The routine application of the distance between the medial end of the clavicles and a line drawn through the spinous processes at the level of the clavicles as a method of assessing degree of sagittal rotation, diagnostic image quality, and need for repeat is flawed” Hardy et al (2015).

Abstract:

BACKGROUND: Chest radiography is one of the most commonly performed radiographic examinations worldwide. Routinely acquired in the erect posteroanterior (PA) position, a chest radiograph displays substantial amounts of medical information when accurate patient positioning is achieved. However, a rotated PA chest radiograph has reduced diagnostic quality and appearances may mask or mimic chest pathology. Radiographic assessment of patient rotation around the sagittal plane has traditionally been undertaken by assessing the distance between the medial end of the clavicles and a line drawn through the spinous processes at the level of the clavicles. This approach continues to be advocated in radiographic technique textbooks internationally although no identified author has provided criteria to determine when a rotated PA chest radiograph should be repeated; determined the relationship between perceived clavicle to spinous process distance and actual degree of patient rotation; or considered the impact of body morphology, in particular the anteroposterior thoracic diameter, on radiographic appearances of rotation.

OBJECTIVES: To determine the impact of anteroposterior chest diameter on radiographic appearances of sagittal rotation on PA chest radiographs.

DESIGN: Experimental study.

METHODS AND SETTINGS: Sixty computed tomography thorax examinations, stratified for gender, were reviewed and data aggregated to determine average anteroposterior (AP) thoracic dimensions. A bespoke experimental unit was constructed specifically to enable testing of the impact of sagittal rotation on radiographic appearances. The experimental unit was situated within a calibrated circular frame enabling 360° rotation at 1° intervals around a central rotational point. The experimental unit components were varied in 1 cm intervals from 9 cm to 15 cm around the central rotation point to reflect varying AP chest diameters. At each interval, images were acquired at 0, 2, 5, 7, 10, and 15° sagittal rotation.
using a horizontal central ray, consistent centring point, and a source-image distance of 180 cm.

RESULTS: A clear linear relationship between AP thoracic diameter and the radiographic appearances of sagittal rotation was noted. Considering significant rotation to be when the medial end of clavicle overlaps the spinous process on the radiographic image, this appearance occurred at a much smaller degree of rotation on wide AP thoracic diameters (15 cm, 5°) than narrower AP thoracic diameters (9 cm, 10°).

CONCLUSIONS: The routine application of the distance between the medial end of the clavicles and a line drawn through the spinous processes at the level of the clavicles as a method of assessing degree of sagittal rotation, diagnostic image quality, and need for repeat is flawed. Persistence in the application of this approach without cognisance of the impact of body morphology on radiographic appearances will result in persons with large AP thoracic diameters being more likely to have a PA chest radiograph repeated for a specified degree of rotation than persons with smaller AP thoracic diameters.

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