Prenatal 3D ultrasound detection of adducted thumbs in x-linked hydrocephaly

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Objective

X-linked hydrocephaly is a rare sex-linked genetic recessive condition occurring in 1/30, 000 deliveries. Adduction of thumbs and mental retardation are additional associated clinical findings. We describe two cases of X-linked hydrocephaly with associated adducted thumbs that were diagnosed prenatally with the combined use of three-dimensional (3D) ultrasound and fetal blood sampling for cytogenetic and molecular analyses.

Methods

Conventional and 3D ultrasound were used to depict the sonographic features of the hands in fetuses with aqueductal stenosis. Those showing adducted thumbs underwent cytogenetic and molecular genetic analyses. Maternal samples were also tested. Fetal and maternal blood underwent direct sequencing on genomic DNA of the 28 exons of the L1CAM gene.

Results

Two fetuses scanned at 28 and 30 weeks showed adducted thumbs on 3D ultrasound in association with severe hydrocephaly. A missense mutation (c. 803G>A, p. Gly268Asp) and in exon 7 a novel nonsense mutation (c. 3241C>T, p. Gln1081X) in exon 24 of the L1CAM gene were detected in fetal and maternal samples.

Conclusion

This report suggests that 3D ultrasound can facilitate the identification of adducted thumbs in fetuses affected by X-linked hydrocephaly and supports evaluation of the fetal hands as an integral part of the ultrasound anatomical assessment in male fetuses with hydrocephaly secondary to aqueductal stenosis. If adducted thumbs are present, molecular studies of the L1CAM gene should be strongly considered. If an L1CAM mutation is confirmed, extensive genetic counseling for the entire family should be provided.