Inter-examiner reliability in analysis of orthogonal radiographs

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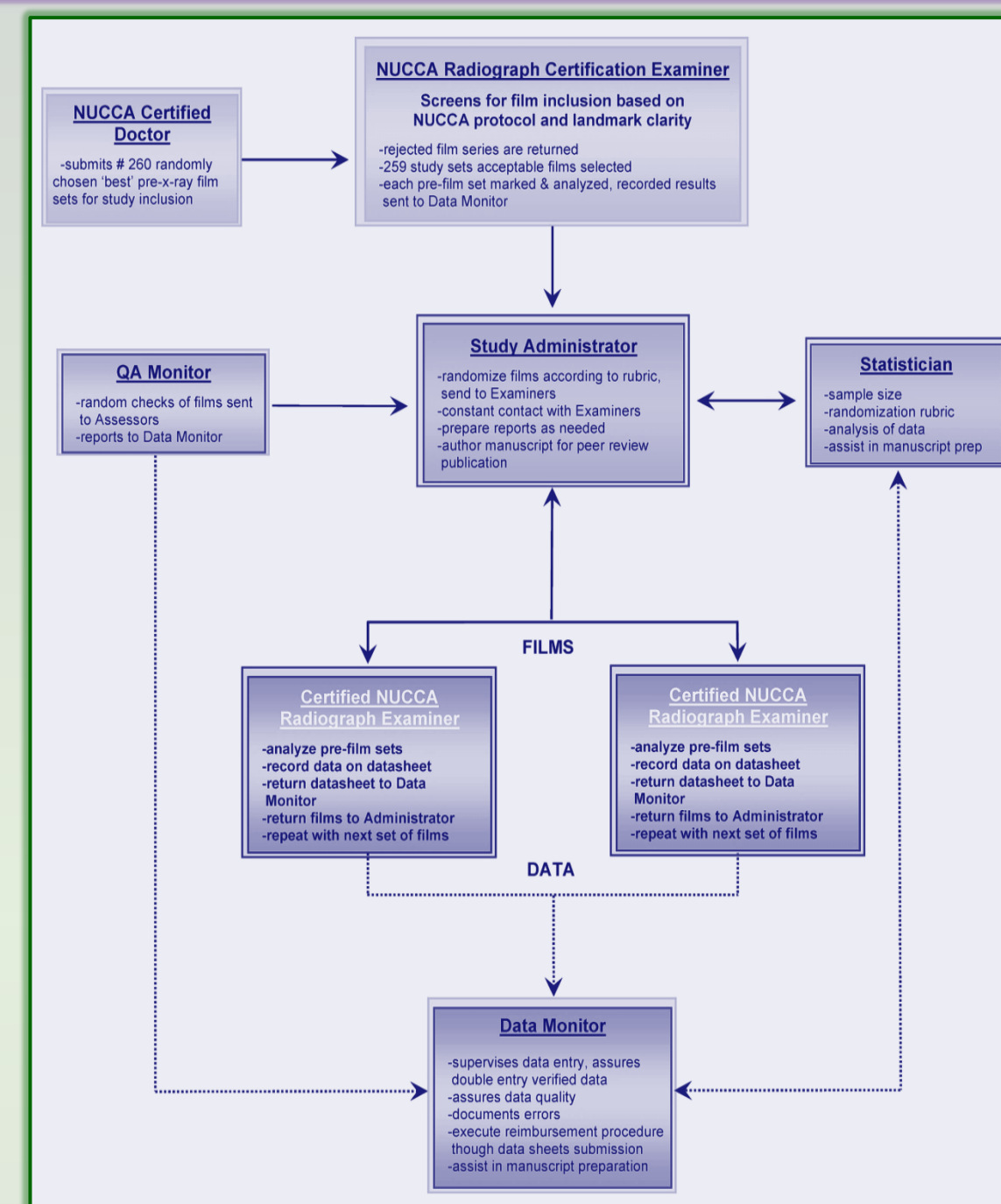
BACKGROUND

An assessment for making important clinical decisions requires due diligence in investigation in reliability of its use. Little evidence appears in the indexed literature positively reporting examiner reliability of the orthogonal radiographic analysis.

The objective was determining inter-examiner reliability between two NUCCA-Board Certified practitioners analyzing orthogonal films.
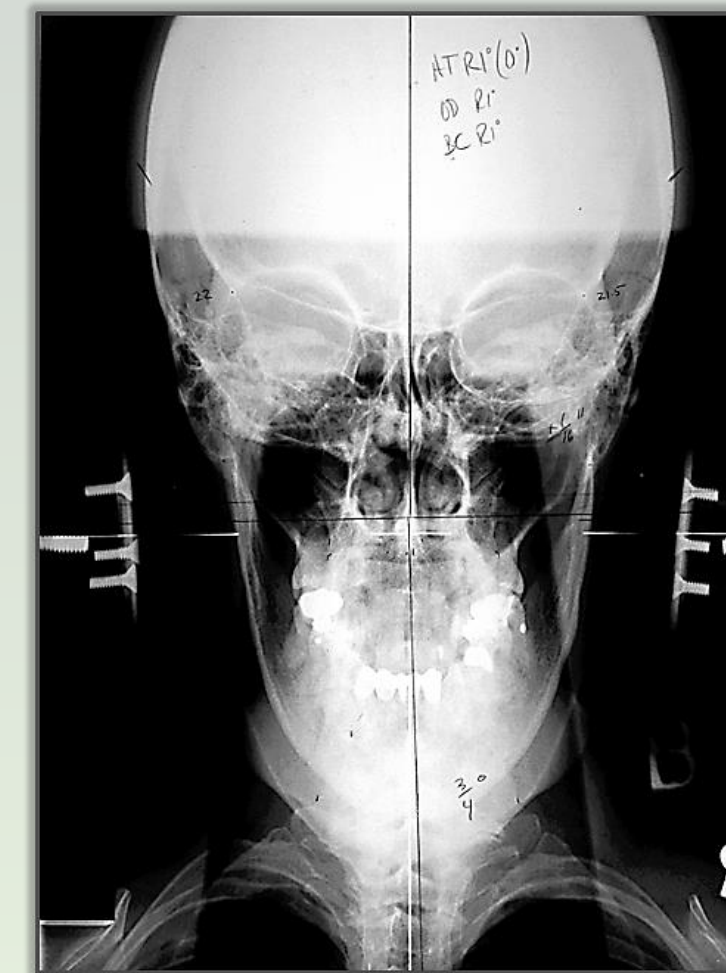
DISCUSSION

➢ Demonstrated reliability does not indicate any clinical relevance or validity
➢ Convenience sample of radiographs may create possible bias in overestimating ICCs
➢ Excellent inter-examiner reliability was found between two NUCCA-Board Certified practitioners analyzing orthogonal films.
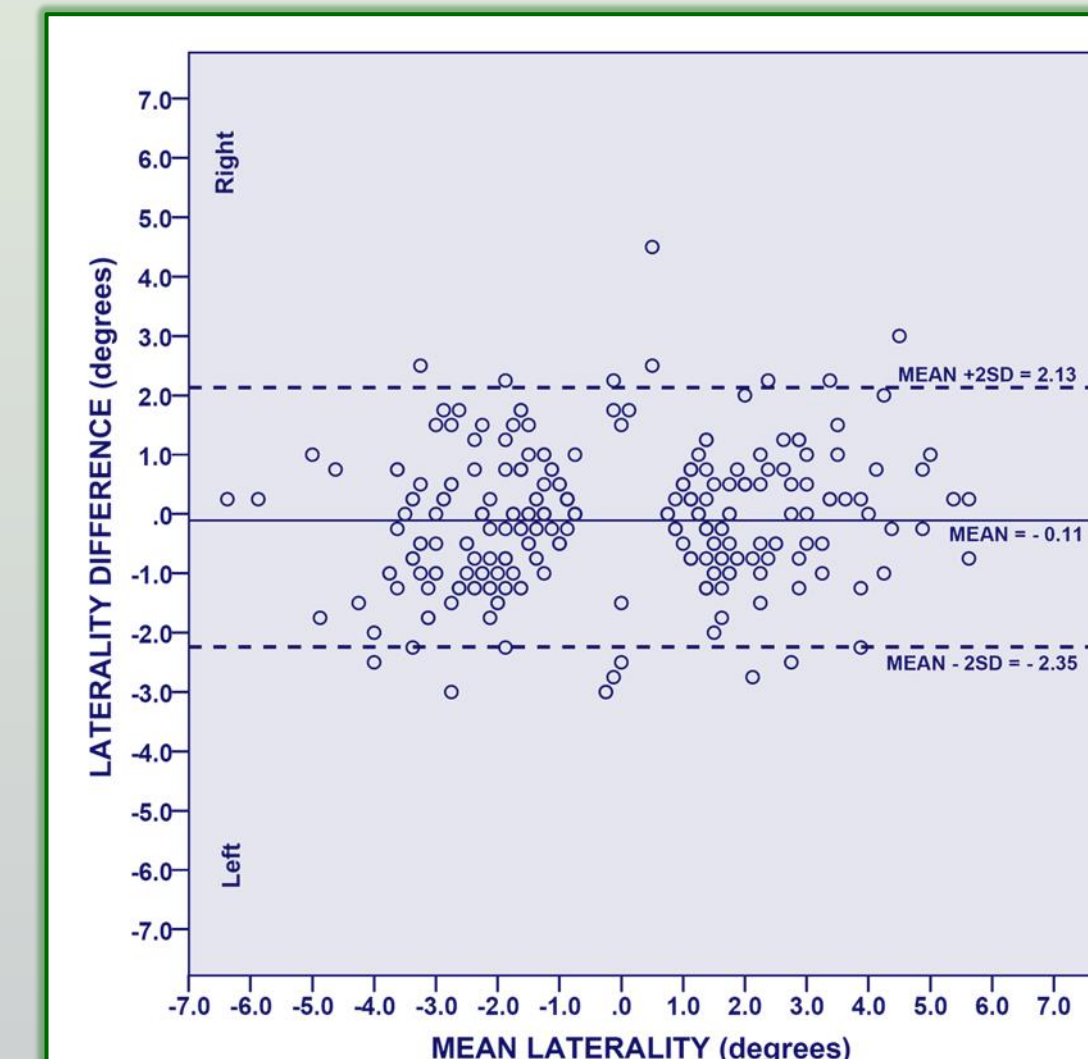
METHODS

➢ Before-correction film-sets, screened for acceptability (n=254),
➢ Randomly sent to two NUCCA Board Certified examiners
➢ Analysis data mailed to a data manager.
➢ Double entered verified data forwarded for statistical analysis.
➢ Data interpretation by percent agreement, ICC, Bland-Altman limits-of-agreement plots.
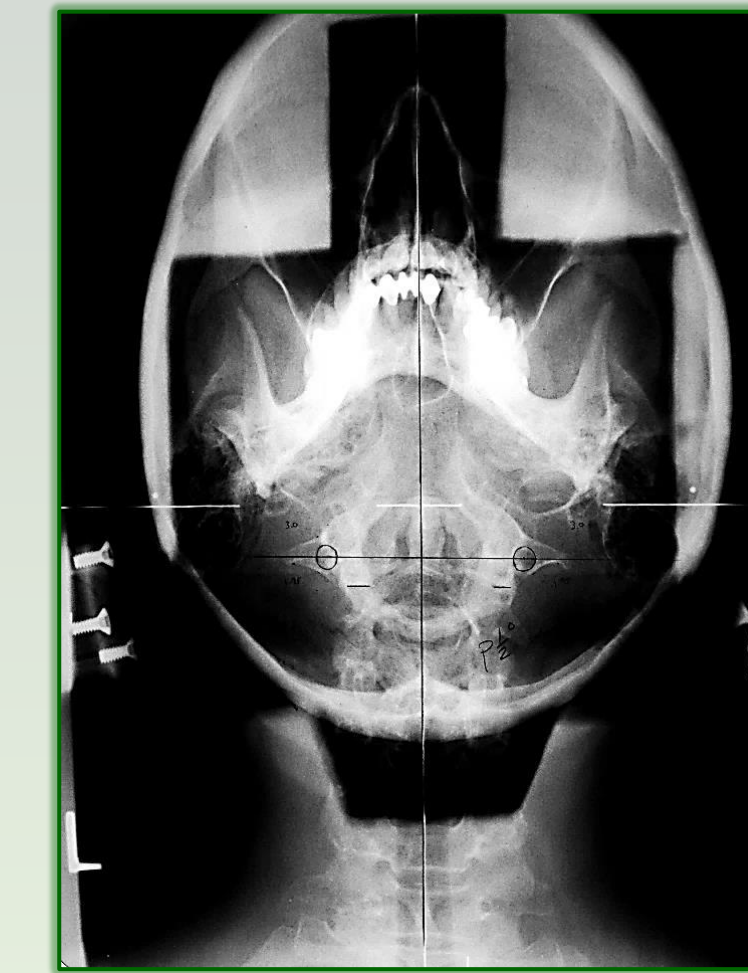
NASIUM – Atlas Laterality

➢ Percent agreement on side of atlas laterality = 96.1% (244/254)
➢ ICC for atlas laterality = 0.906
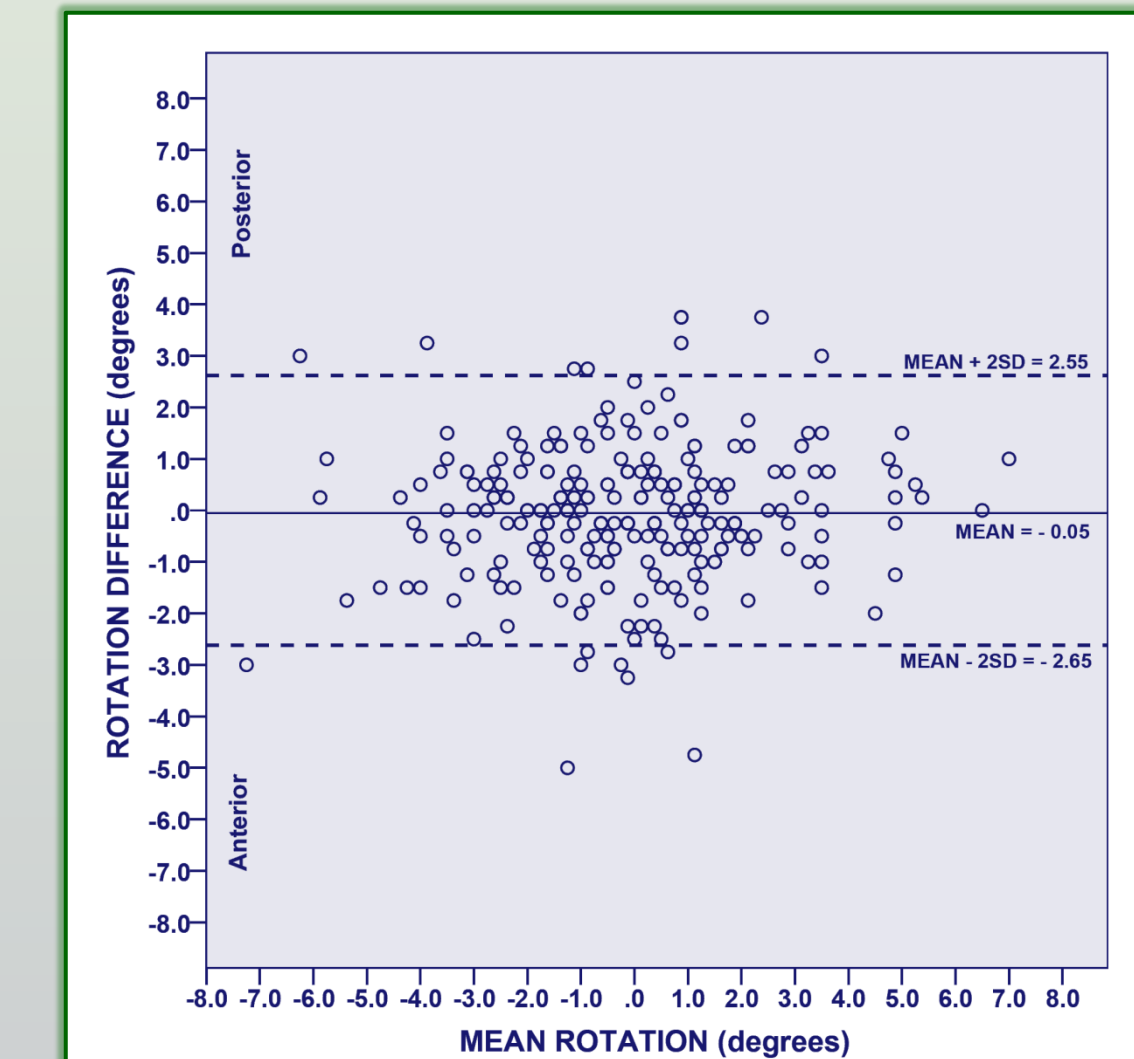   ▪ 95% CI (0.881, 0.926)
   ▪ (agreement model)(n=254)

➢ 14 (5.9%) paired observations outside 95%-agreement limits for laterality

VERTEX – Atlas Rotation

➢ Percent agreement on side of atlas rotation = 94.5% (240/254)
➢ ICC for atlas rotation = 0.850
   ▪ 95%CI (0.812, 0.881)
   ▪ (agreement model)(n=254)

➢ 15 (6.2 %) paired observations outside 95%-agreement limits for rotation

REFERENCES

1. Wernsing AA. The Atlas Specific: Origin, Development, and Application. Hollywood: Oxford Press, 1941.

2. Zabelin MS. X-ray analysis in Thomas M, editor. NUCCA: protocols and perspectives. 1st ed. Monroe: National Upper Cervical Chiropractic Association;2002. p. 10-1-10-48.

3. Rochester RP. Inter- and intra-examiner reliability of the upper cervical x-ray marking system: A third and expanded look. Chiropr Res J, 1994; 3(1):23-31.

4. Hubbard TA, Vowles BM, Forest T. Inter- and intraexaminer reliability of the Blair protractoview method: examination of a chiropractic radiographic technique. Journal of chiropractic medicine. 2010;9(2):60-8.

5. Weir JP. Quantifying test-retest reliability using the intraclass correlation coefficient and the SEM. J Strength Cond Res. 2005 Feb;19(1):231-40.

7. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. Lancet 1986;1:307-10.

8. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics 1977;33:159-74.

9. Hopkins WG. Measures of Reliability in Sports Medicine and Science. Sports Med 2000 Jul; 30 (1): 1-15.