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Unusual Radiological Findings and Autopsy Confirmation of a Rare case of Down Syndrome (Trisomy 21)

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ABSTRACT:

Down syndrome (Trisomy-21) is a genetic disorder, which can be easily diagnosed during the pregnancy by simple screening methods like ultrasound. Antenatal screening of Down syndrome should be available as a routine component of standard antenatal care at all levels of health care system. In developing countries like India it is very difficult to provide such health care facilities and hence the undiagnosed cases of congenital anomalies are also quite common. We here present a case in which the radiological finding of the fetus was showing unusual radiological findings and hence the aborted fetus was sent to the autopsy examination and was confirmed as Tisomy-21.

Key-words: Antenatal screening, Sonographgy, Congenital anomalies, Downs Syndrome, Trisomy-21, Anencephaly.

INTRODUCTION:

There is a strong association of Down syndrome with maternal age and past history of Trisomy-21 in siblings. Down syndrome and other chromosomal abnormalities can be easily diagnosed by ultrasound screening visualizing the fetal nuchal translucency measurement and biochemical serum tests during second trimester.[1] In developed countries like USA all pregnant women are offered screening tests for Down's syndrome,[2,3] but it is not possible in developing countries like India and hence the complications and issues are different at different stages of detection. The diagnosis of Down's syndrome becomes challenging when the anomalies related to it are present in association with other congenital anomalies, as we have noticed in the case presented here in which unusual radiological findings were present in the fetus and by autopsy examination and down's syndrome was confirmed.

CASE HISTORY:

In October 2013, a 27 year old female with a history of 22 weeks amenorrhea and second gravida pregnancy was referred to the department of radio-diagnosis, Vadodara, Gujarat, India for routine antenatal ultrasound screening. The patient did not have any past history of medication or teratogenic exposure and her routine blood investigative reports were normal and showing normal serum folic acid level. On examination by ultrasound, the fetus was corresponding with 20 weeks of pregnancy by femur length with exposed brain tissues

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to the amniotic cavity. The corpus callosum was absent and thalami were fused with single dilated mono ventricle without any hemispheric division, suggesting-fetal acrania with alobar holoprosencephaly. The fetus was also having features of spinal dysgenesis because though the spine was appearing normal in shape, but the total numbers of the spinal elements were less with changes of hypotelorisum [Figure-1].

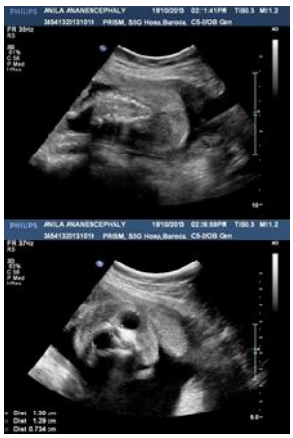

Figure-1: Ultrasound Showing spinal dysgenesis and Hypotelorisum.

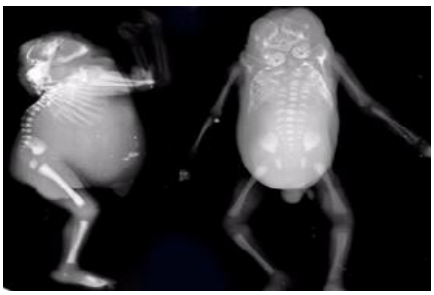

Figure-2: Whole body X-ray showing Rib crowding, hemi and block vertebrae with a reduced total number of vertebral spines in 16.

The fundic bubbles were not visualized and there were findings of congenital hydrocele with features of pleural effusion in both chest cavities and ascitis and enlarged liver. The umbilical cord was showing single umbilical artery in its intra-abdominal part. On examination by fetal echocardiography, heart was found enlarged with cardio-thoracic ratio 63% and dilated right atrium and right ventricle with ventricular septal defect and tricuspid regurgitation. Three vessels umbilical cord was found with reversal of blood flow in the umbilical artery. Liquor was adequate in amount. Nasal bone, mandible, kidneys and gall bladder were normal in appearance. After knowing the findings of ultrasound patient opted termination of pregnancy and a dead fetus was delivered at gynecology department. X-ray examination of the whole body of the fetus was done and we found that spine was showing hemi and block vertebrae with a reduced total number of vertebral spines in 16. Anterior ends of ribs were crowded and the other bones of limbs and face were normal in appearance. [Figure-2]

POST-MORTEM EXAMINTION:

After performing medico-legal formalities, an autopsy was conducted by a panel of doctors of Forensic Medicine, Radiologist and Pathologist and on external examination, we found that the fetus was having features of anencephaly and the skull vault was absent exposing brain tissues with loss of dorsal skin exposing the underlying structures of the upper part of back. [Figure-3] There was a wide space between second and third digits of both hands with normal palmer ceases and no simian crease. Features were apparently looking

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normal and there was no evidence of low set ears or imperforated anus. Internal examination was showing congestive hepatomegaly with normal gall bladder and normal appearance of spleen and both kidneys. Before autopsy sample of blood from a peripheral vein and umbilical cord samples were preserved for karyotyping and sent to a private laboratory, and after receiving of reports of karyotyping Trisomy-21 was confirmed. [Figure-4].

Figure-3: Fetus showing features of anencephaly.

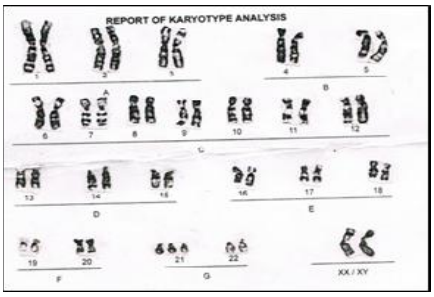

Figure-4: Report of karyotype analysis showing Trisomy of 21st Chromosome.

DISCUSSION:

Chromosomal abnormalities lead to the majority of congenital disorders in medical field and in clinical practice it can be observed in the form of infertility, repeated spontaneous abortions, congenital malformations, developmental delay and mental retardation.[4] Down syndrome is one of the most common congenital disorder and can be easily detected by screening and diagnostic tests during the initial stages of pregnancy. In cases of Down syndrome nuchal translucency of >3 mm in ultraultrasound is an important indicator of diagnosis. There is recent evidence that the inclusion of nasal bone measurement improves the specificity of 1st trimester data.[5] Approximately 30% of babies with Down syndrome have detectable abnormalities on the mid–trimester.[6] Ultrasound nuchal fold thickness >6 mm, hypoplastic nasal bone, echogenic intracardiac focus, echogenic bowel, single umbilical artery are the other indicators to confirm the diagnosis. Structure abnormalities associated with down syndrome are cardiac defects like tricuspid regurgitation, atrial septal defect (ASD), ventricular septal defect (VSD), atrioventricular septal defect (AVSD); abdominal abnormalities like duodenal atresia, esophageal atresia, omphalocele; central nervous system abnormalities like mild fetal ventriculomegaly other abnormalities like abnormal ductus venosus waveforms and hydrops fetalis.[7] Some fetuses can develop transient abnormal myelopoiesis (TAM) particularly towards the 3rd trimester and can then develop foetal hepatomegaly.[8] Abnormalities on the mid-trimester ultrasound are nuchal fold thickness >6 mm, hypoplastic nasal bone, echogenic intracardiac focus, echogenic bowel, single umbilical artery. Central

nervous system, cardiac abnormalities, GIT, renal and other multiple abnormalities are associated. Ultraultrasound plays vital role in diagnosis.

In the present case, congenital malformations of different body systems involving musculoskeletal, cardiovascular and neural systems were detected during radiological screening of fetus and hence the pregnancy was terminated. There were unusual radiological findings in the form of fetal acrania with alobar holoprosencephaly, spinal dysgenesis with hemi and block vertebrae with a reduced total number of vertebral spines in 16 and crowding of ribs, single umbilical artery in the abdominal part of the umbilical cord, and wider space between second and third digits of both hands with normal palmer ceases and no simian crease. The radiological and autopsy findings of chest deformities with heart and brain defects in this case were confusing it with features of Trisomy-18 (Edward syndrome)[9,10] and hence to confirm the diagnosis sample of blood and umbilical cord was sent for the karyotyping, and after receiving the reports of karyotyping we were able to confirm the diagnosis about Down's syndrome in this case.

CONCLUSION:

The diagnosis of Down's syndrome is easy in gynecological practice, but it becomes difficult when when the anomalies related to it are present in association with other congenital anomalies. The autopsies are uncommon in such cases and the confirmation of downs syndrome during autopsy is again a challenging job of the autopsy surgeon due to unavailability of karyotyping tests in their health setup. The case presented here indicates an urgent need to reform the health policies so the mortality and morbidity due to congenital anomalies can be reduced further.

References:

Dimitrova V

1. , Markov D, Chernev T, Karag'ozova Zh, Mazneĭkova V, Andonova S, Vŭzharova R. Ultrasound screening for Down syndrome and other chromosomal abnormalities by fetal nuchal translucency measurement between 11-14 weeks of gestation. Akush Ginekol (Sofiia). 2005;44(1):32-7. [Article in Bulgarian]
2. Kennelly M, Carroll S, Parland PM. Nuchal translucency audit: low uptake of invasive testing in screen positive cases. Ir Med J. 2004 Nov-Dec;97(10):304-5.
3. Th American Congress of Obstetricians and Gynecologists (ACOG). ACOG's screening guidelines on chromosomal abnormalities [News release]. (2007, May 7). Retrieved May 27, 2016, from http://www.acog.org/About_ACOG/News_Room/News_Releases/2007/ACOGs_Screening_Guidelines_on_Chromosomal_Abnormalities
4. Zhu J, Liu H, Tang J, Riaz Khan M, Wang B, Bukhari I. Identification of minor chromosomal defects causing abnormal foetus and spontaneous abortions. Br J Biomed Sci. 2016 May 2:1-7.

5. Kagan KO, Cicero S, Staboulidou, Wright D, Nicolades KH. Fetal nasal bone in screening for trisomies 21, 18 and 13 and Turner syndrome at 11-13 weeks of gestation. Ultrasound Obstet Gynecol. 2009 Mar;33(3):259-64.
6. Bethune M. Literature review and suggested protocol for managing ultrasound soft markers for Down syndrome: thickened nuchal fold, echogenic bowel, shortened femur, shortened humerus, pyelectasis and absent or hypoplastic nasal bone. Australas Radiol. 2007;51 (3): 218-25.
7. Maiz N, Valencia C, Kagan KO, Wright D, Nicolades KH. Ductus venosus Doppler in screening for trisomies 21, 18 and 13 and Turner syndrome at 11-13 weeks of gestation. Ultrasound Obstet Gynecol. 2009;33 (5): 512-7.
8. Hamada H, Yamada N, Watanabe H, Okuno S, Fuzuki Y, Kubo T. Hypoechoic hepatomegaly associated with transient abnormal myelopoiesis provides clues to trisomy 21 in the third-trimester fetus. Ultrasound Obstet Gynecol. 2001;17 (5): 442-4.
9. Lin HY, Lin SP, Chen YJ, Hung HY, Kao HA, Hsu CH, et al. Clinical characteristics and survival of trisomy 18 in a medical center in Taipei, 1988-2004. Am J Med Genet A. 2006 May 1;140(9):945-51.
10. Cereda A, Carey JC. The trisomy 18 syndrome. Published online 2012 Oct 23. doi: 10.1186/1750-1172-7-81 PMCID: PMC3520824.