CASE REPORT

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Single Umbilical Artery (SUA) - prenatal sonography diagnosis and vascular imaging features postnatal cord: a case report

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ABSTRACT

Background: Single umbilical artery (SUA) is a rare presentation in obstetrics practice, yet it comprises most of the umbilical anomaly. Despite its rare occurrence, a proper prenatal diagnosis needs to be established timely in order to prevent morbidity and mortality from commonly coexisting abnormalities. This case report presents a delayed diagnosis of SUA by prenatal sonography diagnosis and vascular imaging features postnatal cord at the third trimester of pregnancy and discusses the proper diagnosis and management of such cases.

Case Presentation: We reported a case of a 37 year old pregnant woman who found to have one artery one vein in her umbilical cord on ultrasound. This is very rare case and precise concern for us. Unfortunately we found this case in the third trimester of pregnancy (37w5d), therefore we have slightly to evaluate. Female baby was born by elective C-section. The baby cried immediately, with an Apgar score of 8-9. We didn't find major abnormalities in the baby. Birth weight 3700 grams. There were not sign of heart diseases and kidney's abnormality. Baby was monitoring for one weeks and the baby has good growth and development.

Conclusion: This report is expected to increase the awareness of this disease entity as a fundamental basis for developing its screening and management protocols.

Keywords: Congenital Abnormalities, Single Umbilical Artery Anomaly, Single Umbilical Artery, Vascular Imaging.
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INTRODUCTION

Umbilical cord is a primary conduit connecting the fetus to the placenta. Embryology development of this structure occurs during the fourth to eighth week of gestation and its patency is established by the fifth week of gestation.[1] A fully developed umbilical cord consisted of a pair of umbilical arteries, one umbilical vein, and allantois remnant immersed in Wharton's jelly enveloped by an amnion layer.[1,2] Single umbilical artery (SUA) is the most prevalent umbilical artery anomaly with the incidence ranging from 0.5% to 1%. This anomaly is hypothesized to arise due to primary agenesis, ensuing atrophy, or persistent allantoic artery body stalk.[2,3]

Despite its rare occurrence, umbilical artery anomalies may lead to the reduction of placental surface area facilitating maternal-fetal gas exchange. Once the reduction exceeds clinical threshold of 30%, increased pulsatility can be detected in Doppler waveforms as a sign of downstream placental vascular insufficiency.[4] Increasing number of studies revealed the association between SUA with poor perinatal outcome, concurrent congenital malformation, and its future recurrence.[2,5] We hereby report a case illustrating the investigation and management of isolated SUA.

CASE DESCRIPTION

We present a case of isolated SUA prenatally diagnosed by ultrasound (US) at 37-38 weeks of gestation (Figure 1). The mother was a 37 years old woman having her second pregnancy. She had a history of miscarriage 2 years prior. She reported having regular antenatal care in another healthcare facility before her current visit. Fetal biometry measurements confirmed all parameters within the normal limit with the estimated fetal weight of 3.427 g, fetal heartbeat 121 beats per minute, resistance index of 0.59, systolic peak (PS)/ end-diastolic velocity (ED) of 2.4, and single deepest pocket (SDP) of 7.2 (Figure 2). No other abnormalities were detected in US except for the isolated SUA. The mother was carefully counseled and closely followed up as this finding was not diagnosed previously.

Postnatal cord examination confirmed the US finding of SUA (Figure 3) and visibly normal placenta (Figure 4). The female baby was born by elective cesarean section. She cried immediately and had an Apgar score of 8-9. Comprehensive examination performed by pediatrician

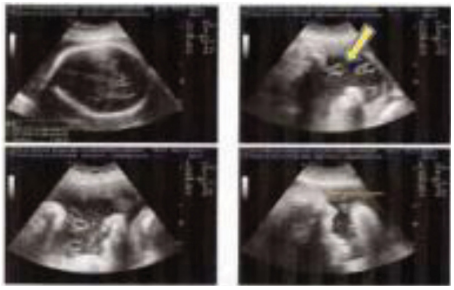

Figure 1. Grayscale ultrasound of the umbilical cord at the gestational age of 37 weeks and 5 days.

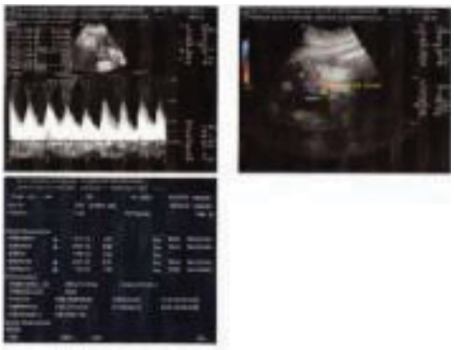

Figure 2. Fetal ultrasound biometry measurements.

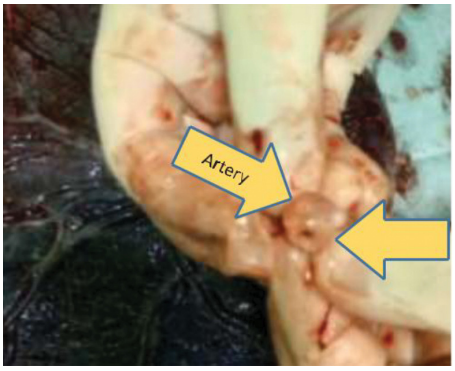

Figure 3. Cross sectional view of the umbilical cord.

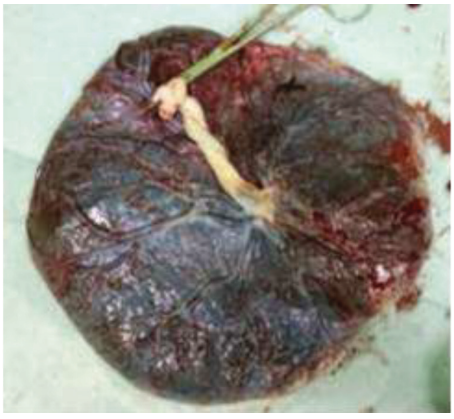

Figure 4. Normal placenta.

revealed no apparent abnormalities and her birth weight was 3.700 g. The baby was feeding well and healthy at one-week follow-up.

DISCUSSION

The diagnosis establishment in this case can be considered delayed because umbilical cord assessment in the ultrasound examination is recommended in first trimester. Heterogenous umbilical cord abnormalities are summarized into the group of length, insertion site, cystic, hematomas, solid or complex, knots, nuchal cord, vascular, funic presentation, and prolapsed cord. Vascular anomalies were further classified into vessel number abnormality and persistent right umbilical vein. In a narrower perspective, the presentation of vessel number abnormality extends to lesser or greater (i.e., supernumerary vessels) number than normal. The single umbilical artery is also termed two-vessel cord representing one artery and one vein. Variants also exist within SUA in which structure is missing. Missing left umbilical artery is the predominant variant (98%) and the existing right umbilical artery branches from the right or left common iliac artery. Less common variations include the umbilical artery from the superior mesenteric artery (1.5%) and coexistence with two umbilical veins or the right umbilical vein, with the latter being the least common and least promising variant.[6]

The International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) published a practical guideline to set standardization on Doppler ultrasonography in obstetrics. Flow abnormality in US examination is usually identified first at the fetal end of the umbilical cord. In cases like SUA, the umbilical artery diameter is larger than its normal counterpart (i.e., when two arteries are present) and thus produced lower impedance.[7] Lower impedance is equivalent to lower pressure-to-flow ratio, which may contribute to its association with lower birth weight, lower Apgar score, and higher neonatal morbidity.[8,9]

Earlier evidence showed that SUA in the absence of other pathologies did not increase perinatal morbidity and mortality,[10-11] as evident in this report and other similar reports.[3,12] The seemingly low disease burden may hamper thorough investigation and management protocol development. However, more recent large-scale population-based study[5] and meta-analysis[2] had proved the opposite. Both studies suggested that SUA was associated with gastrointestinal atresia or stenosis and trisomies; and increased risk of perinatal complications of small for gestational age, oligohydramnios, polyhydramnios, gestational diabetes mellitus, and perinatal mortality. The result from a study involving 1.024 cases of SUA screened at 12-20 weeks of gestation suggested that all pregnancies with SUA would preferably be referred to fetal medicine experts as the first step of the investigation.[3] Isolated SUA would not benefit from invasive genetic testing and fetal echocardiography, while in cases where additional congenital anomalies were detected, proper counseling and further investigations are recommended.

CONCLUSION

This report is expected to increase the awareness of this disease entity as a fundamental basis for developing its screening and management protocols.

AUTHOR CONTRIBUTIONS

All authors contributed to the concept, design, definition of intellectual content, literature research, clinical studies, data analysis, manuscript preparation, editing, and review; all authors served as guarantors for this study.

CONFLICT OF INTEREST

The authors have nothing to disclose.

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ETHICAL CONSIDERATIONS

Written ethical clearance was obtained from the Ethical Committee of Medical Faculty of Universitas Udayana, Sanglah General Hospital and its copy was available to be reviewed by the Editor-in-Chief of this journal.

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