Reference values during growth for the Roussouly classification of sagittal balance and development of a new classification based on pelvic incidence

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Introduction: The Roussouly classification, based on the functional parameter sacral slope (SS), describe the normal sagittal balance in adults. Reference values during growth should be defined since they are an important treatment target. Moreover, during growth there are few correlations between sagittal parameters and the hypothesis that a new classification based on the anatomical parameter pelvic incidence (PI) could be useful needs to be verified.

Objectives: to identify the reference values for the Roussouly classification during growth and to develop a new classification based on PI.

Methods: Cross-sectional study. Patient sample: 222 healthy subjects at first consultation, age 6 to 18 years. Outcome measures: spinal, pelvic, and spino-pelvic sagittal x-rays parameters. Statistics: Correlations between sagittal parameters and age have been searched. A new classification, based on PI, and comprising three types, is defined and compared to the Roussouly classification.

Results: SS and PI increase with age, but with different cut-offs. Correlations between sagittal balance parameters diminished in younger sub-groups. The distribution of Roussouly types did not correspond to that in adulthood; thus, new reference cut-offs are defined. When combining both classifications, no overlap was found; however, there was a uniform and balanced distribution of cases among the nine possible combinations

Conclusions: During growth, new threshold for the Roussouly classification need to be used. The new classification based on PI is strongly correlated with the Roussouly classification, but it is also clearly different. We propose a tool for sagittal balance conservative treatment coming from the comparison between the two classifications.