

# Antenatal Diagnosis of Umbilical Artery Fusion: A Case Report and Review of the Literature

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## Özet

**Background:** Antenatal diagnosis of fused umbilical arteries by ultrasonography.

**Case:** A thirty-eight-year-old woman with gravida:2 parity:1 has got pregnant with ovulation induction. One of the fetuses of twin pregnancy had cystic hygroma at 11 weeks of gestation. Fetal reduction was performed to the anomalous fetus. At 25th weeks of gestation ultrasonography of umbilical cord revealed two arteries and single vein near fetal side, a single artery and single vein close to placental insertion.

**Conclusion:** The clinical significance of fused umbilical arteries is not well known. Compared to the cases of single umbilical artery, fetal anomaly accompanies fused umbilical arteries cases less frequently. Therefore, in order to diagnose antenatally fused umbilical arteries, total length of umbilical cord should be evaluated ultrasonographically.

**Keywords:** Fused umbilical arteries, antenatal diagnosis, ultrasonography.

## Umbilikal Arter Füzyonunun Antenatal Tanısı: Bir Olgu Sunumu ve Literatürün Gözden Geçirilmesi

**Amaç:** Umbilikal arter füzyonunun antenatal ultrasonografik olarak varlığının tesbit edilmesi.

**Olgu:** Otuzsekiz yaşında G:2, P:1 olan ovulasyon indüksiyonu ile ikiz gebelik oluşan hasta kliniğimizdeki takipleri sırasında ikiz eşlerinden birinde kistik higroma saptanması üzere 11. gebelik haftasında fetal redüksiyon işlemi uygulandı. Rutin gebelik takipleri esnasında gebeliğin 25. haftasında yapılan ultrasonografide umbilikal kordun fetüsa yakın kısımda iki arter bir ven, plasentaya yakın kısımda ise tek arter ve ven yapısı izlendi.

**Sonuç:** Nadir bir bulgu olan umbilikal arter füzyonunun klinik önemi tam olarak bilinmemektedir. Tek umbilikal artere göre eşlik eden anormal riski daha azdır. Bu nedenle, umbilikal arter füzyonunun kesin tanısını koymak için umbilikal kord, ultrasonla, detaylı olarak boylu boyunca incelenmelidir.

**Anahtar Sözcükler:** Umbilikal arter füzyonu, antenatal tanı, ultrasonografi.

## Background

Umbilical cord is shaped from umbilical stem containing artery, vein and allantois in the early weeks of embryogenesis and from yolk sac containing omphalomesenteric stem and remaining of original yolk sac connection. The umbilical cord which is basically formed of two arteries, one vein and Wharton gel surrounding these structures has a role for carrying the oxygen to fetal portal circulation and ductus venosus (so to the heart) in the intrauterine period by means umbilical vein and

for transferring the oxidized blood to maternal circulation from fetal circulation.<sup>1</sup>

A normal umbilical cord includes two arteries-one vein. But there is only one umbilical artery in 1% of single pregnancies, 5% of twin gestations and 2.5% of miscarriages.<sup>2</sup> Many different mechanisms are discussed for single umbilical artery formation. Secondary atrophy of umbilical arteries, abnormal Hyrtl anastomosis, primary agenesis of umbilical arteries or being persist of single artery temporarily are some of these mechanisms.<sup>3,4</sup> UAF

is a malformation which becomes definite by antenatal ultrasonographic examination or pathological examination after delivery. It is thought that formation of physiological anastomoses (Hyrthl anastomoses) which exists just before and after entering chorionic stratum between both arteries causes UAF defect. As known, single umbilical artery structure exists in embryo in early periods of embryogenesis. Single artery structure is separated into two parts beginning from the fetal end to placental end in intrauterine growth period. Incompletion of this separation mechanism creates mostly prevalent cause of umbilical artery fusion.<sup>5</sup>

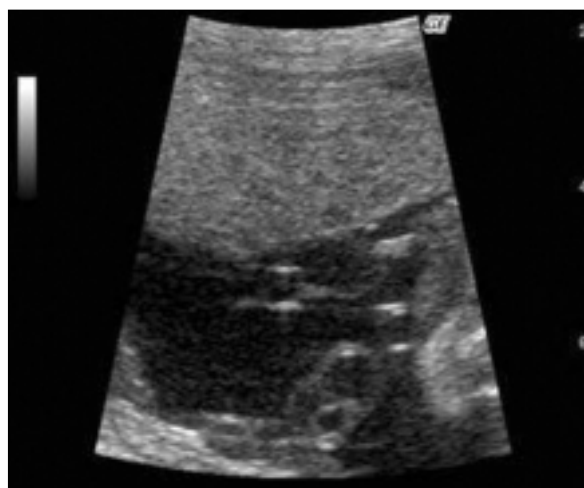
Even though it is easy to report its frequency due to convenience of diagnosing single artery – single vein both pathologically and ultrasonographically in literature, there is no certain information about the frequency of UAF due to the fact that the cord is not examined completely in routine ultrasonography. It was reported prenatally in 2001 by Sepulveda et al for the first time.<sup>2</sup> In the study of Fujikara, UAF frequency was found in female babies as 4.1% and in male babies as 2% as a result of examining 702 cords in postnatal period. But no ultrasonographic examination was performed to these patients in antenatal period.<sup>3</sup>

We, in our study, aimed to discuss ultrasonographic and pathological diagnosis of UAF as a case report.

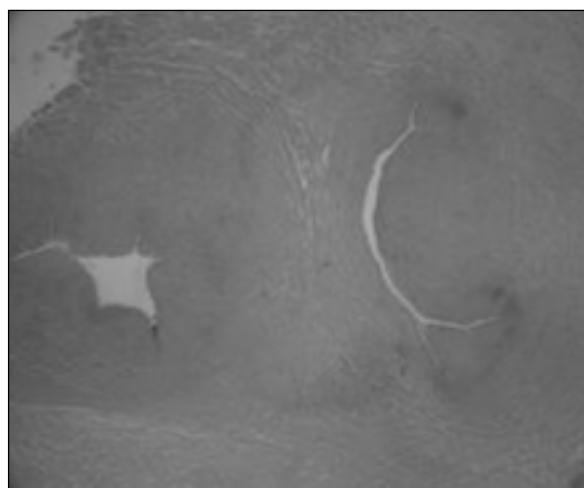
## Case

A thirty-eight-year-old woman with gravida: 2 parity:1 has got pregnant with ovulation induction. One of the fetuses of twin pregnancy had cystic hygroma at 11<sup>th</sup> gestational week. Fetal reduction was performed to the anomalous fetus.

At 25<sup>th</sup> gestational week ultrasonography of umbilical cord revealed two arteries and single vein near fetal side, a single artery and single vein close to placental insertion (Figure 1). No other anomaly was found in fetus, placenta and cord. She was taken into cesarean operation on repeated cesarean diagnosis on 39<sup>th</sup> gestational week. A male baby about 3450 g was born with 10/10 Apgar score by crown arrival. Placenta and its sup-



**Figure 1.** Single artery – single vein on the same section (upper cord), two arteries–single vein(lower cord).



**Figure 2.** Microscopic appearance of the fusion of arteries. (HE X 20).

plements were sent to pathology. She was dispatched from our clinic on postoperative second day when she and baby's health were fine.

The cord was taken into pathological examination as two parts as fetal and placental. 3 vascular lumens consisting of 2 arteries and 1 vein were observed on section surface of fetal part; it was found that appearance with 3 lumens in placental part disappeared and that it continued as 1 artery and 1 vein after fusion of 2 vascular elements (2 arteries) on one area. Fusion area and sections taken from other areas were painted with Hematoxyline – Eosin (HE) and determined

histopathologically. Fusion of two arteries was observed microscopically (Figure 2).

## Discussion

UAF was first reported in 1969 by Chantler in a pregnant who was diagnosed diabetes mellitus and preeclampsia as postpartum.<sup>1</sup> This cord anomaly was first reported by Sepulveda et al in prenatal ultrasonographic examinations.<sup>2</sup> Though incidence of artery fusion is not definitely known, the incidence was reported as 3.1% in a study in which more than 700 placentas and cord structures were examined postpartum pathologically.<sup>3</sup> In the same study, it was found that artery fusion is seen in female babies frequently and additionally marginal and velamentous placenta insertion accompanied more frequently. It was reported that it did not cause congenital malformation increase in UAF cases and prenatal complications but it was observed that chromosomal or congenital anomaly occurrence risk was higher in fetuses having single umbilical artery and preterm delivery, intrauterine growth retardation, placenta pathologies were seen more frequently.<sup>2,3,5</sup> Clinical researches reported congenital anomaly incidence as 25-50% related to muscle-skeleton system, cardiovascular system and genitourinary system in the existence of single umbilical artery. On the other hand, congenital anomaly incidence was reported as 0.2% - 1% in pregnant with UAF diagnosis.<sup>6</sup> Genitourinary system anomaly was reported together with unilateral renal agenesis in a fetus with UAF diagnosis (Haller-mann-Streiff syndrome).<sup>2</sup> The difference of UAF pathophysiology and prognosis from single artery-single vein anomaly reveals the requirement of distinctive diagnosis in antenatal or postpartum period.<sup>6</sup>

Examination of umbilical cord in antenatal period is important. Length and position of cord, masses on cord (true knot, false knot, haematoma etc.) and umbilical veins should be included within ultrasonographic examination.

Antenatal UAF diagnosis is an anomaly which is not noticed due to failure of cord examination frequently as a whole. First, a section should be taken from cord in an area and then its structure should be controlled in close areas to fetal and placental areas. Doppler ultrasonography should be

remembered as well as routine ultrasonographic examination in diagnosing UAF. Observation of umbilical arteries within fetal abdomen especially lying both sides of bladder and observation of single umbilical artery without observing atresia or hypoplasia structure through the length of cord are important clinical diagnoses for UAF.<sup>7,8</sup> In a similar case presented by Sener et al, doppler ultrasonography was used for diagnosing umbilical artery fusion in patient having twin pregnancy.<sup>9</sup>

Consequently, even though UAF incidence is frequently occurs as single artery-single vein, antenatal diagnosis is an anomaly which is not noticed due to failure of cord examination frequently as a whole. It would be useful to separate it from single artery-single vein anomaly accompanying fetal anomalies frequently due to the fact that it accompanies fetal anomalies rarely and umbilical cord is required for antenatal diagnosis for examining as a whole, not by a single section. Thus, umbilical cord should be examined in sections close to fetal and placental areas.

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