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Single Umbilical Artery Leading to Intrauterine Growth Restriction: A Case Report

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ABSTRACT

Single umbilical artery (SUA) is an uncommon yet clinically noticeable anomaly that has been suspected to be correlated with a wide range of pregnancy complications. We hereby present a 30-year-old pregnant woman who was diagnosed with SUA fetus in the 20th week of her pregnancy and was admitted to our center in the 33rd week. During the hospitalization, Doppler studies were performed to monitor fetal development. Later, fetoplacental insufficiency and brain-sparing effect were reported on Doppler ultrasound, indicating asymmetrical Intrauterine growth restriction (IUGR). SUA might be associated with concurrent fetal anomalies including cardiological, nephrological, gastrointestinal, and nervous disorders. Moreover, there is an increased risk of small for gestational age and IUGR compared with normal pregnancies. It is crucial to assess the umbilical cord anatomy during pregnancy to diagnose SUA at lower gestational ages and schedule a precise follow-up to prevent adverse outcomes.

Keywords: Congenital Abnormalities, Single Umbilical Artery, Doppler Imaging, Intrauterine Growth Restriction

Introduction

The formation of the umbilical cord begins at the 2nd week of embryonic life (1). A normal umbilical cord consists of two arteries and one vein. In some pregnancies, the umbilical cord contains a single artery. Various causes have been suggested for this condition, including primary agenesis, later atrophy of one artery, and the persistence of the original allantoic artery in the body stalk (2). SUA is the most common umbilical artery anomaly, with an estimated incidence of 0.5 % (3). The clinical importance of SUA is the reported association between SUA and some pregnancy complications such as IUGR, preterm labor, stillbirth, and fetal anomalies. Several studies have reported adverse fetal outcomes due to SUA (4). We hereby present a case regarding the diagnosis and management of SUA.

Case Presentation

A 30-year-old G1P0000 housewife was admitted to the Asalian obsteristics and gynecology center, in Khorramabad, Iran. The calculated gestational age was 33 weeks according to her last menstrual period. The fetal gender was determined female by ultrasound. Her pre-pregnancy medical and drug history was unremarkable, except for slightly irregular menstrual cycles and an ovarian cyst diagnosed one year before pregnancy, which was treated with medication. In regard to family history, her aunt had a history of curettage due to the lack of fetal heart. In the 8th week of pregnancy, she was diagnosed with hypothyroidism and was prescribed levothyroxine. At the 20th week of pregnancy, the diagnosis of SUA was made by ultrasound. She experienced swelling of her limbs, especially the legs, ever since. She also reported headaches. Since the 20th week of pregnancy, liver enzymes had increased slightly. Her systolic blood pressure was 130 and started taking aspirin at a daily

dose of 80 mg and enoxaparin at a daily dose of 4000IU. Due to her high blood pressure, she had been prescribed methyldopa two weeks before admission.

She did not report a history of high blood pressure before pregnancy. In the laboratory tests, alkaline phosphatase was 300, lactate dehydrogenase was 960 and she had bacteriuria. Other laboratory data were within the normal range. The first ultrasonography was reported normal, with a nuchal translucency of 1.1mm at the 13th week of pregnancy. The ultrasound scan performed at 33rd week of pregnancy showed abdominal circumference (AC) and femur length (FL) decreased by three weeks and biparietal diameter (BPD) decreased by one week than the calculated gestational age according to her first-trimester ultrasonography. Doppler's ultrasound study showed reversed fetal middle cerebral artery to umbilical artery pulsatility index (MCA/UA PI) ratio and resistance index (RI) of uterine arteries were within the range of upper limits of normal (Please refer to Figures 1 and 2 for details). On the follow-up ultrasound, MCA and UA PI and RI were reported within normal range and PI and RI of uterine arteries were increased, which suggested uteroplacental vascular insufficiency. Further Doppler study revealed uteroplacental and fetoplacental insufficiency, fetal distress and the onset of brain sparing effect.

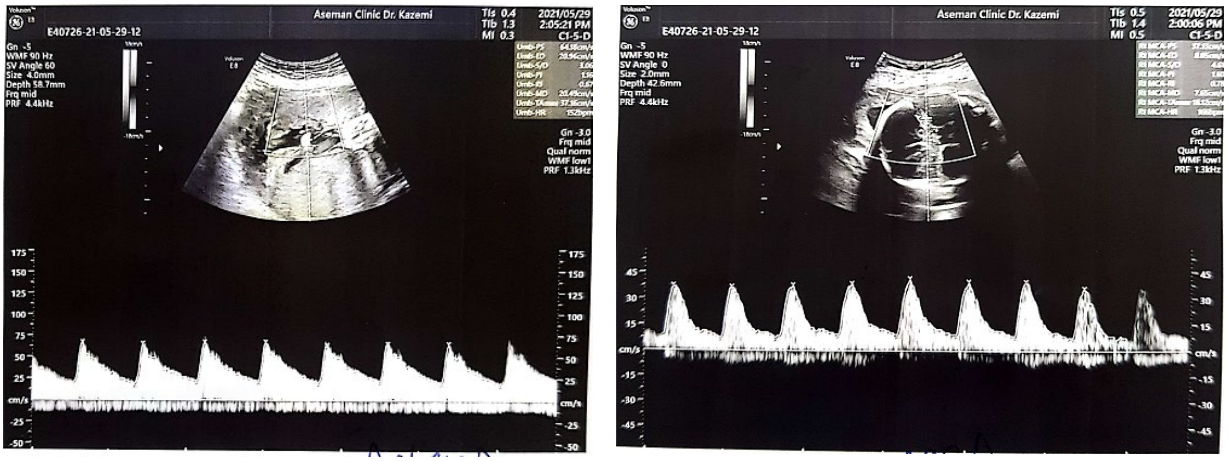

Figure 1. **Doppler ultrasound study showing reversed MCA/UA PI**

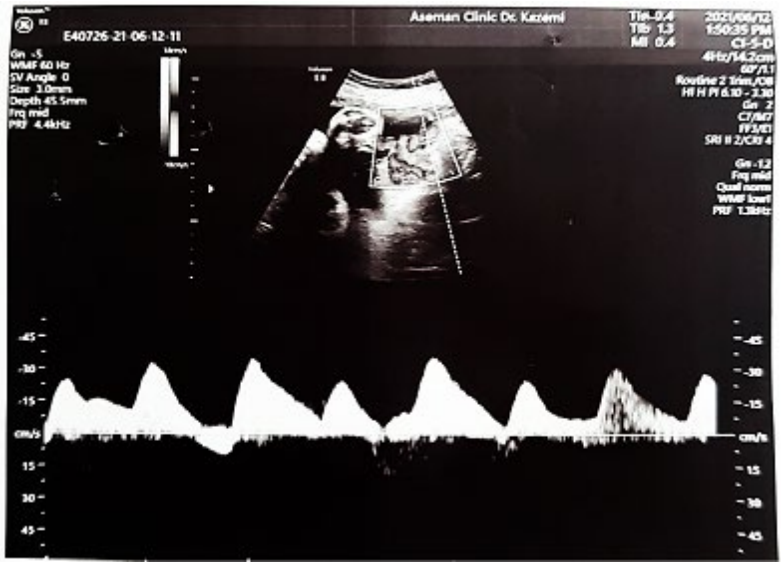

Figure 2. **Doppler ultrasound study increased PI and RI of uterine arteries**

Discussion

Some risk factors have been suggested for SUA. Smoking, chronic hypertension, and preexisting diabetes were more common in women with fetal SUA **(4)**. In the presented case, none of these risk factors was seen. Nevertheless, no certain association between SUA and mean maternal age or gravidity has been found **(4, 5)**. The absence of the left umbilical artery is more common than the right artery **(6)**. Fetal gender does not seem to have an association with the occurrence of SUA **(7)**. However, an increased risk of

SUA in twin pregnancies and aneuploid fetuses has been reported **(8)**. About 19% to 58.3% of SUA cases present with concurrent fetal anomalies including cardiological, nephrological, gastrointestinal, and nervous disorders **(2, 8-10)**. Gupta et al. reported a case of SUA with an umbilical artery aneurysm, which is the rarest vascular anomaly of the cord. The newborn was also diagnosed with congestive cardiac failure **(11)**. Another complication of SUA is a higher risk of small for gestational age (SGA) and IUGR compared with normal pregnancies, with an incidence varying from 4.7% to 25.8% **(4, 5, 12)**. In the presented case, an estimate of fetal weight was 1593gr in the 33rd week of pregnancy and further observed brain-sparing effect on Doppler ultrasound was suggestive of asymmetrical IUGR. In the presented case, the diagnosis of SUA was made in the 20th week of pregnancy. Sanjaya, Pemayun **(13)** reported a delayed diagnosis of SUA in 37-38 weeks of gestation. Although, no complication developed during the delivery of the baby **(13)**. Due to the risk of congenital abnormalities in fetuses with SUA, a detailed anomaly screening is recommended **(14)**. Owing to a higher incidence of intrauterine growth restriction, repeated Doppler studies should be considered **(15)**.

Conclusion

Given the known link between SUA and disorders like congenital abnormalities, IUGR and SGA, it is important to assess the umbilical cord anatomy during pregnancy to diagnose SUA at lower gestational ages and schedule a precise follow-up to prevent the adverse outcomes.

Declarations

Ethical approval and consent to participate

Written, informed, and voluntary consent was obtained from the patient to publish this case report. A copy of the consent is available for review by the Editor-in-Chief of the journal on request.

Competing interest

The authors declare that there are no known competing financial interests of personal relationships that could have influenced the case reported in this paper.

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None.

Conflict of Interest

None.

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