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Colles' Fractures: Intra- and Inter-operator precision of alignment measurements from projection radiographs pre- and post-manipulation under anaesthesia.

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Background
Colles' fractures are a common injury often resulting from a fall onto an outstretched hand. These fractures are frequently associated with wrist deformity, which can result in problems using the wrist if not corrected. Measurements made on projection radiographs of the wrist can assist in the assessment of deformity and in evaluation of deformity reduction via manipulation under anaesthesia (MUA).

Methods
96 wrist radiographs including 30 normal, 30 pre-MUA and 36 post-MUA cases had duplicate measurements of volar tilt (VT), radial height (RH) and ulnar variance (UV) measured by four trained operators. Intra- and Inter-operator precision errors were calculated using intraclass correlations (SPSS V25, IBM)

Results
Intraclass correlations for intra-operator precision ranged from 0.951 to 0.999, 0.842 to 0.979 and 0.980 to 0.996 (p<0.001) for VT, RH and UV respectively. The inter-operator intraclass correlations ranged from 0.867 to 0.986 for VT, 0.942 to 0.922 for RH and 0.957 to 0.987 for RH. There was variation in precision errors across the normal, pre-MUA and post-MUA cases, with post-MUA measurements demonstrating more error than pre-MUA.

Conclusion
High precision is demonstrated for all measurements. The post-MUA precision was poorer than the pre-MUA; this results from inferior visualisation of the bones resulting from a back-slab being in-situ at the time of imaging. Improvements could be made by imaging prior to back-slab application, which would allow for further manipulation in sub-optimal reductions.

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