International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

A Case Report on Intrauterine Growth Retardation (IUGR) with Single Umbilical Artery (SUA)

V. Prathibha[1], U. Aswini[2], V. Lakshmi Narasimha[3], N. Sree Dharani[4], P. Bhagya Lakshmi[5]

[1,2,3,4,5]Pharm. D, Santhiram College of Pharmacy

Abstract

Intrauterine growth restriction (IUGR) is fetal growth below the expected potential for a given gestational age. Single umbilical artery (SUA) fetuses are more likely to experience a number of concerns, including prematurity, IUGR, and intrauterine fetal demise. Although SUA is a relatively uncommon anomaly, it is clinically significant and frequently associated with various pregnancy complications. This case report presents a 24-year-old pregnant woman who underwent a targeted anatomical ultrasound (TIFF scan) at 21 weeks and six days of gestation. The ultrasound identified a single umbilical artery and two echogenic foci in the left ventricular cavity of the fetal heart, with no other abnormalities observed.

Keywords: IUGR, single umbilical artery (SUA), prematurity.

Introduction

The formation of the umbilical cord begins during the second week of embryonic development. A typical umbilical cord comprises two arteries and one vein. However, in some pregnancies, the umbilical cord contains only a single artery. The single umbilical artery's clinical relevance (SUA) lies in its association with various pregnancy complications, including intrauterine growth restriction (IUGR), preterm labor, stillbirth, and other fetal anomalies. SUA is the most common macroscopic anomaly and the most frequent malformation observed in the umbilical cord [1]. Globally, the prevalence of single umbilical arteries (SUAs) ranges from 0.5 to 6% [2]. A single umbilical artery (SUA) can arise from either primary agenesis or secondary atrophy of one of the umbilical arteries. Primary agenesis refers to the failure of one artery to form during development, while secondary atrophy occurs when one of the customarily formed arteries degenerates later in pregnancy [3]. An isolated single umbilical artery is determined by one of the two umbilical arteries not existing in the umbilical cord. This condition is frequently linked with congenital anomalies. However, when no chromosomal or structural abnormalities are present, the condition is called an isolated single umbilical artery [4]. SUA increases risks of prematurity, intra-uterine death, intrauterine growth restriction (IUGR) [5], and mortality among neonates [6]. Intrauterine growth restriction (IUGR) is a disorder that happens when fetal growth is less rapid than anticipated, given the baby's particular growth potential. This means the baby is not growing at the average rate for their gestational age [7]. Intrauterine Growth Restriction (IUGR) can arise from factors related to the mother, placenta, or fetus. Infants with IUGR may experience immediate neonatal issues such as hypothermia, hypoglycemia, and perinatal

asphyxia. IUGR is a significant contributor to perinatal and neonatal morbidity and mortality, which is linked to an increased probability of long-term health problems. Individuals who were born with IUGR are more prone to developing chronic conditions in adulthood, including metabolic syndrome, cardiovascular and renal diseases, Type 2 diabetes, and chronic respiratory conditions [8]. Asymmetrical IUGR typically develops during the later stages of the third trimester and is primarily caused by uteroplacental insufficiency. This form of IUGR leads to uneven fetal growth, with the fetus's head and vital organs often growing more generally than the body. Nutrient delivery to the fetus becomes less efficient as the umbilical cord transfers essential nutrients from the mother. This compromised nutrient transfer affects the fetus's overall growth and development [9].

Case presentation

A 24-year-old pregnant woman, multi gravida (G2A1) with a gestational age of 38 weeks and two days, came to Santhiram Medical College and General Hospital, Nandyal. She was undergoing regular antenatal check-ups in a hospital. Her Obstetric-2/3 Trimester TTFA scan revealed a single live intrauterine gestation with two echogenic foci in the left ventricles of the cardiac and single umbilical artery. Fetal Abdominal Circumference (AC) showed a downward trend and fell to 13 centiles for the gestational age. Her Obstetric-3/3 Trimester pelvic floor muscle showed positive; 30 weeks of gestational age, a growth scan was done and showed normal growth. The patient was admitted for FBS (fetal blood sampling) and PPBS (post-prandial blood sugar). These tests' results show that AFI(Amniotic fluid index)-16 to 17, PPBS-110mg/dl, HbA1C-4.07.The patient advised Tab. Ecospirin, 150mg for 4th month, used for four months, Tab. Dyhydrogesterone 10mg BD spotting at 3rd month. The baby was delivered on 21/8/24, term, Mch, SGA, and mod-em. LSCS, Ind-IUGR. Appear Term: Central pink, peripheral cyanosis shown, crying immediately after birth, secretions cleared from mouth and nose, umbilical cord with one artery and one vein clamped, cut, and secured. APGAR SCORE 8/10 After 1min of birth,9/10 After 5min.Vitals are like PR-136bpm, RR-42cpm, SPO2- 98%,TEMP-36.5degree,CRT-3Sec(central and peripheral).Anthropometry shows HC-31cms, CC-29cms, LENGTH-47cms, BODY WEIGHT-2.365kgs, head-to-toe examination shows Normal. She advised laboratory investigations like USG Abdomen & Pelvics,2D Echo, Neurosonogram, and Metabolic screening.

Clinical findings

Complete Blood Picture

Blood grouping and RH typing	B Positive
Complete hemogram	
Haemoglobin	18.5 g/dL
T.W.B.C	8400/cm
Differential count	
Polymorphs	30%
Lymphocytes	58%
Eosinophils	7%
Monocytes	5%
Basophils	00
ESR	10mm/hr

TRBC	5.2/million/cmm
PCV	54%
MCV	104FL
MCH	35pg
MCHC	34%
Platelet count	2,16,000/cmm

Department of biochemistry
Serum bilirubin

Parameter	Result values
Total bilirubin	10.0mg/dl
Direct bilirubin	1.0mg/dl

Investigations: ULTRASOUND SCAN OF ABDOMEN
Impression: No sonological abnormality detected.
Neuro sonogram
Impression:
Normal neurosonogram study.
Cardiovascular imaging & hemodynamic laboratory
Impression:
MILD DILATED RA/RV
PFO+
PASP: 25 mmHg
SITUS SOLITUS, LEVO CARDIA
D-LOOP, LEFT AORTIC ARCH
NO VSD/PDA/PS/AS
LEFT AORTIC ARCH, NO COARCTATION OF AORTA
GOOD BI VENTRICULAR FUNCTION
Discussion
The incidence of SUA varies from 0.2 to 0.87% [10]. Prenatal ultrasound evaluations for a single umbilical artery (SUA) should ideally be conducted during pregnancy's second and third trimesters [10, 11]. In the presented case, a prenatal ultrasound at 21 weeks gestation identified a single umbilical artery (SUA) and asymmetrical or type 1 intrauterine growth restriction (IUGR). The patient experienced a spontaneous preterm delivery at 38 weeks of gestation. After birth, the diagnosis of asymmetrical or type 1 IUGR was confirmed in the small-for-gestational-age (SGA) neonate, who weighed 2.365 kg at 38 weeks and two days. Additionally, the presence of SUA was verified through a macroscopic examination of the umbilical cord cross-section and a microscopic analysis of the cord tissue. The authors reported that fetuses with a single umbilical artery (SUA) are at a greater probability of adverse pregnancy results, such as intrauterine growth restriction (IUGR), intrauterine fetal demise (IUFD), prematurity, and low birth weight (LBW) [10, 11].

Single umbilical artery (SUA) newborns are more likely to have chromosomal abnormalities and congenital fetal malformations (CFM). The most common congenital malformations associated with SUA include renal, cardiovascular, and musculoskeletal anomalies [12]. The congenital and chromosomal

abnormalities in the neonate were ruled out following delivery. A brain ultrasound and normal karyotyping (46, XX) were conducted the day after birth, confirming the absence of such abnormalities. A single umbilical artery (SUA) may occur as an isolated finding or be associated with congenital heart disease (CHD) [10, 11]. Congenital heart disease (CHD) was ruled out in the neonate through echocardiography performed the day after delivery. The echocardiogram revealed normal findings for a premature infant.

Murphy-Kaulbeck *et al.* found that the SUA fetuses and neonates had 6.77- and 15.35 times greater risk of CFM and chromosomal abnormalities, respectively [13]. Murphy-Kaulbeck *et al.* found the most joint fetal malformations in chromosomally normal fetuses and neonates with SUA were genitourinary (6.48%), cardiovascular (6.25%), and musculoskeletal (5.44%) and concluded that the detection of SUA is essential for prenatal diagnosis of CFM and aneuploidy [13].

The Society of Obstetricians and Gynaecologists of Canada recommends a thorough review of fetal anatomy when a single umbilical artery (SUA) is detected, along with ongoing monitoring of fetal growth. Parents need to be made aware of the higher chance of unfavorable consequences associated with SUA and advised to undergo repeated ultrasound examinations, Doppler assessments, and additional tests for fetal well-being in the later weeks of pregnancy.

Conclusion

Prenatal detection of single umbilical artery (SUA) has been associated with a greater probability of intrauterine growth restriction (IUGR), preterm labor (PTL), and small for gestational age (SGA) infants. These associations suggest that routine obstetric management should be adjusted to include mandatory scanning of umbilical cord vessels. Upon diagnosis of SUA, more frequent and detailed monitoring of fetal well-being, particularly in the third trimester, may be necessary. Evaluating the umbilical cord vessels during pregnancy is crucial. SUA can serve as a marker for potential complications such as detectable chromosomal abnormalities and other anomalies, potentially improving overall pregnancy outcomes.

References

1. Blum M, Weintraub AY, Baumfeld Y, Rotem R, Pariente G. Perinatal outcomes of minor for gestational age neonates born with an isolated single umbilical artery. Frontiers in Pediatrics. 2019 Mar 19;7:79.
2. Sharma D, Shastri S, Sharma P. Intrauterine growth restriction: antenatal and postnatal aspects. Clinical medicine insights: pediatrics. 2016 Jan;10:CMPed-S40070.
3. Abdelazim IA, Abu-Faza M, Hamed ME, Amer OO, Shikanova S, Zhurabekova G. Prenatal diagnosis of single umbilical artery complicated by intrauterine growth retardation and preterm labor: Case report. Journal of family medicine and primary care. 2019 Jun 1;8(6):2151-4.
4. Ebbing C, Kessler J, Moster D, Rasmussen S. Isolated single umbilical artery and the risk of adverse perinatal outcome and third stage of labor complications: A population-based study. Acta Obstetricia et Gynecologica Scandinavica. 2020 Mar;99(3):374-80.
5. Hua M, Odibo AO, Macones GA, Roehl KA, Crane JP, Cahill AG. Single umbilical artery and its associated findings. Obstetrics & Gynecology. 2010 May 1;115(5):930-4.
6. Ramesh S, Hariprasath S, Anandan G, Solomon PJ, Vijayakumar V. Single umbilical artery. Journal of Pharmacy and Bioallied Sciences. 2015 Apr 1;7(Suppl 1):S83-4.
7. Kesavan K, Devaskar SU. Intrauterine growth restriction: postnatal monitoring and outcomes. Pediatric Clinics. 2019 Apr 1;66(2):403-23.

8. Armengaud JB, Yzydorczyk C, Siddeek B, Peyter AC, Simeoni U. Intrauterine growth restriction: Clinical consequences on health and disease at adulthood. Reproductive Toxicology. 2021 Jan 1;99:168-76.
9. Sreedhar A, Parvathy S. Ayurveda Management of IUGR due to single umbilical artery: A case report. Journal of Ayurveda and Integrative Medicine. 2024 Jul 1;15(4):100974.
10. Vasanthalakshmi GN, Pushpalatha T, Mehta P, Devi SA. Single umbilical artery and pregnancy outcomes: Cause for concern. JS Asian Fed Obstet Gynaecol. 2012 May;4:103-5.
11. Prefumo F, Güven MA, Carvalho JS. Single umbilical artery and congenital heart disease in selected and unselected populations. Ultrasound in Obstetrics and Gynecology. 2010 May;35(5):552-5.
12. Ramesh S, Hariprasath S, Anandan G, Solomon PJ, Vijayakumar V. Single umbilical artery. Journal of Pharmacy and Bioallied Sciences. 2015 Apr 1;7(Suppl 1):S83-4.
13. Murphy-Kaulbeck L, Dodds L, Joseph KS, Van den Hof M. Single umbilical artery risk factors and pregnancy outcomes. Obstetrics & Gynecology. 2010 Oct 1;116(4):843-50.