Asphyxiating thoracic dystrophy in one of the twins – a case report

AGATA SZPERA-GOŻDZIEWICZ, MARIOLA ROPACKA-LESIAK, MICHAŁ SZUBER, ANNA DERA, GRZEGORZ H. BRĘBOROWICZ

Abstract
A paper presents a case of a 31-year old multiparous woman, in dichorionic diamniotic twin pregnancy. In prenatal ultrasound examination at 13+6 weeks of pregnancy an initial diagnosis of skeletal dysplasia in fetus B was made based on the following features: shortening of limbs and rib, hypoplastic thorax. In 25 weeks ultrasound revealed flat profile, micrognathia, short ribs reaching half of the thoracic circumference and shortening of limbs. Hypoplastic thorax was clearly visible, as well as signs of abnormal fetal bones mineralization. The fetal head was relatively large with short neck. According to ultrasound features and OMIM database the differential diagnosis was made considering one of the following three diseases: opsismodysplasia, asphyxiating thoracic dystrophy and cerebrocostomandibular syndrome. After neonatological and genetic consultation the diagnosis of asphyxiating thoracic dystrophy was made. Asphyxiating thoracic dystrophy (Jeune syndrome) is a rare autosomal recessive skeletal dysplasia characterized by small thorax, short ribs and polydactyly.

Key words: skeletal dysplasia, Jeune syndrome, twin pregnancy

Introduction

Asphyxiating thoracic dystrophy (Jeune syndrome) is a rare autosomal recessive skeletal dysplasia characterized by small thorax, short ribs and polydactyly. International Working Group on Constitutional Diseases of Bone classified short-rib and polydactyly syndromes into 6 types: type I (Saldino-Noonan), type II (Majewski), type III (Verma-Naumoff), type IV (Beemer-Langer), asphyxiating thoracic dystrophy (Jeune) and chondroectodermal dysplasia (Ellis-van Creveld). Types I to IV are lethal, however asphyxiating thoracic dystrophy and chondroectodermal dysplasia are syndromes which have often, but not always lethal character [1, 2].

Jeune syndrome is an inherited disorder of bone growth characterized by a narrow and short-rib thorax, short sternum and hypoplastic iliac wings. The long bones are either normal or mildly shortened [3, 4]. There is wide spectrum of symptoms beginning from a latent form to lethal condition. In severe cases the progressive respiratory failure may lead to death of neonate. Progressive renal failure is typical for mild form of asphyxiating thoracic dystrophy [4-6]. In milder types it is possible to surgically expand thoracic cavity to prevent respiratory distress [7]. There were some cases of Jeune syndrome concomitant with liver, pancreas and retina abnormalities [8-10]. In 60-80% of Jeune syndrome prognosis is poor and often leads to early death of infant [11]. The asphyxiating thoracic dystrophy is inherited in an autosomal recessive pattern where gene locus was identified on 15q13 chromosome [12]. Recently, in a small sub-group of patients with Jeune syndrome without extraskeletal manifestations, a mutation in the IFT80 gene which encodes an intraflagellar protein was found [13, 14]. Asphyxiating thoracic dystrophy may be detected in prenatal ultrasound examination of the fetus, however sometimes it can be very difficult or even impossible. Characteristic features observed by ultrasonography examination include short limbs, incorrectly small thorax, short and hipoplastic ribs, polyhydramnios and absence of fetal breathing movements [15, 16]. Recently, there has been some research done on the use of computer tomography in diagnosing Jeune syndrome [17].

Case report

A 31-year old multiparous woman, in dichorionic diamniotic twin pregnancy was admitted to the Department of Perinatology and Gynaecology, University of Medical Scientists in Poznań for prenatal sonographic examination. Her 1st pregnancy was complicated by stillbirth in 19th week of pregnancy, followed by genetic consultation which revealed osteogenesis imperfecta. Second pregnancy was with no complications – patient delivered spontaneously healthy male, birth weight 3940 g at 40 week of gestation.

In actual pregnancy in prenatal ultrasound examination at 13+6 weeks of pregnancy there was significantly increased nuchal translucency (NT = 8.8 mm) (Fig. 1).
At this time an initial diagnosis of skeletal dysplasia in fetus B was made based on the following features: shortening of limbs and hypoplastic thorax (Fig. 2 and 3). The initial diagnosis was confirmed by fetal measurements in subsequent ultrasound examination. The results of color-flow Doppler ultrasonography was within limits.

In 25 weeks ultrasound revealed flat profile, micrognathia short ribs reaching half of the thoracic circumference and shortening of limbs. Hypoplastic thorax was clearly visible, as well as signs of abnormal fetal bones mineralization. The fetal head was relatively large with short neck (Fig. 4).

In 37 week of pregnancy the ultrasound examination revealed the female fetus A in vertical presentation. Estimated fetal weight as well as color-flow Doppler ultrasound parameters and amount of amniotic fluid were within limits. Male fetus B was in breech presentation and showing significant shortening of limb bones (FL=18 weeks, HL = 17 weeks) (Fig. 5, 6) and hypoplastic, short-rib thorax (Fig. 7). In addition, the ultrasound images revealed features of hypophosphatemia of bones. Color-flow Doppler ultrasound indicated increased resistance index in the umbilical artery and pulsation in the umbilical vein. Coexisting polyhydramnios was detected and maximum vertical pocket was measured (9.5 cm). Cervical length (CL = 2.37 cm) was evaluated by transvaginal ultrasound examination. The patient was admitted to the hospital in 35 week of gestation because of uterine contractions. She was under continuously monitored and elective caesarian section after 37 weeks of gestation was planned. The patient delivered in 37 weeks of gestation: female fetus A with birth weight 2920 g, Apgar 10, 9, pH 7.31, 7.34, BE 0.0; -2.5 and male fetus B with birth weight 2200 g, Apgar 5, 7, pH 7.31, 7.38, BE -0.7; -8.7 (Fig. 8). Newborns was admitted to the Neonatal Department. The female infant discharged from the
hospital 6 days after delivery and shows normal child development. Male infant died 6 days after delivery due to respiratory insufficiency. The newborn was examined by neonatologist and geneticist. The diagnosis of asphyxiating thoracic dystrophy (ATD1, Jeune syndrome) was proposed.

![Fig. 5. 37 weeks of gestation – shortness of humerus of fetus B corresponding to 18 weeks of gestation](image1)

![Fig. 6. 37 weeks of gestation – shortness of femur of fetus B corresponding to 18 weeks of gestation](image2)

![Fig. 7. Hypoplastic thorax with shortened ribs](image3)

![Fig. 8. The newborn with severe thoracic hypoplasia, a large head and flat profile](image4)

**Discussion**

Some authors state, that the diagnosis of Jeune syndrome is possible just around 17-18 weeks of gestation [18, 19]. However, these reports come from 80’s of XX century. Nowadays, with dynamic development of ultrasound techniques, earlier diagnosis is possible, especially in severe cases of this disease.

According to ultrasound features and OMIM database (Online Mendelian Inheritance In Man) we considered one of the following three diseases in fetus B: opsismodysplasia (“late bone maturation”), asphyxiating thoracic dysplasia (ATD1, Jeune syndrome) and cerebrocostomandibular syndrome (CCMS, rib gap defects with micrognathia).

Opsismodysplasia is a rare kind of chondrodysplasia. The clinical symptoms are significant shortness of limbs (micromelia) with extreme short hands and feet, short and narrow thorax with features of platylospondylia, delayed osteosis of long bones epiphysis and extreme short metatarsal bones and phalanges, which may be detected in image examinations [20-22].

Cerebrocostomandibular syndrome is characterised by severe micrognathia, ribs’ anomalies and mental retardation. There is wide spectrum of ribs abnormalities – it may include only few dorsal parts of ribs or even total lack of osteosis. In most cases autosomal recessive inheritance is present, although there are some reports concerning dominant inheritance. Moreover, there are posterior pseudarthrosis of ribs at birth, at multiple levels, and soon as the patient get older it appears that the negative intrathoracic pressure begin to cause overlap of
these areas of pseudarthrosis, with effective shortening of the ribs and reduction in transverse volume of the thorax. In contrast to the narrowing of the chest in Jeune syndrome due to shortening of intact dysmorphic ribs, in cerebral costal mandibular syndrome the narrowing is due to a structural instability [23-26].

References


[22] Online Mendelian Inheritance In Man (OMIM): MIM ID %258480, OPSISMODYSPLASIA.


Dr. Agata Szpera-Goździewicz
Department of Perinatology and Gynaecology
Poznań University of Medical Sciences
60-535 Poznań, ul. Polna 33, Poland