Antenatal Sonographic Diagnosis of Patau Syndrome (Trisomy 13): A Case Report

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Abstract

Patau syndrome is caused by an extra copy of chromosome 13, a medium acrocentric chromosome. In Malaysia, the incidence of Patau syndrome is 2.6/10,000 births. We report a case of Patau syndrome in thirty-two years old, Bugis, Indonesian, fifth gravida, para four diagnosed during antenatal ultrasound scan and confirmed by karyotyping.

Keywords: Trisomy 13, Patau syndrome, Holoprosencephaly.

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Introduction

Erasmus Barthalin was first to describe the clinical appearance of Trisomy 13 in the year 1657.Patau et al described the syndrome in the year 1960.(1) Patau syndrome is caused by an extra copy of chromosome 13, a medium-length acrocentric chromosome. The incidence of congenital anomalies is 1 in 838 live births in Malaysia. The frequency of newborns having abnormal chromosomes is 0.14% of Malays, 0.12% of Chinese and 0.06% of Indians.[2] In Malaysia, the incidence of Patau syndrome is 2.6 /10,000 births.[3] We report a case of Patau Syndrome confirmed by Karyotyping which was undetected during first - trimester ultrasound scan due to inexperience.

Case Report

A thirty-two years old, Bugis, Indonesian, fifth gravida, para four, came to the health clinic for antenatal booking at 7^{+1} weeks of gestation. The first ultrasound scan was done at 12^{+1} week and reported normal. There was a single live intrauterine fetus of 11^{+5} weeks of gestation. There was no congenital anomaly in her previous children. Her marriage was non-consanguineous. There was no history of infection or drug abuse and serological screening for HIV and syphilis were negative. The second scan was done at 31^{+5} weeks of gestation for placental location. Multiple abnormalities were noted in the fetus. They were microcephaly, lateral ventriculomegaly (15 mm), dangling choroid plexus, holoprosencephaly (Fig. 1), absent cavum septum pellucidum, abnormal facial profile , a proboscis (Fig. 2), ventricular septal defect, bilateral renal pelvicalyceal dilatation with echogenic kidneys (Fig. 3), polydactyly both hands and feet, congenital talipes equino varus (CTEV) and rocker bottom foot. The spine appeared to be normal. An umbilical cord showed three vessels. The diaphragm was intact and stomach bubble was present in the left upper abdomen. The placenta was posterior not previa.

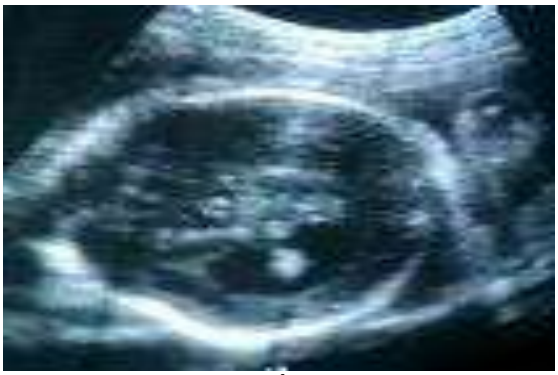

Fig. 1: USG scans at 2nd trimester show lateral ventriculomegaly, dangling choroid plexus, and holoprosencephaly

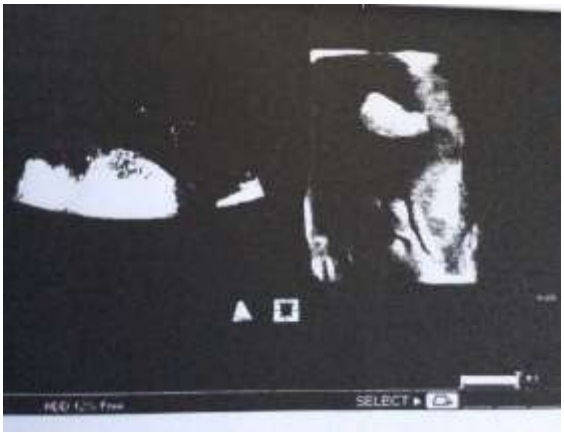

Fig. 2: USG scan at the 2nd trimester shows a proboscis

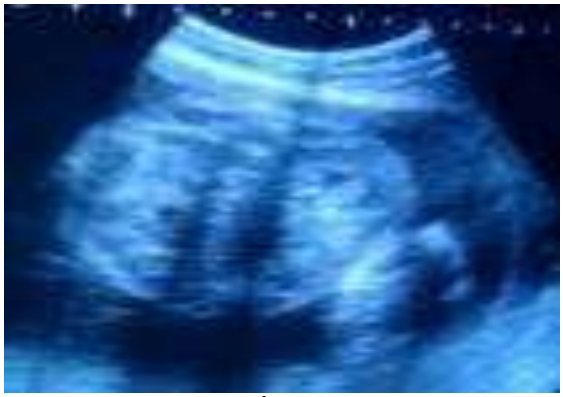

Fig. 3: USG scans at 2nd trimester show mild renal pelvicalyceal dilatation and echogenic kidneys

The patient was referred to the maternal fetal medicine unit at a tertiary care center for further assessment and management. An amniocentesis was performed at 32^{+5} weeks and karyotyping study confirmed trisomy 13, Patau syndrome (47xx, +13, inv (9) p11q13) (Fig. 4). The couple was counseled about the prognosis. The parents decided to continue the pregnancy. She delivered a term female baby on 28/02/2015 at 17.40 pm. The baby was born flat, cyanosed, Spo2 60% and hypotonic. At auscultation, heart rate was 80 beats per minute, a systolic murmur present and intermittent apnoea was present. The birth weight was 2800 grams. On examination, the baby was noted to have multiple dysmorphic features consistent with Patau syndrome, including a proboscis, a single median eye, absent nose, polydactyly with 6 digits on both hands and feet and rocker-bottom foot. The baby was transferred to the neonatal intensive care unit for observation by the pediatrician. The baby lived for 30 minutes. The parents declined for a neonatal autopsy. The parents were counseled and advised for parental karyotyping for chromosomal translocation but they declined.

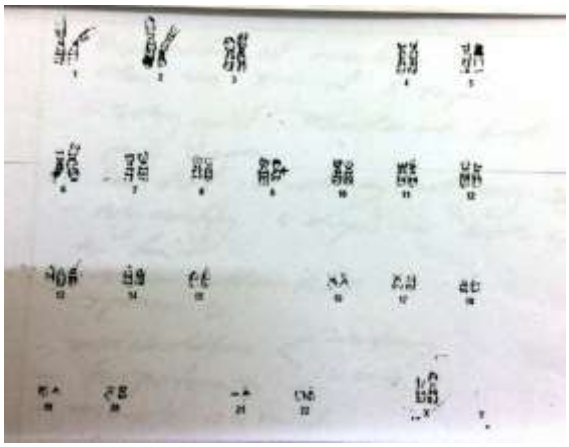

Fig. 4: The cytogenetic study shows an abnormal female karyotype with trisomy for chromosome 13 (Patau syndrome) alongside with inversion 9 which is considered to be a normal variant

Discussion

Currently, ultrasound scan is an important noninvasive diagnostic modality for prenatal screening of fetuses with congenital anomalies. It is a reliable tool for clinicians to diagnose the anomalies themselves as compared to biochemical screening. There is 90-100% sensitivity for the Sonographic diagnosis of Trisomy 13.[4] Trisomy 13 cases are fully evident at birth and a significant number of cases end in spontaneous abortion, fetal demise or stillbirth.[5] The recurrence risk is less than 1%.

First trimester combined screening is the method of choice for Trisomy 13, 18 and 21. Antenatal diagnosis of trisomy 13 is possible with maternal serum screening and sonographic screening. Trisomy 13 and Trisomy 18 is associated with a decrease in maternal serum free beta human chorionic gonadotropin and (PAPP- A) pregnancy- associated plasma protein A and fetal tachycardia, with the heart rate being above the 95th centile of euploid fetuses.[6] The ultrasound scan shows increased nuchal translucency above the 95th centile for crown-rump length, congenital heart defects, holoprosencephaly, and omphalocele.[7] The 11-13 weeks scan reveal, absence of the nasal bone (50%), abnormal flow in the ductus venosus (55%) and tricuspid regurgitation (30%) in fetuses with trisomy 18 and 13.[8]

In this case, the first scan was done at 12^{+1} weeks and the congenital abnormalities were not detected, because of inexperience. Three out of thirteen cases of trisomy 13 were undetected on sonography.[9] For the diagnosis of congenital anomalies, one needs in-depth knowledge and experience in the interpretation of scan during the first trimester.

This case had multiple congenital anomalies detected during the second trimester. This included holoprosencephaly, absent cavum pellucidum, lateral ventriculomegaly, microcephaly, cyclopia, a proboscis, ventricular septal defect, bilateral renal pelvicalyceal dilatation with echogenic kidneys and polydactyly of both hands and feet. However, our case did not have a facial cleft and anterior abdominal wall defect.[4]

The second- trimester sonographic features of trisomy 13 may overlap with those of other syndromes. Therefore, precise knowledge of the Sonographic finding of trisomy 13 is important. The main differential diagnosis of trisomy 13 is pseudo- trisomy 13, Meckel-Gruber syndrome and Edward syndrome (trisomy18). Pseudo trisomy 13 shows normal karyotype with holoprosencephaly and postaxial polydactyly with microcephaly, hydrocephaly, agenesis of corpus callosum.[10] Meckel- Gruber syndrome shows cystic renal dysplasia, posterior encephalocele, or other abnormalities in central nervous system and postaxial polydactyly.[11] Trisomy 18 and trisomy 13 may have similar features and difficult to differentiate on sonography and therefore can be confirmed by karyotyping.

To make a definitive prenatal diagnosis, an amniocentesis or chorionic villous sampling is needed. An amniocentesis was performed for karyotyping study which confirmed trisomy 13 Patau syndrome (47xx + 13, inv (9) p11q13). (Fig. 4) Karyotyping study is a gold standard to confirm the diagnosis of trisomy13.

Noninvasive prenatal testing with cell-free DNA from the maternal blood sample is a newer promising technique with high sensitivity and specificity and higher positive predictive value than standard prenatal aneuploidy screening. Cell free DNA testing is important noninvasive technique for primary screening of fetal autosomal aneuploidy.[12]

A team approach, which involve a maternal fetal medicine specialist, a geneticist and a genetic counselor are essential for the counseling the patient about inheritance, recurrence risk and genetic testing of family members. Early screening and prenatal diagnosis should be offered to the patient in all future pregnancies. [13]

Conclusion

Diagnosis of congenital anomalies requires in-depth knowledge, awareness and experience in the interpretation of antenatal scan. Therefore, we recommend the special training of the medical personnel who is conducting and reporting antenatal ultrasound scan. We recommend early referral of the patient to a maternal fetal specialist for prenatal diagnosis and further management due to the poor prognosis of this syndrome.

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