

## Sources of error in the evaluation of the medial clavicular epiphysis for forensic age diagnostics: a prospective study

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### Introduction

According to the updated recommendations of the Study Group on Forensic Age Diagnostics (AGFAD), the evaluation of medial clavicular epiphysis is crucial for the forensic age estimation of individuals undergoing criminal proceedings, especially in cases with completed development of the hand skeleton. In this first prospective study of post-mortem clavicle specimens by means of thin-slice multi-detector computed tomography we additionally focused on the investigation of sources of error in the process of stage evaluation.

### Patients and methods

From autopsied individuals between 10 and 30 years of age, 158 specimens containing the medial parts of the right and left medial clavicular epiphysis connected to the manubrium sterni were extracted from the body, shrink-wrapped and stored at -20°C. Subsequently, the specimens were scanned by using a 16-row multi-detector computed tomography system. Applying the staging systems developed by Schmeling et al. (2004) and Kellinghaus et al. (2010), 0.6 mm images in axial and coronary visualization were evaluated by two investigators: one experienced and one unexperienced.

### Results

The statistical parameters were comparable to those of recent reference studies. However, the ossification stage 3 and the sub-stage 3a were observed earlier. In 25 % of the cases, the assessment of the ossification stage was different between the two examiners. Three main sources of error could be identified in the cohort considered.

### Conclusions

The knowledge of the main sources of error could be of crucial value for the evaluation of the clavicular epiphysis during forensic age estimations in living individuals. In order to find further sources of error and to validate the data obtained, the comparison of the ossification stages given by two examiners should be repeated and corroborated in a larger cohort.