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Patau's syndrome ultrasonographic and morphological features of a near term live birth case

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ABSTRACT

We report a near term live birth of a child prenatally diagnosed with Patau's syndrome, rare case reaching this gestational age. Despite the acknowledgement of the poor fetal prognostic the parents chose to accept the natural course of the affected pregnancy, decision based on religious considerations. Alobar subtype of holoprosencephaly associating facial dysmorphism along with severe cardiac and limb defects and ambiguous genitalia were the main ultrasonographic and clinical findings. We describe a particular phonotypical association for a full aneuploidy that have been early prenatal diagnosed.

Keywords: Patau syndrome, trisomy 13, aneuploidy, clinical features, facial dismorphism, cardiac defects, polydactyly

INTRODUCTION

Classically an additional copy of chromosome 13 resulting in multiple congenital malformations that jeopardy the fetus life or survival after birth gives Patau syndrome, this specific full genotype being related with advanced maternal age. Several studies reported the incidence of trisomy 13 from 1 to 2.8 in 10 000 births, with prevalence of live births of 0.4 in 10 000 births and a median survival after birth from 2.5 days to 2 weeks [1-4]. Mosaicism, partial or unbalanced translocation variants of trisomy 13 will have less severe manifestations, a lifespan longer than a year and in some extremely rare cases they could even reach over 5 years of age [2]. About 50% of the pregnancies diagnosed with Patau syndrome in the first trimester will end naturally as miscarriages, and another significant percentage are electively terminated by parent's decision [5]. Cardiac defects are the most common ultrasonography finding of fetuses affected by this syndrome, followed by central nervous system anomalies as holoprosencephaly associating craniofacial dysmorphism: cleft lip and palate, impaired nose development, microphtamlia or anophtalmia, microcephaly; cystic kidneys, intrauterine growth restriction, limb abnormalities and cryptorchidism in males or bicornuate uterus in females can also be noticed [6,7].

CASE PRESENTATION

Young Muslim pregnant women, 23 years old, gravida 3, para 3, presents at 24 weeks gestation for second opinion on ultrasound evaluation of her fetus diagnosed after amniocentesis and karyotyping with trisomy 13 in the early second trimester (Figure 1). QF-PCR test for aneuploidy screening depicted three copies in regions specific to chromosome

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13 instead of two, this result being indicative of trisomy 13. There was a copy of chromosome X and one of chromosome Y suggesting a male fetus.

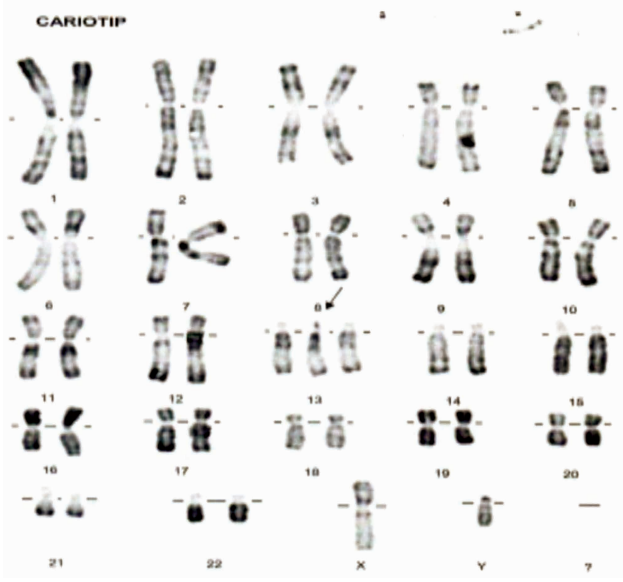

FIGURE 1. Fetal conventional karyotyping identify three copies of the chromosome 13 (arrow)

At the second opinion ultrasound evaluation, performed by a maternal-fetal medicine specialist, alobar holoprosencephaly (HPE) (Figure 2), microphtalmia, abnormal nose with visualization of a single external nostril and absent nasal septum (Figure 3), high-arched palate, complex heart anomaly (Figures 4,5,6), single umbilical artery and bilateral post axial polydactyly of hands (Figure 7) have been documented. Persistent truncus arteriosus type I, characterized by the presence of a single great artery that overrides the right and left ventricles, was easily seen on color Doppler examination that also sustain the presence of a ventricular septal defect (Figure 6).

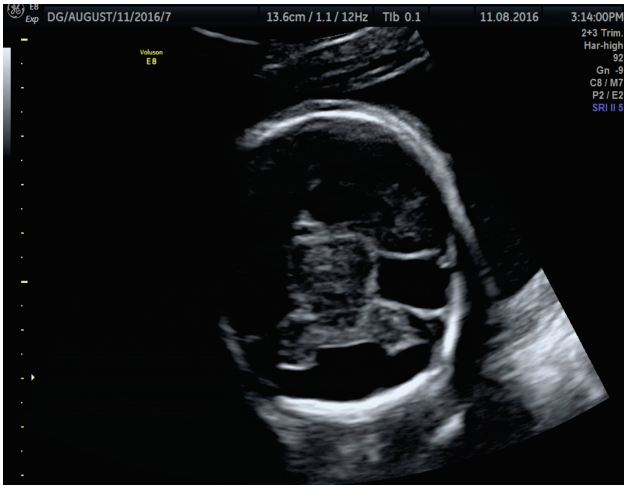

FIGURE 2. Standard transvers section of the fetal brain; the failure of the forebrain cleavage appear as absence of the falx and inter hemispheric fissure, fused central thalami and lateral ventricles

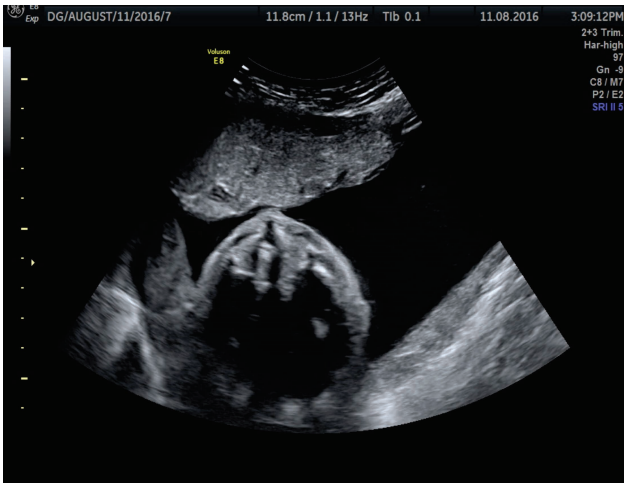

FIGURE 3. Single central nostril nose; 2D ultrasound in the oblic plane of palate examination

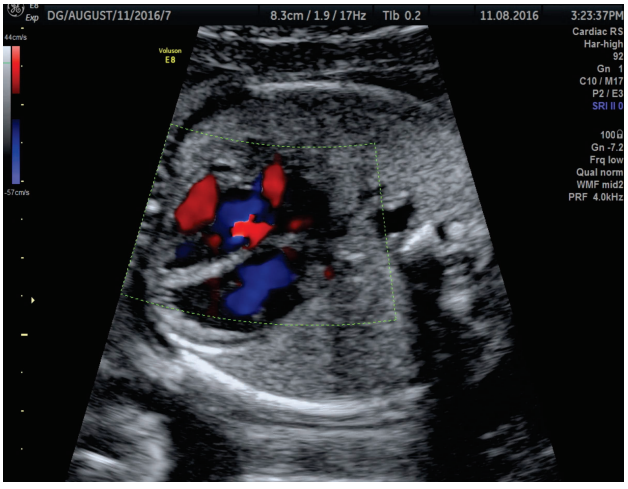

FIGURE 4. The aparent normal 4 chamber view section on color Doppler imaging, showing a normal axis of the cord and a normal cardiac aria

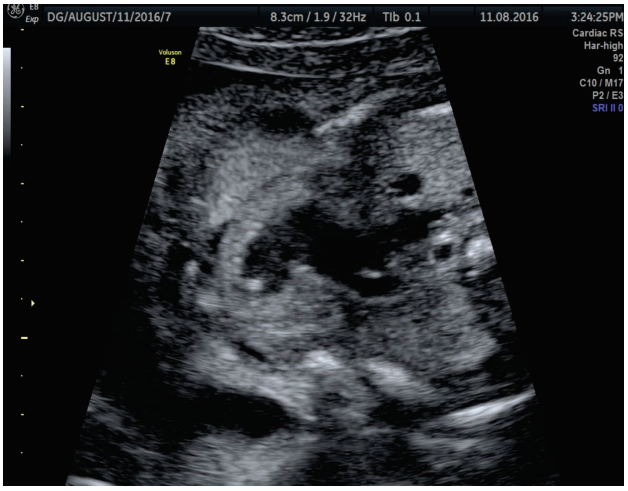

FIGURE 5. The abnormal three-vessel view discloses the trajectory of one dilated and bifurcated central vessel (persistent truncus arteriosus type I) flanked by two smaller vessels

Despite the poor fetal prognostic, the parents chose to continue the pregnancy due to religious

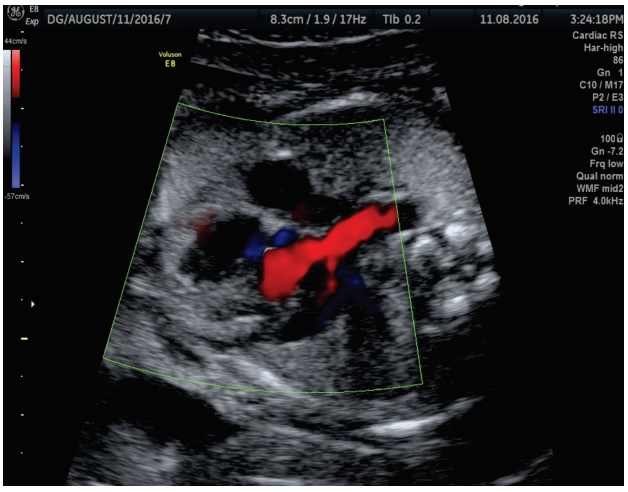

FIGURE 6. Color Doppler imaging emphasizes the persistent truncus arteriosus and the ventricular septal defect

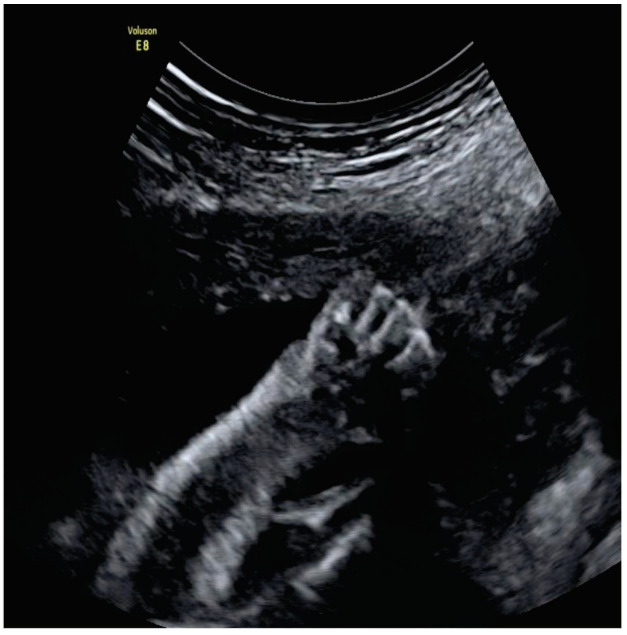

FIGURE 7. Prenatal ultrasound diagnosis of the post axial polydactyly of the left hand

considerations. The baby boy weighing 2,700 grams was delivered by cesarean section due to the uterine scars from the two previous ceasarean sections, at 35 weeks of gestation, when preterm prelabor rupture of membranes took place; the severe polyhydramnios have been installed from 33 weeks of gestation. The clinical examination of the neonate (Figure 8) showed facial dysmorphic elements: absent nasal septum and single-nostril nose, hypotelorism, microphtalmy, low insertion of the hairline (Figure 9), bilateral polidactyly of the hands and one unexpected element: ambiguous genitalia consisting in the cranially directed micropenis and the longitudinal raphe at the base of the penis with bilateral cryptorchidism (Figures 10). The parents had the chance to comfort their child through palliative care and got emotional closure accepting their loss that happened 5 days after birth.

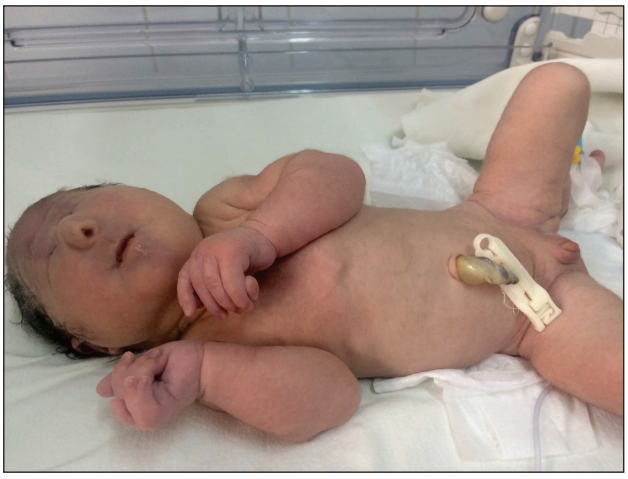

FIGURE 8. The overview of the newborn shows microphtalmy, the abnormal development of the nose, low insertion of the hairline, bilateral polidactyly of the hands and ambiguous genitalia

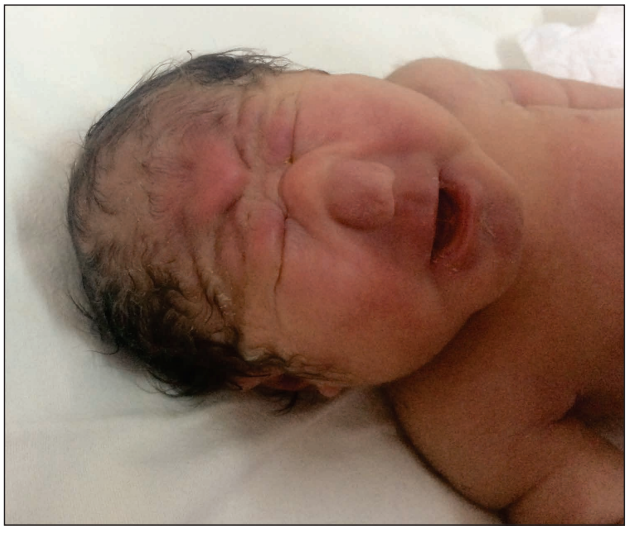

FIGURE 9. Features of the cebocephaly are present: single-nostril nose and hypotelorism. Particular facial dismorphism consist in a proeminent nasal bridge; microphthalmia and a low hairline may also be noted

DISCUSSION

HPE is a continuum of craniofacial and central nervous system defects; alobar HPE is a severe form of central nervous system disorganization associated in our case with a severe midline defect of primitive nasal structure represented by a defective single-nostril nose that is included along with closely-set eyes in definition of cebocephaly, one of the four entities of holoprosencephaly spectrum. Even if the depressed nasal bridge is the most common facial deformity associated with moderate to severe HPE, in our case a prominence at this level, along with a low hairline have been noted.

Cardiac abnormalities are prezent in almost 80 percent of patients with trisomy 13, and usually consist in ventricular or atrial septal defects, patent

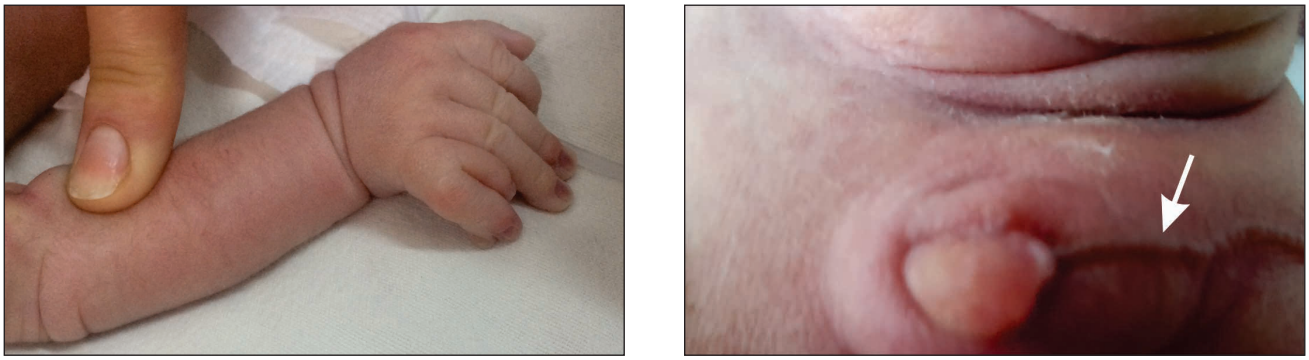

FIGURE 10. Bilateral post axial polydactily of hand is ilustrated in the left image; the right image offer a closed image of the longitudinal raphe of the scrotum (arrow), which do not contain the testis

ductus arteriosus or cardiac dextroposition. Persistent truncus arteriosus, a rare form of congenital heart disease, is resulted from incomplete or failed septation of the truncus arteriosus into aorta and pulmonary trunk. The well known Collett and Edwards classification is the earliest one, developed in 1949 and based on where pulmonary arteries arise from the common trunk [8]:

- Type I: the main pulmonary artery bifurcates into the left and right pulmonary arteries
- Type II: the right and left pulmonary arteries arise adjacent to each other from the postero-lateral segment of the common trunk
- Type III: the right and left pulmonary arteries originate separately from the right and left lateral segments of the common trunk.
- Type IV: neither of the pulmonary arteries arises from the common trunk, but are perfused by aortopulmonary collaterals.

In our case, even the 4-chamber view evidenced only disorganized atrial morphology, the major modified aspect of the three-vessel view showed one dilated central vessel superiorly bifurcated, flanked by two smaller other vessels. Due to the overriding interventricular septum by a great vessel, differential diagnosis of persistent truncus arteriosus with tetralogy of Fallot is the most common discussed.

Atypical genital appearance or difference of sex development (DSD) occurs with an incidence of 1 in 1,000-4,500 live births and in our particular case it could involve either an undervirilization, or a sex chromosome mosaicism/chimerism involving the Y chromosome. To our knowledge, none of the previous stated variants have been reported in the context of a trisomy 13.

Most of the fetuses with Patau syndrome are lost in the first and early second trimester, due to spontaneous abortion, or by parents decision to terminate the pregnancy at the moment of the diagnostic, others are stilllborn in late second or third trimester and very few are born alive at term. Incidence of trisomy 13 for live births varies by region influenced by religious habits and selective termination policies [3]. Due to high mortality rate, lack of genetic treatment and severe intellectual disability, the recommendation regarding neonatal attitude in cases of trisomy 13 is to offer support, but not intensive treatment (9,10).

For parents confronting with the finding of having a baby with trisomy 13 and also for health care providers this condition is a sensitive subject, difficult to manage from making the decision whether to continue or terminate the pregnancy to accepting this situation and make every effort possible to improve life quality of their offspring. A study that evaluated parental hopes for neonates with trisomy 13 concluded that most of the parents wanted to meet their child alive and be a family as long as it is possible [11]. Health providers should be prepared to accept the challenge of caring and value the life of the children affected by trisomy 13 even when poorest outcome is evident and respect the patient (parents) perspective of informed decision. The recurrence rate is estimated at about 1%.

CONCLUSIONS

We describe a particular phonotypical association for a full aneuploidy that have been early prenatal diagnosed. Persistent truncus arteriosus, ambiguous genitalia and the low hairline are atypical features of the Patau syndrome.

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We consider that the complete and augmented prenatal diagnosis played an important role in assuming by the family the unfavorable evolution of a major genetic anomaly case.

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