th Edition^{1,3,5}. The motion segment C3-C4 is ratable for linear translation on the Extension view with a measurement of 4.3 mm.

Cervical Spine Relative Translation (Flexion / Extension)

Clinical Relevance of Measurements & Analysis

Relative Translation measurements are used in diagnosing Alteration Of Motion Segment Integrity (AOMSI). An AOMSI diagnosis, indicating significant permanent ligament injury and alteration of motion of the cervical spine, qualifies the patient for a permanent impairment rating if the relative translation exceeds 20% with confirmation of clinical correlation and MMI established. The measurements in this section were obtained from the patient's cervical flexion and extension radiographic views in accordance with the relative translation methodologies described in the scientific literature and AMA Guides.¹⁻⁸ This method, standardized in the AMA Guides,¹⁻² is considered the most scientific method of measuring translation utilized to detect ligament damage and instability with alteration of motion from cervical spine injury to determine cervical spine permanent impairment.⁵⁻⁶



Flexion				Extension			
Motion Segment	Linear Translation (A) (mm)	Superior Body Diameter (B) (mm)	Relative Translation (%)	Motion Segment	Linear Translation (A) (mm)	Superior Body Diameter (B) (mm)	Relative Translation (%)
C2-C3	0.8 anterior	27.2	2.9	C2-C3	0.8 posterior	26.4	2.8
C3-C4	2.1 posterior	30.7	6.8	C3-C4	4.3 posterior	28.9	14.9
C4-C5	1.3 posterior	29.5	4.4	C4-C5	3.0 posterior	28.8	10.4
C5-C6	0.2 posterior	29.2	0.7	C5-C6	3.4 posterior	29.9	11.4
C6-C7	1.3 posterior	29.6	4.4	C6-C7	0.7 posterior	28.4	2.5

The tables above quantify cervical spine motion segment relative translation measurements in flexion and separately in extension. Alteration Of Motion Segment Integrity (AOMSI) is diagnosed when there is more than 20% relative translation, anteriorly OR posteriorly, on flexion OR extension radiographs. (AMA Guides 1-2) Measurements exceeding the 20% AOMSI threshold determination are bolded in the tables above. The Relative Translation Calculation Method is described in Figure B. When relative translation is greater than 20%, then AOMSI is present and the patient qualifies for a permanent impairment rating due to permanent damage to the cervical spine ligaments and alteration of motion at that respective motion segment.³⁻⁴ The impressions and discussion on page 1 of this radiology AOMSI report describe the significance of the measurements and calculations.

Figure B: Relative Translation Calculation Method

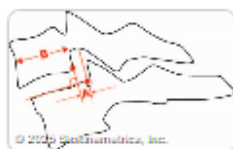
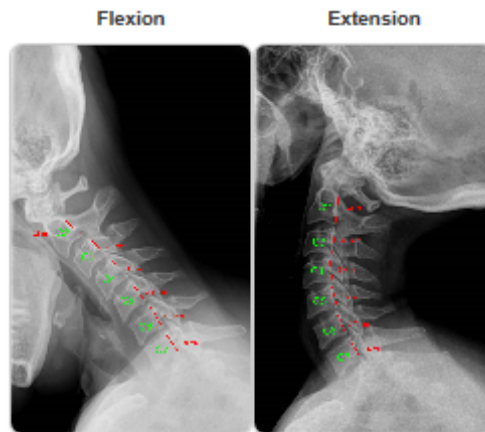


Figure B shows the location of the lines to be drawn. A dot is placed at the posterior superior corner of the lower vertebra, and a separate dot is placed at the posterior-inferior corner of the upper vertebra. The distance (A) is measured as illustrated by Figure B, using two parallel lines. The A-P sagittal plane diameter is measured at the mid-level of the superior vertebral body (B). Distance A is then compared to distance B; by the following formula: Relative Translation is a % that equals 100 times measured translation (A) divided by the measured superior mid-vertebral body diameter (B); then, the percentage is determined for comparison to the cervical spine relative translation threshold value for AOMSI (>20%). Relative Translation Measurements are obtained in flexion and separately in extension.³⁻⁴ The patient's measurements and calculations are compiled in the Relative Translation Measurements table.

Cervical Spine Linear Translation (Flexion / Extension)

Clinical Relevance of Measurements & Analysis

Radiographic Linear Translation measurements can be used in diagnosing Alteration Of Motion Segment Integrity (AOMSI). Radiographic Linear Translation is an alternate method of calculating Translation to determine if AOMSI is present as described in the Fifth Edition (Errata) of the AMA Guides.^{1,3,5-6} An AOMSI diagnosis, indicating significant permanent ligament injury and alteration of motion of the cervical spine, qualifies the patient for a permanent impairment rating if the linear translation exceeds 3.5 mm at a motion segment with confirmation of clinical correlation and MMI established. The measurements in this section were obtained from the patient's cervical flexion and extension radiographic views in accordance with the linear translation methodologies described in the AMA Guides.^{3,5-8}

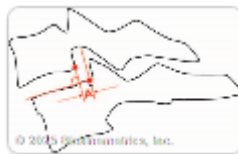


Linear Translation Measurements

Motion Segment	Flexion Translation (A) (mm)	Extension Translation (A) (mm)
C2-C3	0.8 anterior	0.8 posterior
C3-C4	2.1 posterior	4.3 posterior
C4-C5	1.3 posterior	3.0 posterior
C5-C6	0.2 posterior	3.4 posterior
C6-C7	1.3 posterior	0.7 posterior

The Linear Translation measurements for this patient's flexion and extension views are displayed in the above table for the cervical spine motion segments. If a linear threshold measurement of > 3.5mm is present, then a diagnosis of AOMSI is present. If AOMSI is present, it is bolded in the table above at the involved motion segment. A diagnosis of AOMSI qualifies the patient for a permanent impairment rating, with confirmation of clinical correlation and MMI, according to the 5th Edition of the AMA Guides, DRE Cervical Category IV, Section 15.0^{2,3} AOMSI presence provides evidence of ligament damage from injury and permanent alteration of motion at the respective motion segment. The Impressions and discussion on page 1 of this radiology AOMSI report describe the significance of the measurements and calculations. Additionally, the medical literature²⁻¹⁴ has published that linear translation measurements that are greater than 1.1 mm but below the AOMSI threshold of 3.5mm, demonstrates evidence of ligament damage from injury and alteration of motion at the motion segment, but not severe enough to be ratable by the AMA Guides.

Figure C: Linear Translation Calculation Method



The method for measuring linear translation is to measure distance A as shown in Figure C, which is the same as the Relative Translation measurement for determining the distance A. On the patient's radiographs of the cervical spine motion segments, a dot is placed at the posterior superior corner of the lower vertebra, and a separate dot is placed at the posterior-inferior corner of the upper vertebra. The distance (A) is measured as illustrated by Figure C, using two parallel lines. Measurements are obtained in flexion and separately in extension.^{2,5-8} The patient's motion segment measurements are displayed in the Linear Translation Measurements table.