



### H105 Postmortem Computed Tomography (PMCT) Versus the Skeletal Survey in Children: A Pathology-Proven Study

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**Learning Overview:** After attending this presentation, attendees will understand the value of skeletal surveys and PMCT in deceased children with respect to the detection of fractures.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by showing a potential new approach to postmortem pediatric imaging in cases of suspected physical abuse.

Annually, between 118,000 and 180,000 children in the Netherlands are exposed to some form of abuse. Of these children, 18% are physically abused. It has been shown that child abuse not only has short-term but also long-term effects on the (mental) health of a child. Therefore, it is important to detect child abuse as early as possible to protect the health of the child and to prevent further injuries, of which death is the most extreme outcome. To do this, non-accidental injuries should be recognized correctly by the physician and an imaging technique should be available to accurately detect abuse-related injuries. In children under the age of 3 years, a skeletal survey is a mandatory procedure in the work-up of suspected physical abuse. This skeletal survey consists of a predefined set of Conventional Radiographs (CR) as defined by the Royal College of Radiologists and the Society and College of Radiographers.

In recent years, several studies in adults have shown that Computed Tomography (CT) has a higher sensitivity for rib fractures and skull fractures, for example. However, it is not clear if this is true for children as well, or if CT has the ability to detect small metaphyseal corner fractures.

The goal of this research was to determine whether it was possible to (partly) replace the skeletal survey by PMCT. For this determination, deceased children younger than five years referred to the Netherlands Forensic Institute for a forensic autopsy in whom both a skeletal survey and a PMCT scan were obtained were included in this study. Included cases were retrospectively reviewed by an experienced pediatric radiologist. The fracture patterns on CR and CT were scored and evaluated. Out of 55 eligible cases, fractures were observed in 24 cases (16 boys (mean age: 3.25 months, age range: 1–8 months) and 8 girls (mean age: 3.25 months, age range: 0–13 months)). Radiology findings were compared to full autopsy reports.

CR and CT were concordant in 36 cases and non-concordant in 19 cases. It was shown that CT detects significantly more rib fractures compared to CR or autopsy ( $p=0.01$  and  $p=0.004$ , respectively). Also, CT detected more skull fractures compared to CR. In contrast, CR had a higher sensitivity compared to PMCT (e.g., metaphyseal corner fractures), where PMCT missed two out of three fractures. Autopsy was superior in detecting basilar skull base fractures ( $N=5$ ), which all were missed by CT and CR.

These results suggest that radiographs of the thorax and skull can be excluded from the skeletal survey in a postmortem setting. However, it is shown that PMCT cannot completely replace the skeletal survey, as clinically relevant metaphyseal corner fractures were missed on CT. Based on these findings, it is suggested that a whole body PMCT with additional radiographs of the joints, hands, and feet may be a viable option in a forensic postmortem setting.

#### Child Abuse, Fractures, Radiology