

## Case Report

# Three umbilical arteries resulting in a four-vessel umbilical cord in a stillbirth

Xue Du<sup>1\*</sup>, Qing Yuan<sup>1\*</sup>, Zengyan Li<sup>1</sup>, Yongmei Li<sup>2</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, General Hospital, Tianjin Medical University, Tianjin, China; <sup>2</sup>Department of Medical Microbiology, School of Basic Medical Sciences, Tianjin Medical University, Tianjin, China. \*Equal contributors.

Received December 23, 2014; Accepted February 11, 2015; Epub March 15, 2015; Published March 30, 2015

**Abstract:** Here we first describe a four-vessel umbilical cord including three umbilical arteries and one vein in a stillbirth. A 28-year-old woman delivered a 2360 g stillbirth in the 33th week of gestation. The infant had no gross anomalies. The placenta was examined pathologically, and the cord was measured as 60.0 cm long, which has four vessels with three arteries and one vein throughout its whole length confirmed by direct and microscopic examination. Fibro-necrosis and dotted necrosis were found in the placenta. A pregnancy with three umbilical arteries may need fetal monitoring during the second trimester. Further observation and adequate investigation are needed in such cases.

**Keywords:** Umbilical cord, umbilical arteries, stillbirth, anomalies

### Introduction

Aberrations in the number of umbilical vessels do occur occasionally during pregnancy. The rate of four umbilical vessels is extremely unusual and has been previously reported to be associated with a high incidence of major congenital anomalies [1, 2]. There are only a few cases of a four-vessel cord with two umbilical veins and two umbilical arteries have been reported worldwide [3, 4]. Here we report a case of a stillbirth with a four-vessel cord which has three umbilical arteries and an umbilical vein for the first time.

### Case report

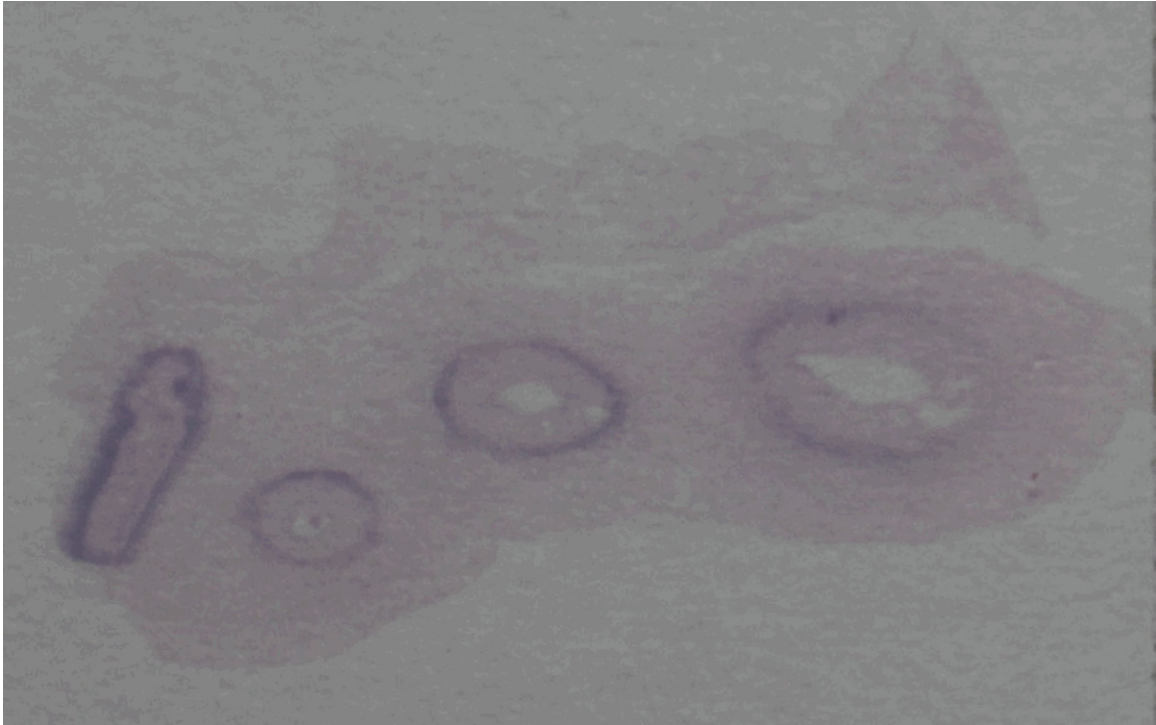
A 28-year-old woman was admitted to our hospital at 33 weeks of gestation with no fetal movement for 18 hours. Vaginal bleeding like menstrual hemorrhage had occurred twice at 8 and 12 gestation weeks respectively, and no fetal abnormality was found by ultrasound examination. Thus the patient was treated as threatened abortion. Twice ultrasound examinations were given after and reported no anomalies of the fetal heart and other important organs (without cord scanning).

The patient delivered a dead neonate weighed 2360 g and had no gross anomalies excluding the vascular abnormality of three umbilical arteries and one vein throughout the whole length of the cord which was confirmed by direct or microscopic examination (see **Figures 1, 2**). Edema and thickening were found on the root of the cord while fibro-necrosis and dotted necrosis were found in the placenta (see **Figure 3**). No further information about the dead baby could be obtained because of no committing of the newborn families for autopsy.

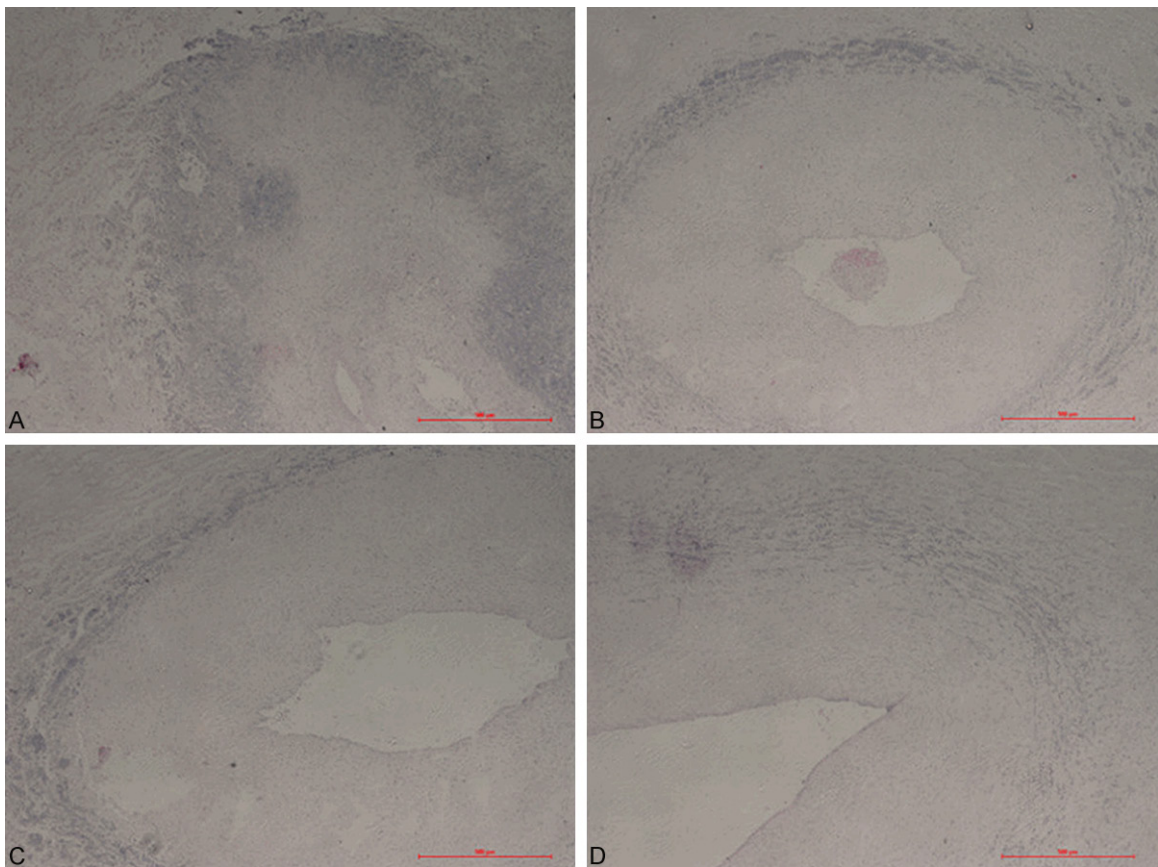
### Discussion

The umbilical arteries first appear as ventral branches of the paired dorsal aortas at the third week of embryo-genesis. With fusion of the paired dorsal aortas, the primitive umbilical arteries unite with the descending aorta, and the definitive umbilical arteries arise as two lateral branches from the caudal end of the descending aorta. Simultaneously, an arterial plexus develops around the allantois and coalesces to form a single artery extending almost the entire length of the body stalk. This allantoic artery becomes shorter as the right and left umbilical arteries advance in the body

Three umbilical arteries in stillbirth

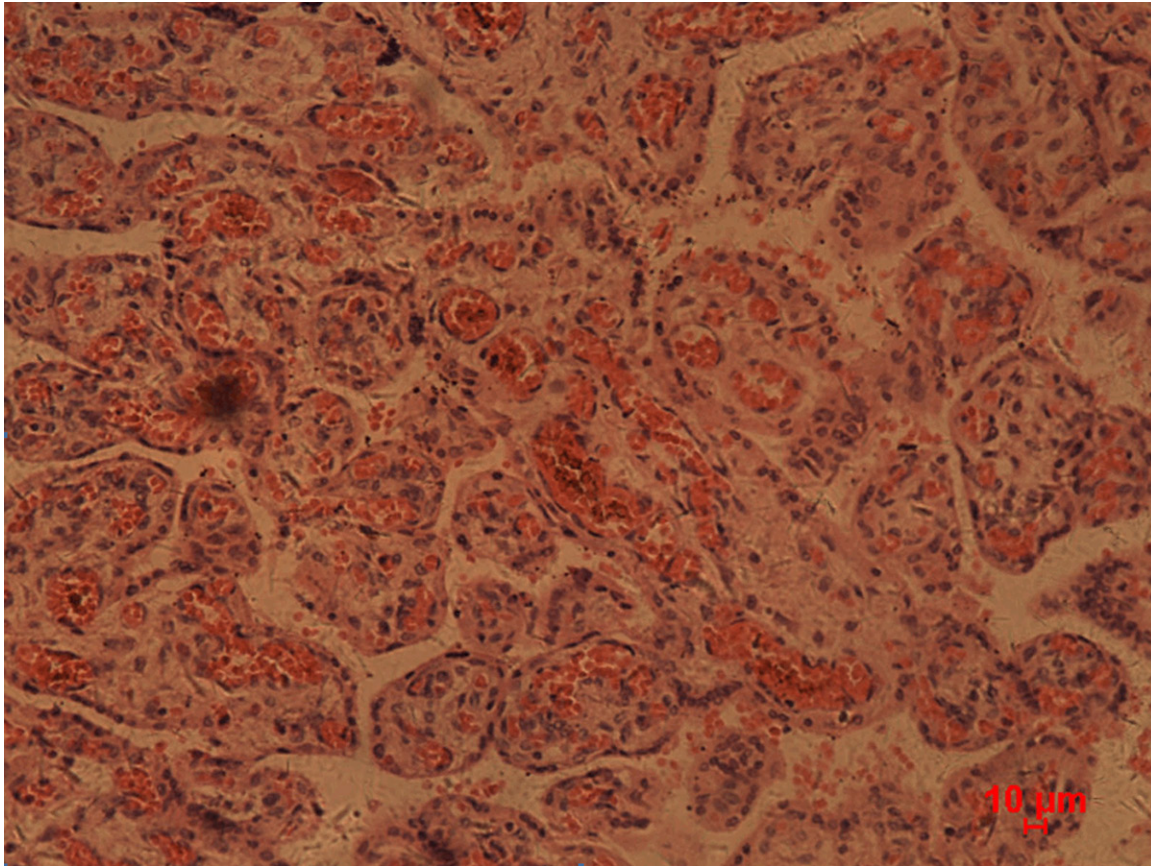


**Figure 1.** Four umbilical vessels in the cord of a stillbirth case.



**Figure 2.** A: An umbilical vein. B-D: Umbilical arteries.





**Figure 3.** Fibro-necrosis and dotted necrosis were found in the placenta.

stalk and eventually unites with both arteries to form the inter arterial anastomosis normally present in the region of the placental insertion. Under normal conditions the right umbilical vein regresses in the second month of fetal life. The left umbilical vein and the two umbilical arteries become the vessels found in the normal cord [5]. Here we just report a four-vessel cord which has three umbilical arteries and an umbilical vein.

The explanation of the possible mechanisms of the three umbilical arteries is abnormality during the coalescence process in the embryogenesis such as: (1) during the process that the primitive umbilical arteries unite with the descending aorta; (2) during the process that an arterial plexus coalesces to form a single artery; (3) during the process that this allantoic artery unites with both arteries; (4) during the process that an umbilical artery splits into two as the developmental stage of the embryo advances [6].

Our report here further suggests that doctors should be encouraged to provide second trimester screening. Fetal sonography during the second trimester may allow a more exact prenatal diagnosis of a multivessel umbilical cord and thus may permit a more comprehensive workup for a better outcome [7].

### **Acknowledgements**

The work was supported by the National Natural Sciences Foundation of China (Grant No. 813-03108, and No. 81201871). The authors thank Dr. Yuan Zhou for critically reading and correcting the manuscript.

### **Disclosure of conflict of interest**

None.

**Address correspondence to:** Xue Du or Zengyan Li, Department of Obstetrics and Gynecology, General Hospital, Tianjin Medical University, NO. 154, Anshan Road, Heping District, Tianjin 300052, China.

## Three umbilical arteries in stillbirth

Tel: + (86) 22-60363758; E-mail: lanlandetom-mao@163.com; 1852859804@qq.com

### References

- [1] Pérez-Cosío C, Sheiner E, Abramowicz JS. Four-vessel umbilical cord: not always a dire prognosis. *J Ultrasound* 2008; 27: 1389-1391.
- [2] Painter D, Russell P. Four-vessel umbilical cord associated with multiple congenital anomalies. *Obstet Gynecol* 1977; 50: 505-507.
- [3] Schimmel MS, Eidelman AI. Supernumerary umbilical vein resulting in a four-vessel umbilical cord. *Am J Perinatol* 1998; 15: 299-301.
- [4] Rodriguez MA. Four-vessel umbilical cord without congenital abnormalities. *South Med J* 1984; 77: 539.
- [5] Yamada S, Hamanishi J, Tanada S, Tachibana M, Mimura R, Fujii S, Shiota K. Embryogenesis of fused umbilical arteries in human embryos. *Am J Obstet Gynecol* 2005; 193: 1709-1715.
- [6] Abuhamad AZ, Shaffer W, Mari G, Copel JA, Hobbins JC, Evans AT. Single umbilical artery: does it matter which artery is missing? *Am J Obstet Gynecol* 1995; 173: 728-732.
- [7] Mari G, Hanif F. Fetal Doppler: umbilical artery, middle cerebral artery, and venous system. *Semin Perinatol* 2008; 32: 253-257.