

# Trisomy 10: first-trimester features on ultrasound, fetoscopy and postmortem of a case associated with increased nuchal translucency

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## ABSTRACT

We report a case of the prenatal diagnosis of trisomy 10 in a fetus presenting with an increased nuchal translucency thickness (5 mm) on a routine first-trimester anomaly scan at 12 weeks' gestation. Multiple abnormalities were diagnosed by ultrasound and fetoscopy. Karyotyping on chorionic villus sampling led to the diagnosis of homogeneous trisomy 10 which was confirmed by in situ hybridization on fetal tissue samples. Postmortem examination confirmed major anatomical malformations, including facial cleft, arthrogyposis of the upper and lower limbs and bilateral diaphragmatic hernia, and also revealed hypoplastic lungs, right renal agenesis and a complex cardiac malformation.

Trisomy 10 is an uncommon chromosomal abnormality that is likely to be associated with increased fetal nuchal translucency. This case also emphasizes the value of a detailed anomaly scan in high-risk patients in the first trimester of pregnancy.

## INTRODUCTION

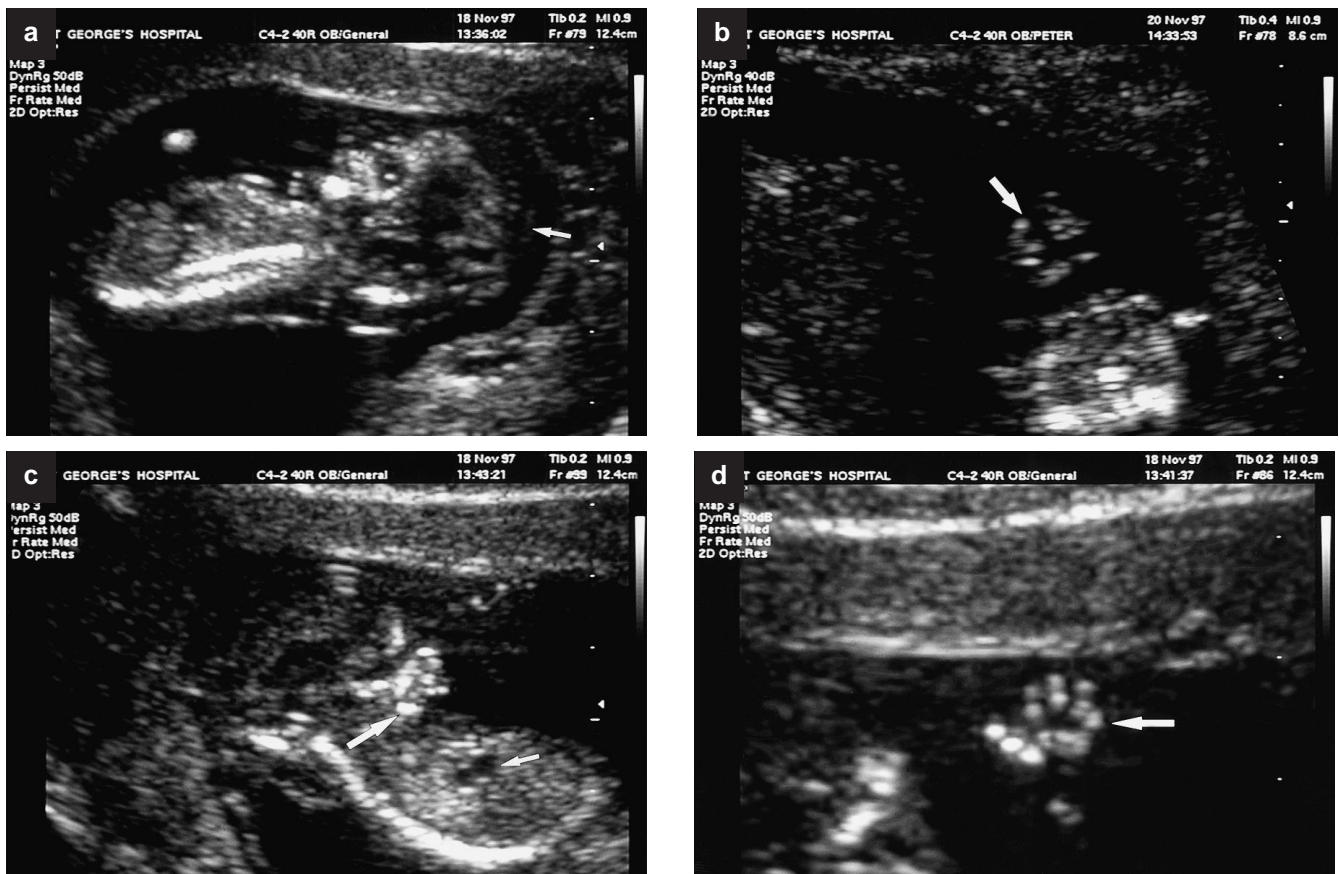
Trisomy 10 is a rare chromosomal abnormality, the incidence of which is unknown. However, this genetic anomaly has been identified in 1.8% of abortions<sup>1,2</sup> and is also dependent upon maternal age<sup>3</sup>. While none of the fetuses diagnosed with trisomy 10 have survived to term, all cases of trisomy 10 in liveborns have been found to be mosaic with a euploid cell line<sup>4,5</sup> or monosomy X<sup>6</sup>. The phenotype and clinical features of this trisomy 10 mosaicism include growth and mental retardation, hypertelorism, cryptor-

chidism, marked plantar and palmar furrows, congenital heart defects and short life expectancy.

There is a strong association between increased fetal nuchal translucency thickness and chromosomal defects<sup>7</sup>, but also with congenital cardiac malformations<sup>8</sup> and various genetic conditions<sup>9,10</sup>. We report a case of prenatal diagnosis of nuchal edema associated with major cardiac abnormalities in a fetus affected by trisomy 10; ultrasound, fetoscopic and postmortem findings are presented.

## CASE REPORT

A 32-year-old Caucasian woman, gravida 2, para 1, underwent an ultrasound examination at 12 weeks of gestation to screen for major fetal anomalies and fetal aneuploidy by measurement of the nuchal translucency. This showed a live fetus with a 61-mm crown–rump length, 19-mm biparietal diameter and 9-mm femur length. The nuchal translucency thickness was increased (4.7 mm) and mild general skin edema was noted (Figure 1a). Detailed ultrasound examination raised suspicions of a facial cleft (Figure 1b), an extreme form of micrognathia, diaphragmatic hernia (Figure 1c) and a hypoplastic clenched fifth finger on the left hand (Figure 1d). As termination of the pregnancy was a strong consideration, we offered the patient confirmation of the sonographic findings by diagnostic fetoscopy. This was performed under local analgesia with a semi-rigid 1-mm 0° diagnostic endoscope (Karl Storz, Tuttlingen, Germany). The fetal face was visualized in a frontal plane and appeared dysmorphic. A central facial cleft seen sonographically was confirmed; a prominent



**Figure 1** Longitudinal view at 12 weeks of gestation, showing (a) an increased nuchal translucency and mild general skin edema (arrow). (b) Frontal view of the head demonstrates a facial cleft (arrow), and a sagittal view (c) shows marked micrognathia (large arrow) and a diaphragmatic hernia with the stomach within the thorax (small arrow). (d) Hypoplastic and clenched fifth finger on the left hand (arrow)

forehead and marked micrognathia were noted. In addition to the confirmation of a clenched and hypoplastic fifth finger of the left hand, bilateral talipes were also noted. The needle through which the fetoscope had been inserted was also used to perform chorionic villus sampling. The karyotype was 47,XY + 10. This was confirmed by *in situ* hybridization of fetal tissue with the use of a specific chromosome 10 centromeric probe (D 10 ZI).

The parents elected to terminate the pregnancy, and this was performed by prostaglandin induction of labor at 13 + 3 weeks.

### External examination

External examination showed marked edema of the neck extending to most of the head and in parts of the body. There was a deep cleft extending into the right nasal orifice, and the right nasal fold was prominent; as a result, the face appeared grossly asymmetric (Figure 2a). The palatal shelves were not fused. There was marked micrognathia (Figure 2b). The ears were set low, had a round shape and appeared hairy (Figure 2a). The left hand showed the nail of the fifth finger in an apical location (Figure 2c). The lower limbs showed arthrogryposis and marked talipes (Figure 2d). In both the right and left feet, the fifth toes were short and most nails were in the apical region of their corresponding toes.

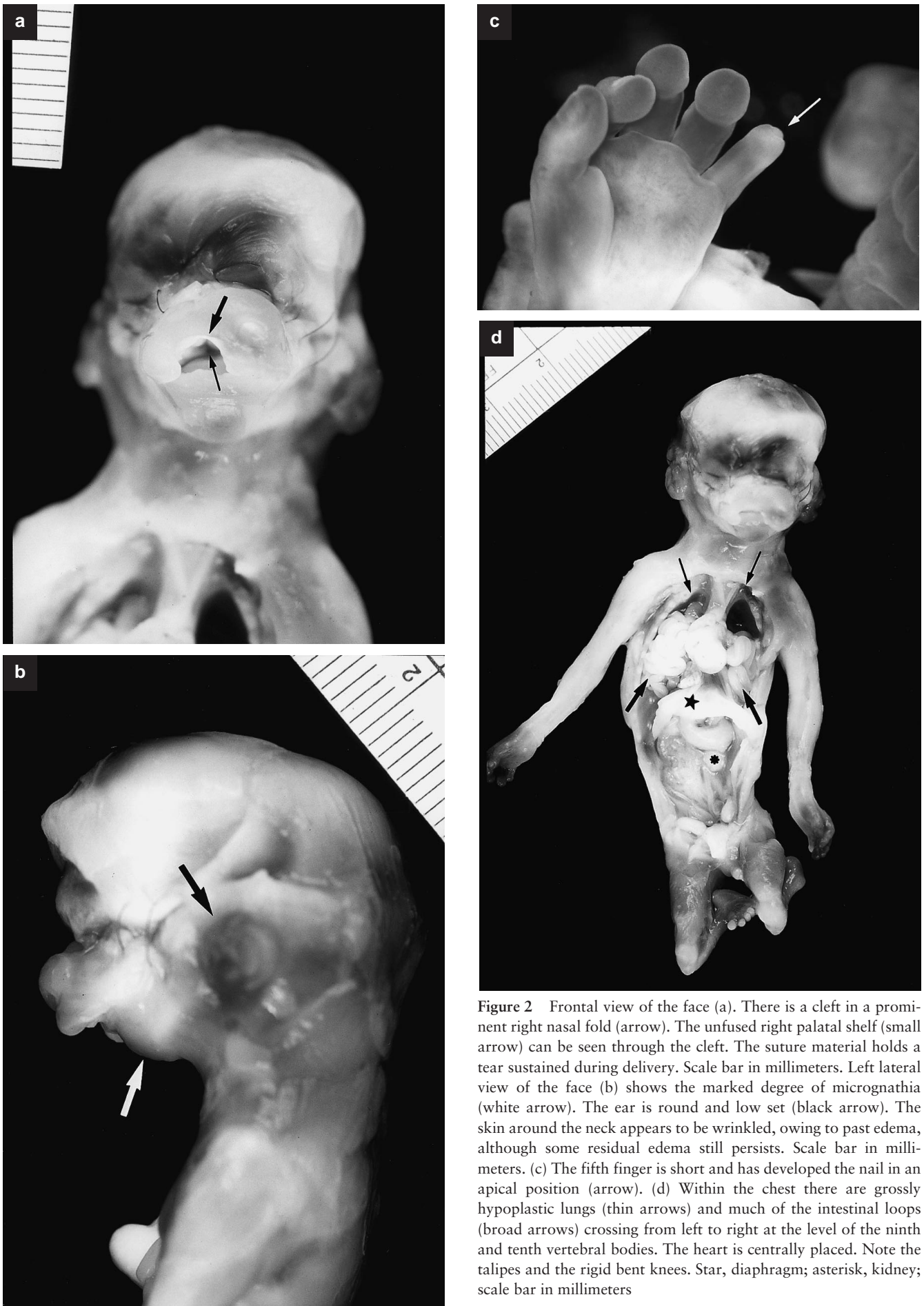
### Internal examination

There were two grossly hypoplastic lungs (Figure 2d). Much of both the right and the left hemithorax was occupied by most of the intestinal loops. Much of the right lobe of the liver was within the right hemithorax. There were two large defects in the right and left leaves of the diaphragm.

The heart was centrally placed and there was atresia of the tricuspid valve. The right ventricle was hypoplastic and was connected to the pulmonary trunk with a normal pulmonary valve. The left ventricle was hypertrophic. There was a common origin for both the common and left carotid arteries. The isthmus of the aorta was narrow (0.7 mm). There was a large atrial septal defect of the secundum type. The coronary sinus opened into the right atrium. There was agenesis of the right kidney and the left kidney was small and showed no fetal lobulations. There was a thin-walled cyst, 2 mm in diameter, containing clear watery fluid in the hilar region of the left testis.

### DISCUSSION

First-trimester sonographic screening for nuchal translucency thickness, in combination with maternal age, is feasible in experienced hands. It has shown a sensitivity of up to 86% in detecting trisomy 21 and also in detecting



**Figure 2** Frontal view of the face (a). There is a cleft in a prominent right nasal fold (arrow). The unfused right palatal shelf (small arrow) can be seen through the cleft. The suture material holds a tear sustained during delivery. Scale bar in millimeters. Left lateral view of the face (b) shows the marked degree of micrognathia (white arrow). The ear is round and low set (black arrow). The skin around the neck appears to be wrinkled, owing to past edema, although some residual edema still persists. Scale bar in millimeters. (c) The fifth finger is short and has developed the nail in an apical position (arrow). (d) Within the chest there are grossly hypoplastic lungs (thin arrows) and much of the intestinal loops (broad arrows) crossing from left to right at the level of the ninth and tenth vertebral bodies. The heart is centrally placed. Note the talipes and the rigid bent knees. Star, diaphragm; asterisk, kidney; scale bar in millimeters

other chromosomal abnormalities, including trisomy 18, trisomy 13 and 45,XO<sup>7</sup>.

Recently, the first report of prenatal diagnosis of trisomy 10 at 15 weeks of gestation emerged, suggesting an association of trisomy 10 and fetal nuchal edema<sup>11</sup>. The post-mortem features included thickened skin of the posterior neck, low-set ears, facial cleft, micrognathia, right-hand polydactyly, left 'hitch-hiker' thumb, left 'rocker bottom' foot with hypoplastic toes and agenesis of the right lung and right kidney. Ultrasound examination at 12 weeks of gestation in our case of trisomy 10 identified increased nuchal translucency, facial cleft, micrognathia, diaphragmatic hernia and a hypoplastic fifth finger on the left hand. Fetoscopy confirmed these findings and additionally enabled a precise description of the facial dysmorphism and the diagnosis of bilateral talipes. This case resembles the one previously described<sup>11</sup>, particularly with regard to the facial dysmorphism. Therefore, the facial and limb features together with an increased nuchal translucency could be taken as diagnostic landmarks strongly suggesting trisomy 10. Furthermore, we describe additional abnormalities including major cardiac malformations and bilateral diaphragmatic hernia, with all the added pathology that it entails. Whilst polydactyly, agenesis of the right lung and malrotation of the intestines were not found in our case, the presence of multiple external and internal malformations found in both cases points to a problem of symmetry and axial distribution in fetuses affected by trisomy 10.

The presence of a nuchal translucency of > 4 mm in a first-trimester fetus in this case was regarded as a high-risk indicator and prompted further tests, leading to the prenatal diagnosis of trisomy 10. The results of the detailed antenatal and postmortem analysis confirm and extend the range of malformations seen in fetuses affected by trisomy 10. Whilst trisomy 10 can be diagnosed *in utero*<sup>11</sup>, and mosaicisms can present with some of the same malformations, first-trimester ultrasound examination can accurately diagnose most of these, especially when the sonographer's attention is caught by an increased nuchal translucency thickness at 10–14 weeks. Therefore, this is likely to extend the list of chromosomal abnormalities manifesting an increased nuchal translucency thickness at 10–14 weeks of gestation.

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