Obstetrics & Gynaecology

A PROSPECTIVE STUDY ON SINGLE UMBILICAL ARTERY AND PREGNANCY OUTCOME

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ABSTRACT
Background: The umbilical cord contains one vein and 2 arteries. Occasionally one artery is absent, left side more common than right. The umbilical arteries carry the deoxygenated blood from the fetus to the placenta and the umbilical vein carries the oxygenated blood from the placenta to the fetus. The incidence of single umbilical artery varies from 0.2 to 0.87%. **Objective:** To study the pregnancy outcome of the antenatal women with single umbilical artery at a tertiary care centre. **Methods:** It was a prospective study conducted on 20 patients with single umbilical artery diagnosed by ultrasonography at Mallareddy hospital, Suraram, during a period of 16 months [FEBRUARY 2021-AUGUST 2022]. **Results:** Fetal anomalies like renal, cardiac and other congenital anomalies, intrauterine death, low birth weight, low placental weight and preterm birth were high in women with single umbilical artery. **Conclusion:** evaluation of cord vessels is must and fetuses with single umbilical artery need more detailed assessment and monitoring like Doppler studies in the presence of intrauterine growth restriction. A significant association was noted between single umbilical artery and low birth weight.

KEYWORDS : single umbilical artery, intrauterine growth restriction, fetal anomalies, ultrasound.

INTRODUCTION:
The umbilical cord contains of two arteries and one vein, occasionally one artery is absent, left more common than right (1). The absence of single umbilical artery is one of the most common congenital anomalies of the umbilical cord. Multiple gestation is affected three to four times more frequently than singletons (2).

The arterial system forms during the 4th and 5th week of embryonic development. The paired umbilical arteries, transporting the deoxygenated blood, pass through the connecting stalk which later becomes the umbilical cord and drains into the chorionic vessels of the placenta. The proximal parts of the umbilical artery become the internal iliac arteries and the superior vesical arteries. The distal part obliterates after birth and becomes the median umbilical ligament (3). There are three theories concerning the pathogenesis of an absent umbilical artery -

1. primary agencies 2. secondary atrophy or atresia of the previously normally developed vessel and 3. persistence of the original allantoic artery of the body stalk.

It is estimated that about 30 to 60% of cases with single umbilical artery are concomitant with congenital anomalies like cardiac and genito urinary abnormalities, skeletal or gastrointestinal malformations or chromosomal abnormalities such as trisomy 13, 18, 21 and triploidy (4).

single umbilical artery can be diagnosed prenatally by ultrasound as early as 12 weeks of gestation showing two vessels on cross section of free loop of cord in the fetal pelvis as arteries course around the bladder is useful (5).

METHODS:
This was a prospective study conducted at Malla Reddy hospital, suraram, during a period of 16 months [February 2021 – august 2022] on 20 pregnant women who were diagnosed with single umbilical artery during their routine antenatal survey.

All cases diagnosed with single umbilical artery had a detailed anomaly scan and fetal echocardiography. We evaluated the fetus regarding the associated anomalies, fetal growth, post-natal and neonatal outcome.

All women with single umbilical artery with multiple anomalies were counselled for karyotyping and amniocentesis, only one woman was willing and underwent the procedure.

RESULTS:
Out of 20 pregnant women diagnosed with single umbilical artery at antenatal survey, 13(65%) pregnant women had isolated single umbilical artery and 7(35%) were non isolated (single umbilical artery with multiple anomalies).

Table 1: Type of single umbilical artery

Type	No. Of cases	Percentage (%)
Isolated SUA	13	65
Non isolated SUA	7	35
Total	20	100

Single umbilical artery was associated with cardiac anomalies in 4(20%) pregnant women, out of these there was one neonatal death and 3 pregnancies were terminated in view of multiple anomalies.

Table 2: single umbilical artery and cardiac anomalies fetus outcome

Obstetric score	Gestational age (weeks)	CVS anomaly	Outcome
G2P1L1	Term	TOF + IUGR	Neonatal death
Primi	22+3	VSD+TOF(taussig syndrome	MTP
G3P1L1A1	24	Right ventricular hypoplasia + tricuspid atresia	MTP
G2P1L1	23+6	VSD +AV malformation	MTP

TOF- tetralogy of fallot, IUGR- intrauterine growth restriction, VSD- ventricular septal defect, AV malformation- arteriovenous malformation, MTP- medical termination of pregnancy.

Single umbilical artery was associated with urogenital anomalies in 3 (15%) pregnant women. Out of this one case was of absent right kidney, one was hypospadias with IUGR and one was bilateral renal agenesis. Out of these two were alive and healthy and one was terminated medically in view of multiple anomalies with bilateral renal agenesis.

Table 3: Single umbilical artery and urogenital anomalies fetuses outcome:

Obstetric score	Gestational age (weeks)	anomaly	outcome
Primi	Term	Hypospadias+IUGR	Alive/healthy
G2A1	Term	Absent right kidney	Alive/healthy
G2P1L1	23+4	bilateral renal agenesis	MTP

There were 3 pregnancies with single umbilical artery with IUGR (birth weight less than 10th percentile), out of these 2 had isolated single umbilical artery and had tetralogy of fallot with IUGR.

Table 4: outcome of fetuses with IUGR

	IUGR	Neonatal death
Isolated	2	0
Non isolated	1	1

DISCUSSION:
The presence of isolated single umbilical artery would increase the risk of perinatal complications like small for gestational age, oligohydramnios, polyhydramnios and perinatal mortality (6, 7,8,9). Newborns with single umbilical artery are at an increased risk of urogenital anomalies, long term respiratory morbidity compared to newborn without single umbilical artery (10). As umbilical cord anomalies can be diagnosed prenatally, awareness and detection of condition in the antenatal period will improve fetal survival and reduce infant mortality (11). In cases of non isolated single umbilical artery further prenatal tests like karyotyping should be considered and offered to all non isolated cases.

In a study done by Tasha et al (2014) the incidence of cardiac abnormalities among fetuses with single umbilical artery was 20.3% (12) and it was about 16.42% in the study done by Malora J et al. (2018). In the present study it was about 20%.

In pregnancies with isolated single umbilical artery, the incidence of fetal growth restriction that small placental size was increased.

In a study done by Homeira Vafaei et al (2021), the isolated single umbilical artery cases were about 76.5% and in cases with congenital anomalies cardiac and renal anomalies were detected in 19.04% and 21.42% respectively.

In the present study, the pregnant women who had isolated single umbilical artery were about 65% and non-isolated were about 35%. SUA with urogenital anomalies were 15%. There were 2 cases of IUGR in pregnant women with SUA.

In our study the pregnancy outcome was two neonatal deaths, four medical abortions , 3 cases of IUGR and 12 were alive and healthy fetuses.

CONCLUSION:
Prenatal diagnosis of single umbilical artery should prompt detailed fetal anatomic survey especially four chamber view and outflow tract of the heart and genitourinary system. Fetal echocardiogram must be done. In cases of multiple anomalies, invasive testing like amniocentesis or karyotyping should be considered. In view of association with IUGR the women should be asked to follow-up pregnancies with serial ultrasound assessment for fetal growth, (American College of Obstetricians and Gynecologists, ACOG). Post natally the neonate should be followed up for 3-4 weeks to see for any late sequelae.The ultrasound findings should be used to counsel women who are diagnosed with SUA and guide the antenatal and post-natal surveillance.

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