Case Report

Absence of Wharton’s jelly: an association with feto-maternal morbidity

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ABSTRACT

Umbilical cord contains two arteries and one vein connecting fetus to the placenta and is responsible for blood flow between the two. It is surrounded by Wharton’s jelly which is a gelatinous substance and functions as adventitia layer of umbilical vessels, thereby providing insulation and protection to the umbilical cord. Umbilical cord abnormalities are associated with poor perinatal outcomes. Very few cases of absent Wharton’s jelly are reported in literature. Ours might be the 8th one in which we did a lower segment caesarean section for meconium stained liquor but the baby died after 12 hours.

Keywords: Meconium stained liquor, Umbilical cord, Wharton’s jelly

INTRODUCTION

Wharton’s jelly is a gelatinous substance within the umbilical cord which acts as a protective structure for the umbilical vessels. Absence of Wharton’s jelly around the umbilical arteries is very rare and may be associated with adverse perinatal outcome. Till now 7 cases have been reported to the best of our knowledge.

- 1st case in 1961 by Bergman et al in which a segment of the umbilical arteries were devoid of their Wharton’s jelly covering.¹
- 2nd, 3rd and 4th cases were reported by Labarrere et al described 3 cases of completely absent Wharton’s jelly around the umbilical cord arteries but was present around the umbilical veins; all cases were of meconium stained term neonates who died shortly after birth in whom umbilical arteries were detached from the cord substance and were associated with acute fetal distress and perinatal death which may be due to compression of the unprotected vessels.²³
- 5th case reported by Thomson and Hoo.⁴
- 6th case by Kulkarni et al.⁵
- 7th case by Christiano et al.⁶

Here, it might be the 8th case report of absent Wharton’s jelly.

CASE REPORT

Reporting a case of absent Wharton’s jelly in a 22-year-old pregnant female at 38 weeks of gestation admitted in our hospital. Patient was referred for meconium stained liquor and leaking per vaginum for last 8 to 10 hours. Patient was G3P1+(1). She had one live issue (1st), a female child of 4 years delivered by caesarean section at 37 week of gestation and the indication was eclampsia with Fetal distress. 2nd issue was a preterm vaginal delivery at 7 months gestational age, a female child, died at one day of life. (In second pregnancy there was no documentation of hypertensive disorder of pregnancy or any other risk factor).
Patient’s height was 5 feet 5 inch and weight was 105 kg (BMI 38.56 kg/m²). On physical examination bilateral pitting pedal edema along with generalized edema (anasarca) was present; no other significant abnormality was found. In present pregnancy, patient was on a (regular) ANC checkup at other hospital and diagnosed as hypertensive at 36 weeks, was on Tab Labetalol 100 mg BD and her BP was controlled since then. On admission her BP was 150/90 mmHg and urine albumin +1. Patient’s all other investigations were within normal limits and no abnormality was detected in USG.

DISCUSSION

The umbilical cord is a structure that provides vascular flow between the foetus and the placenta. It contains two arteries and one vein which are surrounded and supported by gelatinous tissue known as Wharton’s jelly (substantia gelatinea funiculi umbilicalis).7

Wharton’s jelly is made up of mucopolysaccharides (hyaluronic acid and chondroitin sulphate), fibroblasts and macrophages. Hyaluronic acid (70%) is an important molecule for the mechanisms of diffusion and osmosis in the umbilical cord. This structure gives elasticity to the umbilical cord, thus the main function of Wharton’s jelly is the protection of the umbilical blood vessels by neutralizing the external pressure influence on blood flow between placenta and foetus.6 If Wharton’s jelly is poorly developed, or if the vessels remain unprotected, they become more prone to compression.2,8

Wharton’s jelly when exposed to temperature changes, collapses structures within the umbilical cord and thus provides a physiological clamping of the cord (an average of) 5 min after birth.

Structural abnormalities of the umbilical cord are conditions increasingly recognized, in literature, as being associated with foetal death in utero. The umbilical cord abnormalities that may cause damage to the foetal well-being includes rupture and thrombosis of the umbilical vessels, umbilical artery agenesis, and stenosis/obliteration/constriction of the cord, furcate and velamentous cord insertion, and absence of Wharton’s jelly. These structural changes are strongly associated with intrauterine growth restriction, foetal death and increased rates of caesarean delivery.9-11 The quantitative alterations of Wharton’s jelly have been linked to conditions such as gestational hypertension, smoking and prematurity.12 The extreme reduction of Wharton’s jelly commonly named the ‘Absence of Wharton’s jelly’ or ‘insertio funiculi furcata’, is a very rare lesion with which the literature has presented a suggestive relationship to meconium staining, low Apgar score, and stillbirths. In these cases, the insertion site is normal, but as the cord vessels lose the Wharton’s jelly, their vessels become separated before reaching the placental surface.2,5

Raio et al, found an association between the presence of a thin umbilical cord and the delivery of an infant who is small for its gestational age.13 Similar relationship was found in our case as the baby, though weighed 2.0 kg and had thin Umbilical cord.

In our case the baby was Meconium stained with low Apgar score and died 12 hours after birth despite many resuscitative efforts. The three cases reported by Labarrere et al, were of meconium stained neonates who died shortly after birth in whom umbilical arteries were detached from the cord substance. But the relationship to meconium was disputed by Thomson and Hoo, who

Figure 1: Gross examination at the time of delivery (caesarean section) showing absence of Wharton’s jelly with umbilical arteries lying outside the umbilical cord.
described a case of severely retarded child but without meconium stain in “linear disruption of the umbilical cord.” Filiz et al, investigated the relationship between the amount of Wharton’s jelly and its protective role in umbilical cord vessels, and hence, on foetal growth. Abnormal situations, such as a decrease in the hyaluronic acid content of Wharton’s jelly and Wharton’s jelly fibrosis, may affect the mechanical characteristics of the cord, which leads to impaired foetal circulation, anoxia, and foetal death.

It had been suggested that this anomaly, absent Wharton’s jelly, may be due to degeneration of Wharton’s jelly around the vessels. An alternative explanation of this lesion is incomplete fusion of the amniotic covering and the mesenchyme of the umbilical cord during early development or a hypoplasia of amniotic covering with a secondary loss of the Wharton’s jelly.

CONCLUSION

The case we report here from our hospital is the first of its kind during the last 55 years period from 1965 to 2019 with an average of 22,000 deliveries per year.

As shown in other studies, our study also shows the association of absent Wharton’s jelly with adverse perinatal outcome. The pathogenesis of absence of Wharton’s jelly and its mechanism which affects foetus are to be studied further. There may be association of absent Wharton’s jelly with hypertensive disorders of pregnancy and Intrauterine growth restriction/foetal growth restriction. More studies are needed to prove this.

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