Inherited 13q deletion in a first trimester fetus with prenatally detected parietal cephalocele

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Abstract

Parietal cephalocele communicating with the third ventricle is a rare variety of cephalocele. In this case first trimester ultrasonographic evaluation showed a parietal cephalocele which was associated with deletion of the distal part of the q arm of chromosome 13. Karyotyping of the couple revealed a balanced translocation between chromosomes 9 and 13 in the husband. This is the third reported case of parietal cephalocele with 13q deletion indicating that parietal cephalocele may be characteristic for chromosome 13q deletion. This case is also the first report of first trimester detection of parietal cephalocele associated with 13q deletion.

Case report

A 22 year old woman in her fourth pregnancy was referred to our center in view of her bad reproductive history. The first pregnancy was terminated at 19 weeks of gestation due to bilateral pleural effusion in the fetus and there were two spontaneous first trimester miscarriages after that. The present pregnancy was of eight weeks gestation and ultrasonography confirmed a viable gestation of 8 weeks. In view of her past obstetric history, karyotyping of the couple was done, which revealed a balanced translocation between chromosomes 9 and 13 [46,XY,t(9;13)(p24;q22)] in the husband (Fig 1a). The wife's karyotype was normal. Follow up ultrasonography at 12 weeks gestation revealed a parietal cephalocele measuring 4mm×4mm over the midline sagittal suture. The cavity of the cephalocele was in continuity with the third ventricle (Fig 1b). At 14 weeks gestation, follow up ultrasonography confirmed an enlarging cephalocele. Nuchal translucency was within normal limits and rest of the brain was normal in appearance. After genetic counseling, amniocentesis was performed. Fetal karyotype from amniotic fluid cell culture revealed a terminal deletion in the long arm of chromosome 13 from q22 to qter [46,XY,del(13)(q22-qter)] (Fig 1c). The couple opted for termination of the pregnancy in view of the poor prognosis. Fetal autopsy confirmed the parietal cephalocele to be an extension of the third ventricle in between two parietal cerebral hemispheres. The cerebellum, vermis and other brain structures were normal. Associated anomalies noted were hypertelorism, retrognathia, low set ears (Fig 1d), imperforate anus and penoscrotal inversion (Fig 1f), hypoplastic thumbs (Fig 1g & 1h) and talipes equinovarus deformity of the left foot (Fig 1i). No malformations of internal organs were noted.

Reported cases with inherited deletion of 13q are due to balanced rearrangement involving chromosome 13 in parents. The translocation (9;13)(p24;q22) has been reported in a family and was associated with spontaneous miscarriages and partial trisomy 13 in the offspring.[1] The deletion of a large segment of chromosome 13 in this fetus was inherited from the father who had a balanced translocation between chromosomes 9 and 13. The previous miscarriages and fetal hydrops in this couple were most likely due to chromosomal imbalances in the conceptuses.

13q deletion syndrome is an uncommon but well delineated syndrome with neural tube defects, anal atresia, genital abnormalities and hypoplastic thumb as characteristic features.[2,3] Holoproencephaly, Dandy Walker malformation, gut and genital abnormalities have also been reported in 13q deletion and many of these are prenatally detected.[4–7] Neural tube defects of all types including

cephaloceles have often been reported and the critical region is thought to be 13q33-34, which was deleted in the reported fetus.[2,8,9] Absent/hypoplastic thumb and anal atresia present in the fetus are often seen in cases with deletion 13q syndrome.

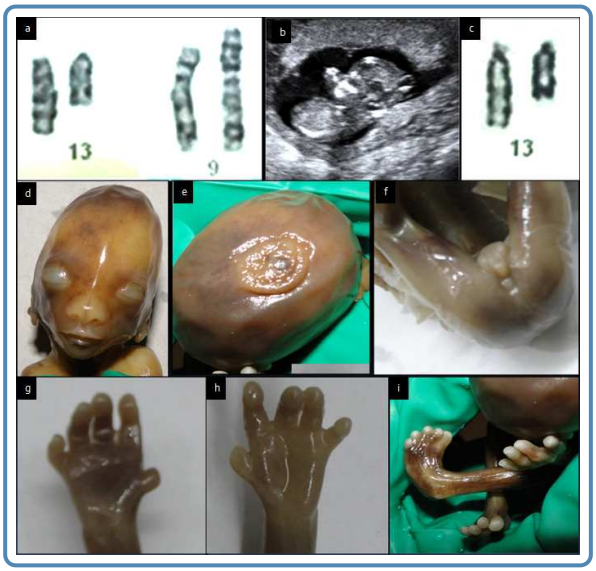

Figure 1 a) Partial karyotype of husband; b) Prenatal ultrasonography showing parietal cephalocele in connection with third ventricle; c) Partial karyotype of fetus; d) External examination of fetus showing hypertelorism, retrognathia, low set ears; e) Parietal cephalocele; f) Penoscrotal inversion and imperforate anus; g) Hypoplastic thumb in right hand; h) Hypoplastic thumb in left hand; i) Left foot showing talipes equinovarus deformity.

The present case came to our attention because of prenatal detection of parietal cephalocele at 12 weeks of gestation. There are limited reports of first trimester detection of parietal cephalocele in literature.[10] Prenatal detection of 13q deletion syndrome is reported and two of them had small parietal encephalocele detected at 16 weeks and 14 weeks of gestation respectively.[7,11] Parietal cephalocele is a rare type of cephalocele and accounts for less than 13% of cephaloceles. This is the third report of prenatal detection of this rare variety of cephalocele in association with the 13q deletion syndrome. Prenatal detection of parietal cephalocele should lead one to suspect the possibility of 13q deletion syndrome and conventional karyotyping or cytogenetic microarray is the preferred method to detect these imbalances.

References

1. Schinzel, A. *et al.* Further delineation of the clinical picture of trisomy for the distal segment of chromosome 13: report of three cases. *Hum Genet* **32**, 1-12 (1976).
2. Luo, J. *et al.* Neural tube defects and the 13q deletion syndrome: evidence for a critical region in 13q33-34. *Am J Med Genet* **91**, 227-30 (2000).
3. Chen, C.P. *et al.* Prenatal diagnosis of partial monosomy 13q associated with occipital encephalocoele in a fetus. *Prenat Diagn* **16**, 664-6 (1996).
4. Araujo Junior, E. *et al.* Prenatal diagnosis of the 13q-syndrome through three-dimensional ultrasonography: a case report. *Arch Gynecol Obstet* **274**, 243-5 (2006).
5. Gutierrez, J. *et al.* Prenatal diagnosis of 13q-syndrome in a fetus with holoprosencephaly and thumb agenesis. *Ultrasound Obstet Gynecol* **17**, 166-8 (2001).
6. Alanay, Y. *et al.* Is Dandy-Walker malformation associated with "distal 13q deletion syndrome"? Findings in a fetus supporting previous observations. *Am J Med Genet A* **136**, 265-8 (2005).
7. Hindryckx, A. *et al.* First trimester prenatal diagnosis of 13q-syndrome presenting with increased nuchal translucency, Dandy-Walker malformation and small parietal encephalocoele. *Prenat Diagn* **28**, 445-6 (2008).
8. Kirchhoff, M. *et al.* Phenotype and 244k array-CGH characterization of chromosome 13q deletions: an update of the phenotypic map of 13q21.1-qter. *Am J Med Genet A* **149A**, 894-905 (2009).
9. Brown, S. *et al.* Preliminary definition of a "critical region" of chromosome 13 in q32: report of 14 cases with 13q deletions and review of the literature. *Am J Med Genet* **45**, 52-9 (1993).
10. Sepulveda, W. *et al.* Fetal Cephalocele: First-Trimester Sonographic Spectrum In A Review Of 35 Cases. *Ultrasound Obstet Gynecol* (2014).
11. Manolakos, E. *et al.* First trimester diagnosis of 13q-syndrome associated with increased fetal nuchal translucency thickness. Clinical findings and systematic review. *Clin Exp Obstet Gynecol* **39**, 118-21 (2012).