

# The use of cephalometric analysis on fetal MRI to investigate the development of head and neck anatomical structures

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Magnetic resonance imaging (MRI) is a second-level screening exam prescribed during pregnancy for the assessment of fetal craniofacial malformations. Aim of the present study was to assess if MRI scans performed for gynecologic reasons are useful in morphologic field to investigate the development of head and neck anatomical structures.

Twenty-eight fetal MRI of patients from 20th to 32nd weeks of gestation taken to dispel doubts about the presence of skeletal malformations were analyzed and divided into 3 groups according to different gestational weeks: group A from 20th to 22nd, group B from 23rd to 25th, group C from 27th to 32nd.

In each image, cephalometric landmarks were set on cranial base, maxilla, mandible and hyoid bone and used to calculate linear and angular measurements. The vertical and sagittal dimensions were computed to investigate the skeletal growth of the different anatomical structures and the position of maxilla and mandible in relation to the anterior cranial base. Oropharyngeal and nasopharyngeal areas were defined to study the development of functional spaces. Descriptive and inferential statistics were applied to each parameter. Also, correlations between linear, angular data and areas were performed.

At the analysis, the growth of the analyzed anatomical structures was linear in both vertical and sagittal directions during the first interval (from group A to B) and peaked during the second interval (from group B to group C) ( $p < 0.05$ , Wilcoxon-Mann-Whitney test). On sagittal plane, a significant retrusion of maxilla in relation to anterior cranial base was observed at the second interval ( $p < 0.05$ , Wilcoxon-Mann-Whitney test). Both oropharyngeal and nasopharyngeal spaces increased significantly during the first interval with a peak of growth during the second interval ( $p < 0.05$  Wilcoxon-Mann-Whitney test), however growth of nasopharyngeal area was significantly lower than oropharyngeal area ( $p < 0.05$ , Wilcoxon signed-rank test).

The present study found a harmonic growth of skeletal structures and functional spaces of head and neck anatomical region. These findings are in continuity with the existing literature that assessed craniofacial growth of fetus by cephalometric analysis on radiographies [1]. Cephalometric analysis on MRI images of fetus seems to be a useful and non-invasive method to investigate craniofacial development.

## References

- [1] Esenlik E et al. (2014) Sener EH, Yılmaz HH, Malas MA. Cephalometric investigation of craniomaxillofacial structures during the prenatal period: a cadaver study. *Am J Orthod Dentofac Orthop.* 145:217-227.

## Key words

Growth, Craniofacial, Development, Oropharyngeal, Nasopharyngeal.