Original research

Growth pattern of the philtrum in cases of normal and pathological fetal development

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ABSTRACT

Objectives: This study aimed to determine the fetal philtrum length at early stages of gestation and perceive its growth through different gestational ages in case of normal and pathological fetal development.

Methods: This cross-sectional observational study was conducted based on ultrasound images obtained at an institutional centre specialised in Prenatal Diagnosis. A total of 108 fetuses between 10 and 26 weeks of gestation were included, of which 90 corresponded to normal pregnancies and 18 to pregnancies diagnosed with fetal pathology. The fetal philtrum study was performed by ultrasound during a routine evaluation for each fetus. Fetal philtrum length was measured by ultrasonography, based on a mid-sagittal plane from the posterior border of the columella to the top of the upper lip. Data analysis was conducted through predictive models.

Results: The best regression model for predicting the philtrum length between the 10th and 26th gestational weeks was the linear one (without constant). This model, defined by the equation $\hat{y} = 0.294 \times (R^2 = 0.970, p = 0.001)$, represents a 0.294 mm increase of the philtrum length per week of gestation. No statistically significant differences were found in the mean value of the philtrum length, either in the presence or absence of fetal pathology.

Conclusions: This study provides additional data about the growth pattern of the philtrum in early stages of gestation and offers a simpler way to identify alterations in the philtrum length. However, more studies with larger samples are needed to understand better

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the relationship between philtrum anomalies and craniofacial abnormalities in order to obtain a more accurate prenatal diagnosis.

Padrão de crescimento do filtro em casos de desenvolvimento fetal normal e patológico

R E S U M O

Palavras-chave:
Filtro labial
Face
Diagnóstico pré-natal
Ultrassonografia

Objetivos: Determinar o comprimento do filtro labial fetal em idades gestacionais precoces e compreender o seu crescimento ao longo da gestação em casos de desenvolvimento fetal normal e patológico.

Métodos: Este estudo, observacional transversal, foi desenvolvido com base em imagens ultrassonográficas obtidas num centro institucional especializado em diagnóstico pré-natal. Um total de 108 fetos foram incluídos, entre a 10ª e a 26ª semana de gestação, dos quais 90 corresponderam a gestações normais e 18 a gestações patológicas. O estudo do filtro fetal foi realizado durante um exame ultrassonográfico de rotina para cada caso. O comprimento do filtro fetal foi medido num plano sagital médio ecográfico do bordo posterior da columela ao topo do lábio superior. A análise dos dados foi realizada através de modelos preditivos.

Resultados: O melhor modelo de regressão para prever o comprimento do filtro, entre a 10ª e a 26ª semana de gestação foi o linear (sem constante). Este modelo, definido pela equação $\hat{y} = 0.294 \times$ ($R^2 = 0.970$, $p = 0.001$), representa um aumento de 0,294 mm no comprimento do filtro por semana de gestação. Não foram detetadas diferenças estatisticamente significativas no valor médio do comprimento do filtro, tanto na presença ou ausência de patologia fetal.

Conclusões: Este estudo fornece dados adicionais sobre o padrão de crescimento do filtro fetal em idades gestacionais precoces e oferece uma forma simples de identificar alterações no comprimento do mesmo. Contudo, tornam-se necessários mais estudos com amostras maiores para uma melhor compreensão da relação entre as anomalias do filtro e as anomalias craniofaciais de forma a permitir um diagnóstico pré-natal mais preciso.

Introduction

Facial anomalies can occur isolated or associated with chromosomal anomalies or syndromes related to a disproportionate growth of fetal facial features.[1,2] The most reported defects include an atypical profile, orbital dysplasia, low-set ears, hyper- or hypotelorism, retrognathia, and micrognathia.[2,3] Since some of these defects can be prenatally diagnosed, the ultrasonographic study of the fetal face has become relevant to routine prenatal screening,[3] especially in high-risk pregnancies.[4] Although the ultrasonographic study can also be based on three-dimensional (3D) ultrasound images, two-dimensional (2D) ultrasonography has shown to be easier, quicker, more efficient, and more accurate.[3] Several ultrasound studies on facial parameters have proposed different nomograms for the forehead,[5] the orbits,[6,7] the nose,[8,9] the alveolar ridge,[10] the mandible,[11] the philtrum, and the chin.[12]

The early diagnosis and characterisation by ultrasound of some pathologies associated with orofacial features can allow the dentist in planning posterior treatments. In these type of cases, when the orofacial anomalies present result in physical disabilities, the dentist should adopt an active role since the counselling to the treatment in order to provide the best prognosis to the parents with a prenatal diagnosis of a craniofacial malformation.[13–17]

Regarding philtrum evaluation, one of the examples of the facial features that can be assessed by prenatal ultrasound, the detection of an abnormal length (too short or too long) constitutes a typical feature of several dysmorphological syndromes.[1,18,19] The fetal alcohol syndrome is probably the most documented one associated with teratogenic exposure.[12] Other teratogens, such as carbamazepine and valproate, are also associated with fetal syndromes characterised by several findings, including a long philtrum.

Despite its clinical importance, recognised in paediatrics, the evaluation of the fetal philtrum length (FPL) was initially based on subjective criteria. Currently, sonographic nomograms are available for in term and preterm neonates[20] and for fetus from the 13th week of gestation.[12] In most cases, the assessment of fetal facial profiles on the same plane as the philtrum is possible from the 12th week of gestation.[3,21] However, since the fetal philtrum is formed around the 7th