Case Report

Intrauterine Detection of Ebstein’s Anomaly and Down’s Syndrome. Prenatal Diagnosis of a Rare Combination

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Ebstein’s anomaly, although the most common malformation of the tricuspid valve, is a rare disease. Its association with other syndromes and extracardiac anomalies is very rare and has been reported in only a few cases. A case of prenatal diagnosis of Ebstein’s anomaly in a patient with Down’s syndrome is reported.

Ebstein’s anomaly was described for the first time as an autopsy finding by Wilhelm Ebstein in 1866. The cardiac anomaly is defined as a variable adherence of the posterior and septal leaflets of a redundant tricuspid valve to the interior of the right ventricular wall, with a more caudal implantation of the valve towards the apex. Ebstein’s anomaly, although rare, is the most common congenital disease of the tricuspid valve, accounting for 0.5% of the congenital heart diseases. No association with any particular syndrome exists, and extracardiac defects have been rarely reported.

Watson, in a study, reported approximately 500 cases, reported the association of Ebstein’s anomaly and congenital cardiac malformations in 48% of the patients catheterized and in 81% of autopsies. Most associated defects were related to the interatrial septum defects, corrected transposition of the great vessels, and hypoplasia of the right ventricular outflow tract. In the last 10 years, only 3 cases of the association of Ebstein’s anomaly and Down’s syndrome have been reported. We report a case of prenatally diagnosed Ebstein’s anomaly associated with Down’s syndrome.

Case Report

The patient is a 39-year-old pregnant female, G1 P1, referred at the 35th gestational week to the Unit of Fetal Cardiology at the Instituto de Cardiologia of Porto Alegre, RS - Brazil. The patient was followed up until the 38th week, when interruption of the pregnancy was indicated due to signs of fetal congestive heart failure. The fetal weight of 2,680 g in the 50th percentile. No systemic signs of hemodynamic decompensation existed. The patient was followed up until the 38th week, when interruption of the pregnancy was indicated due to signs of fetal congestive heart failure. The newborn was delivered through a cesarean section with APGAR scores of 7 and 7 in the first and fifth minutes, respectively, and weight of 2,680 g. During the first physical examination, Down’s syndrome was diagnosed, and later confirmed on a karyotype. The newborn developed cyanosis in the first hours of life, when oxygen therapy was provided to improve arterial oxygen saturation and reduce pulmonary vascular resistance. Despite the support measures, the newborn evolved with progressive aggravation of the cyanosis and metabolic acidosis. On the third day of life, the newborn required mechanical ventilation with FiO₂ of 1.0, and nitric oxide and milrinone were initiated to optimize the pulmonary anterograde flow. The clinical findings were severely improved, evidencing a hemodynamically stable situation. The complications were as follows: jaundice, which required phototherapy from the second day of life onwards, and left atelectasis, which improved with respiratory therapy. The echocardiogram at birth confirmed the diagnosis of Ebstein’s anomaly with a dysplastic right atrioventricular valve and downward displacement - below the valvar ring - of the septal and posterior leaflets, causing severe regurgitation. The right atrium was markedly enlarged, and the pulmonary trunk and branches were well developed with anterograde and retrograde flow through a small patent ductus arteriosus. The oval foramen was patent and had a bidirectional flow through it. The left cavities had normal function and morphology, but the interventricular septum was displaced towards the left ventricle. A small pericardial effusion was evident. No signs of hemodynamic decompensation were observed. An obstetrician echocardiography revealed a single fetus in the longitudinal position and cephalic presentation, with normal amniotic fluid volume. The compatible gestational age was 35-36 weeks, with an estimated fetal weight of 2,610 g in the 50th percentile. No systemic signs of hemodynamic decompensation existed. The patient was followed up until the 38th week, when interruption of the pregnancy was indicated due to signs of fetal congestive heart failure. The newborn was delivered through a cesarean section with APGAR scores of 7 and 7 in the first and fifth minutes, respectively, and weight of 2,680 g. During the first physical examination, Down’s syndrome was diagnosed, and later confirmed on a karyotype. The newborn developed cyanosis in the first hours of life, when oxygen therapy was provided to improve arterial oxygen saturation and reduce pulmonary vascular resistance. Despite the support measures, the newborn evolved with progressive aggravation of the cyanosis and metabolic acidosis. On the third day of life, the newborn required mechanical ventilation with FiO₂ of 1.0, and nitric oxide and milrinone were initiated to optimize the pulmonary anterograde flow. The clinical findings were severely improved, evidencing a hemodynamically stable situation. The complications were as follows: jaundice, which required phototherapy from the second day of life onwards, and left atelectasis, which improved with respiratory therapy. The echocardiogram at birth confirmed the diagnosis of Ebstein’s anomaly with a dysplastic right atrioventricular valve and downward displacement - below the valvar ring - of the septal and posterior leaflets, causing severe regurgitation. The right atrium was markedly enlarged, and the pulmonary trunk and branches were well developed with anterograde and retrograde flow through a small patent ductus arteriosus. The oval foramen was patent and had a bidirectional flow through it. The left cavities had normal function and morphology, but the interventricular septum was displaced towards the left ventricle. A small pericardial effusion was evident. No signs of hemodynamic decompensation were observed. An obstetrician echocardiography revealed a single fetus in the longitu-
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The electrocardiogram revealed right atrial and ventricular hypertrophy, with a normal PR interval and no signs of preexcitation (Fig. 4). The chest X-ray showed a greatly enlarged cardiac area, causing pulmonary hypoplasia. After hemodynamic stabilization on the first days, the patient evolved uneventfully with no new complications and is currently 7 months of age.

Discussion

Down's syndrome is associated with congenital heart diseases in 50% of cases, the most common associations being septal defects and tetralogy of Fallot. A review of the literature in the past 10 years showed 3 clinical case reports on the association of Ebstein's anomaly and Down's syndrome, and, in only 1, the diagnosis was established in the prenatal period. In the other 2 cases, Ebstein's anomaly was discovered in adulthood, at the age of 55 years and on autopsy. These patients had the mild form of the disease with only a few symptoms.

The case here reported emphasizes the important role played by fetal echocardiography in the prenatal diagnosis of severe heart diseases, such as Ebstein's anomaly, which has an incidence of 1:20,000 in the general population and accounts for 0.5% of the congenital heart diseases found in the neonatal period. Fetal echocardiography may change these figures, because Ebstein's anomaly, if left untreated, is an important cause of fetal death, and, without the establishment of its diagnosis, it cannot be included in the statistics of congenital heart diseases. Prenatal diagnosis and the treatment of these patients, as well as the interruption of pregnancy in the cases with severe and untreatable cardiac failure, may improve the prognosis of these fetuses. The mortality rate of patients with the severe form of the disease in the neonatal period is high, up to 85% even in large centers, mainly when the symptoms are precocious and surgery is required.

In the present case, the diagnosis of Down's syndrome was not established in the prenatal period, because the mother did not undergo first-trimester nuchal translucency or fetal morphologic ultrasound study in the second trimester, due to her late referral to our institution.

The diagnosis of Ebstein's anomaly in a fetus with Down's syndrome is not frequent, and it is worth reemphasizing the importance of performing the genetic assessment of patients with congenital heart disease. Patients with Down's syndrome should systematically undergo complete cardiological assessment with echocardiography, because of the high incidence of heart disease in those patients. It is worth noting that a cardiological examination with auscultation suggestive of an innocent murmur in a syndromic patient does not mean lack of heart disease, because of the existence of some congenital heart defects that mimic an innocent murmur, such as the mild form of Ebstein's anomaly. This poses great difficulty for the differential diagnosis based only on heart auscultation.

The association of Down's syndrome and Ebstein's anomaly is rare, fetal echocardiography being a powerful tool for assessing fetuses with that combination. Its major function is to evaluate fetal hemodynamic stability, allowing follow-up, treatment, and indication of interruption of pregnancy as a neonatal therapy, when necessary. Prenatal diagnosis is also extremely valuable for providing the pediatrician with ideal conditions for managing those neonates from the delivery on.
Fig. 4 - Electrocardiogram on the first day of life showing right atrial and ventricular hypertrophy.

References


