A83 The Influence of a Pathological State on Fetal Biometric Age Estimation

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The goal of this presentation is to highlight the influence of fetal growth-affecting diseases on the estimation of fetal biometric age calculated from conventional anthropometric tools. This presentation reveals the potential mistakes inherent in the estimation of fetal age in cases in which judicial consequences are crucial. This study challenges the anthropometric tools traditionally used for age estimation in healthy fetuses and suggests more relevant markers of fetal growth in pathologic conditions. With brain maturation being the most relevant marker of fetal maturation, skull base bony structures could be a useful witness of fetal growth.

This presentation will impact the forensic science community by providing diagnostic tools useful in all fetal diseases characterized by a short femur length.

Pars basilaris growth is not influenced by the diseases characterized by a short femur length; thus, the decoupling between pars basilaris growth and that of long bones is a diagnostic element for these diseases. Thirty-seven Computed Tomography (CT) fetal scans, *in utero* or postmortem, conducted after observing a short femur length were compared to a control population of 97 CT postmortem fetal scans. Twin pregnancies were excluded. The study population was divided into two groups: (1) a "skeletal anomalies" group involving fetuses suspected of, or that were carriers of, a constitutional bone disease or a chromosomal abnormality; and, (2) an "isolated short femur length" group involving fetuses without suspicion of syndromic context. A reconstruction of the long bones (humerus, radius, ulna, femur, and tibia) and the pars basilaris of each fetus allowed the calculation of the maximum long bones diaphyseal lengths and the dimensions of the pars basilaris (maximum width, maximum length, and sagittal length). For each fetus, the ratio of diaphyseal lengths to Femoral Length (FL) as well as that of FL to pars basilaris dimensions were calculated. Between study and control populations, a significant difference in the humeral, radial, femoral, and tibial lengths was observed ($p<0.05$), whereas no difference between the pars basilaris dimensions was found. Age estimation calculated from the FL underestimated the true age of the population. The FL/Maximum Width Basilaris ratio was the most relevant diagnostic tool of the diseases characterized by a short femur length, and the Humeral Length/FL ratio was useful for the differential diagnosis between intra-uterine growth retardation and constitutional bone disease.

A study associating both pars basilaris and long bones growth estimation allows: (1) reducing the risk of gestational age underestimation and, thus, its legal consequences; and, (2) making a diagnosis of disease affecting fetal growth, which is a challenge in anthropological practices.

Fetal Age, Short Femur Length, Anthropology