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A CASE OF A FOUR – DAY – OLD MALE WITH CARPENTER'S SYNDROME WITH TRANSPOSITION OF GREAT ARTERIES*

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SUMMARY: Balcı S, Haytoğlu T, Özer S. (Genetics Unit, Department of Pediatrics, Hacettepe University Faculty of Medicine, Ankara, Turkey). A case of a four-day-old male with Carpenter's syndrome with transposition of great arteries. Turk J Pediatr 1998; 40: 461-466.

Carpenter's syndrome (acrocephalopolysyndactyly type II) is an autosomal recessive syndrome characterized by peculiar facies, synbrachydactyly on fingers and preaxial polysyndactyly on feet. To our knowledge there are about 40 reported cases of Carpenter's syndrome in the literature. Congenital heart disease is an uncommon entity in Carpenter's syndrome. In the case we present, transposition of great arteries, subpulmonic ventricular septal defect (VSD) and secundum atrial septal defect (ASD) were diagnosed with echocardiographic examination. Therefore, a cardiologic examination should be done in every newly diagnosed case of Carpenter's syndrome for possible heart defect. Early fatality is seen in Carpenter's syndrome cases associated with congenital heart disease. This is particularly important from the genetic counselling point of view. *Key words: acrocephalopolysyndactyly type II, Carpenter's syndrome, transposition of great arteries.*

Carpenter's syndrome (acrocephalopolysyndactyly type II) was first described by Carpenter[1,2] in two sisters with peculiar facies, synbrachydactyly and polysyndactyly on feet. Temtamy[3] reviewed the findings of 12 similar cases in the literature together with her case and stated that the cardinal features of Carpenter's syndrome are different from those of Laurence-Moon Biedl and Apert's syndromes. To date there have been about 40 reported cases of Carpenter's syndrome[4]. Balcı et al.[5] reported the first prenatal diagnosis of Carpenter's syndrome in a 20-week-old male fetus with clinical and post mortem findings. Although very rare, congenital heart defects such as patent ductus arteriosus (PDA), ventricular septal defect (VSD), atrial septal defect (ASD), pulmonary stenosis and transposition of great arteries could be associated with Carpenter's syndrome[6].

We present a case of Carpenter's syndrome diagnosed with clinical and radiological findings in the neonatal period in association with transposition of great arteries, subpulmonic VSD and secundum ASD according to echocardiographic evaluation. As far as we know, this is the first reported case of Carpenter's syndrome with congenital heart disease from Turkey.

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Case Report

M.B., a four-day-old boy, was admitted to our clinic because of deformities on his hands, feet and head. The child was the first product of a full-term gestation to a 20-year-old mother and a 26-year-old father who were first-degree relatives. He was 3500 g at birth. There was no known exposure to infection, drug or irradiation during the pregnancy. No similar malformations were known in either the mother's or the father's family.

On physical examination, weight was 3500 g (50-75th percentile), length 48 cm (10-25th percentile) and head circumference 32.5 cm (10th percentile). Body temperature was 37 °C and heart rate was 148 beat/min. He was cyanotic and icteric. The patient was found to have a tower skull (acrocephaly) and a peculiar facies characterized by low-set ears, epichanthal folds, frontal bossing, and a relatively flat nasal bridge (Fig. 1). The anterior fontanel was closed and the sutures were overriding. Nipples were hypoplastic. Preaxial polydactyly on the hands and feet were present. Also, syndactyly between the second and fifth fingers and toes were noted. In addition, bilateral pes equinovarus deformity was present (Fig. 2). The cardiac examination revealed a grade 2/6 pansystolic murmur on the left third intercostal space. Both femoral pulses were palpable.

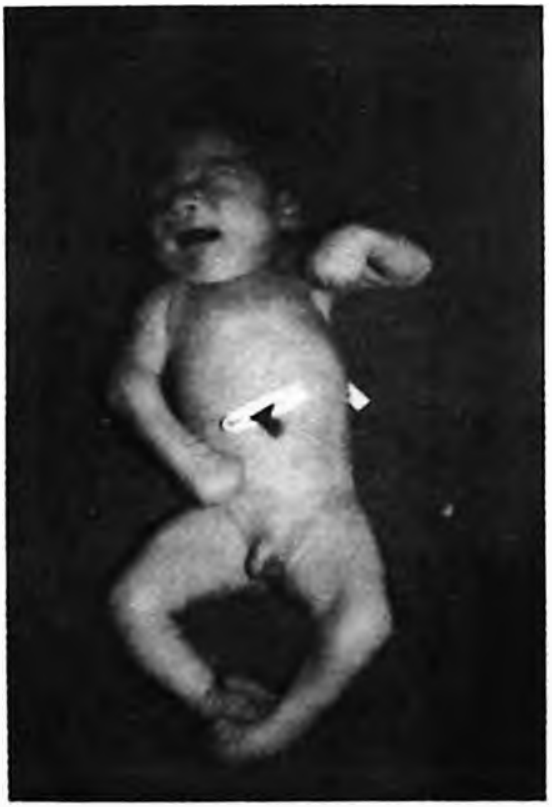

Fig. 1: Peculiar facies characterized by "tower skull" appearance (acrocephaly), low-set ears, epichantus, flat nasal bridge and frontal bossing. Note preaxial polysyndactyly of both hands and feet.

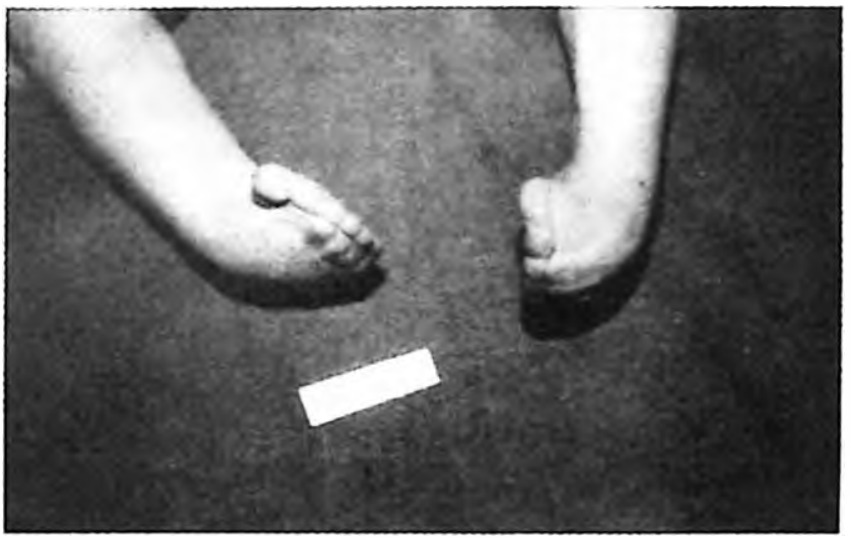

Fig. 2: Pes equinovarus deformity and preaxial polysyndactyly of feet.

The laboratory examination disclosed unconjugated hyperbilirubinemia with a total bilirubin level of 17.4 mg/dl and a conjugated bilirubin level of 0.3 mg/dl. Complete blood count, serum glucose-6-phosphate dehydrogenase level and urine-blood amino acids were within normal range. Routine skull x-ray revealed closure of the anterior fontanel. Radiological examination of the chest revealed cardiomegaly, bilateral thymic shadow and normal vasculature (Fig. 3). Right axis deviation with

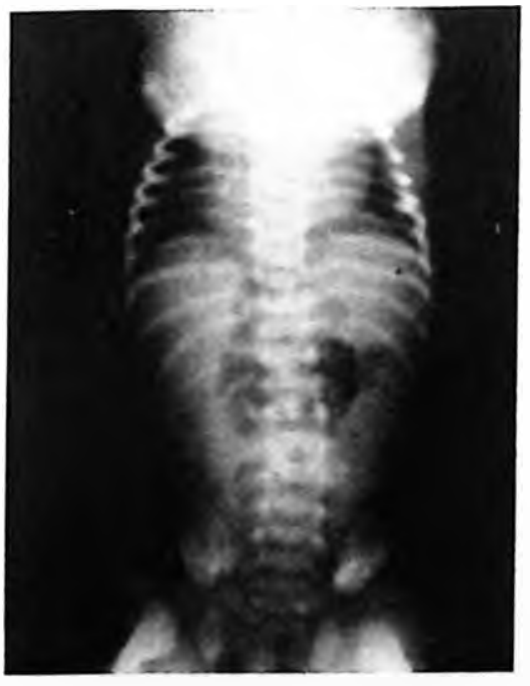

Fig. 3: Chest x-ray revealing cardiomegaly, bilateral thymic shadow and normal vasculature.

right ventricular hypertrophy was found on electrocardiogram. Echocardiogram demonstrated subpulmonic VSD with a diameter of five mm and secundum ASD with a diameter of six mm. As for the great vessels, the aorta was anteriorly located and originating from the right ventricle, and the pulmonary artery was posteriorly located and originating from the left ventricle. No pressure gradient was noted with Doppler echocardiographic examination. All the findings suggested possible diagnosis of transposition of great arteries, subpulmonic VSD and secundum ASD.

Cranial computed tomography demonstrated open coronal sutures but a closed anterior fontanel with normal intracerebral structures, although cavum septi pellicidi et vargae was noted.

The child was hospitalized on his fourth day of life and given phototherapy. After his discharge from the hospital on his 10th day of life he died at home. Postmortem examination could not be done.

Discussion

Carpenter[1] defined a new syndrome in two sisters in characterized by acrocephalopolysyndactyly, and defined the associated congenital malformations of the syndrome in 1909[2]. But this entity was accepted as a distinct syndrome only after Temtamy[3] reviewed 12 previously reported similar cases, added one case and suggested the term Carpenter's syndrome to the complex of associated malformations. Cardinal features of Carpenter's syndrome are acrocephaly, peculiar facies, brachysyndactyly on fingers, preaxial polysyndactyly on feet, hypogenitalism, obesity and mental retardation. The occurrence of this syndrome in siblings of consanguineous parents suggests an autosomal recessive inheritance. The case we present was the first child of the family of first-degree relative parents.

Other manifestations which might be present include genu valgum, coxa vara, pes varus, umbilical hernia, congenital heart defect and diabetes. To date more than 40 cases of Carpenter's syndrome have been reported in the literature[4]. Several authors reported Carpenter's syndrome in more than one sibling[4, 7-10]. However, there are also reported sporadic cases[11]. It is now certain that Carpenter's syndrome is inherited in an autosomal recessive pattern.

Cohen[12] reviewed the cases of this syndrome, and Cohen et al.[7] reported that Goodman's and Summit syndromes fall well within the clinical spectrum of Carpenter's syndrome.

In differential diagnosis of Carpenter's syndrome: 1) Apert's syndrome (acrocephalosyndactyly type I), 2) Bardet-Biedl syndrome, 3) Sakati-Nyhan syndrome, and 4) Summit syndrome should be considered.

Sakati et al.[13] reported a new syndrome with characteristic findings of acrocephalopolysyndactyly, brachydactyly of fingers, polysyndactyly of toes, bowing of femur, hypoplasia of tibia, cutaneous atrophy of scalp, and ear and cardiac abnormalities.

Frank mental retardation or low-to-normal intelligence is present in more than three-fourths of reported Carpenter's syndrome patients[7]; however, there have been reported cases with normal intelligence despite a tower skull appearance[8, 14, 15]. Although surgical correction of skull defects has been advocated as a method of facilitating normal brain development and preventing mental retardation, patients with early surgical intervention who were subsequently found to be intellectually subnormal have been described[16].

The case that Balci et al.[5] diagnosed prenatally at 20-weeks gestation had obvious craniosynostosis and severe central nervous system malformations, including corpus callosum agenesis, agyria, cerebellar hypoplasia, dilatation of lateral ventricles, broadened cerebral aquaduct and absence of third ventricle. The presence of severe central nervous system malformations in this prenatally diagnosed 20-week-old fetus may explain why mental retardation occurs in cases who had an early craniectomy[5]. Thirty-three percent of the Carpenter's syndrome cases are associated with congenital heart defects like VSD, ASD, PDA, pulmonary stenosis and tetralogy of Fallot[4]. Transposition of great arteries as in our case and superior vena-cava duplication have also been reported in Carpenter's syndrome[12, 17].

The case we present is interesting because of the presence of transposition of great arteries, a very rare congenital heart defect, in Carpenter's syndrome. Unfortunately, a post-mortem examination could not be done since the patient died at home. Therefore, every newly diagnosed Carpenter's syndrome case should be evaluated for congenital heart disease which could be associated with early fatality. Since the case was the first child of the family, genetic counselling was given to the parents and availability of prenatal diagnosis in the next pregnnacy by early ultrasonography at the 12^{th}-14^{th} week of gestation was explained.

In summary, we presented a case with radiologic and clinical findings of acrocephalopolysyndactyly in association with a very rare congenital heart defect transposition of great arteries. We suggest prenatal diagnosis of Carpenter's syndrome because of its autosomal recessive inheritance which has a 25 percent risk of recurrence.

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