



### Araştırma/Research

## Umbilical cord prolapse in case of preterm premature rupture of membranes: When to be more cautious?

Emre Ekmekci<sup>1</sup>, Servet Gencdal<sup>2</sup>

<sup>1</sup>Sanliurfa Education and Research Hospital, Department of Obstetrics and Gynecology, Maternal-Fetal Medicine Unit, Sanliurfa, Turkey

<sup>2</sup>Izmir Katip Celebi University Atatürk Education and Research Hospital, Department of Obstetrics and Gynecology, Izmir, Turkey

### Abstract

**Purpose:** To describe the umbilical cord prolapse rates in patients with preterm premature rupture of membranes (PPROM) between 24 weeks and 33 weeks and 6 days gestation and to define the associated factors with umbilical cord prolapse.

**Material and methods:** Patients admitted due to PPRM between 24 weeks and 33 weeks and 6 days of gestation, and followed in clinic are included in the study. Primary aim of the study was to describe the umbilical cord prolapse rates. Secondary aim was to describe the pregnancy specific factors associated with umbilical cord prolapse.

**Results:** Total 88 patients are included in the study. Umbilical cord prolapse rate was 3.4% (3/88). Umbilical cord prolapses, all occurred in the first week after membrane rupture. All were multiparas and at non-vertex presentation.

**Conclusion:** Umbilical cord prolapse is much frequent after PPRM compared to general obstetric population. Clinicians should be more cautious in follow-up of patients after PPRM in case of earlier gestational weeks, transverse situs and non-vertex presentations, especially in the first week after PPRM.

**Keywords:** Malpresentation, preterm premature rupture of membranes, umbilical cord prolapsed,

### Yazışmadan Sorumlu Yazar

#### Servet Gencdal

Izmir Katip Celebi University Atatürk Education and Research Hospital, Department of Obstetrics and Gynecology, Izmir, Turkey

Tel : +90 505 314 31 36

E-mail: [servetgencdal@hotmail.com](mailto:servetgencdal@hotmail.com)

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### **Preterm erken membran rüptürü durumunda umbilikal kord prolapsusu: Ne zaman daha dikkatli olmalı?**

**Amaç:** 24 hafta ve 33 hafta 6 gün arasında gestasyonel yaşta, preterm erken membran rüptürü (PPROM) olan hastalarda umbilikal kord prolaps oranını ve umbilikal kord prolapsusu ile ilişkili faktörleri tanımlamak.

**Gereç ve Yöntem:** Çalışmaya 24 hafta ve 33 hafta 6 gün arasında gestasyonel yaşta, PPRM nedeniyle başvuran ve klinikte takip edilen hastalar dahil edildi. Çalışmanın primer amacı, umbilikal kord prolapsusu oranını tanımlamak idi. Çalışmanın ikincil amacı, umbilikal kord prolapsusu ile ilişkili faktörleri tanımlamaktır.

**Bulgular:** Çalışmaya toplam 88 hasta dahil edildi. Umbilikal kord prolapsusu oranı % 3.4 (3/88) idi. Umbilikal kord prolapsusu olgularının tümü membran rüptüründen sonraki ilk haftada meydana geldi. Hepsi multipar ve non vertex pozisyonunda idi.

**Sonuç:** Umbilikal kord prolapsusu, PPRM sonrası genel obstetrik popülasyon ile karşılaştırıldığında daha siktir. Klinisyenler, PPRM sonrası hastaların takibinde, özellikle erken gebelik haftalarında, transvers situs ve non-verteks prezentasyon halinde ve rüptür sonrası ilk haftada daha dikkatli olmalıdırlar.

**Anahtar Kelimeler:** Malprezentasyon, Preterm erken membran rüptürü, Umbilikal kord prolapsusu

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## Introduction

Umbilical cord prolapse is an emergent obstetric problem which can result in a significant perinatal mortality or long-term neurological morbidity. Prolapse of the cord leads to compression and/or spasm of the fetal vessels from contact irritation and local temperature changes and may result to fetal circulatory compromise, fetal hypoxia, acidosis, brain damage, and intrauterine fetal or early neonatal death (1, 2). Incidence in live births is reported as 0.16 to 0.18 percent in large studies (2, 3). The incidence is reported as 0.47% in 16,874 live births at a study from Turkey and they reported that fetal abnormal presentation, multiparity, low birth weight, prematurity, polyhydramnios, and spontaneous rupture of membranes, especially with high Bishop scores were the major risk factors for umbilical cord prolapse (4). Prematurely delivering infants have a higher risk for umbilical cord prolapse, due to the smaller fetus relative to the amniotic fluid volume and the higher incidence of malpresentation among premature fetuses (5). Multiparity, as a risk factor may be associated with the increased likelihood of rupture of membranes prior to engagement of fetal presenting part, since engagement in multiparas often occurs after labor has begun and later than in nulliparas (6).

Preterm premature rupture of membranes (PPROM) refers to membrane rupture earlier to the onset of labor prior 37 weeks of gestation. It is the cause of approximately one-third of preterm births and the single most common identifiable factor associated with prematurity. PPRM occurs in 3 percent of pregnancies. Also, 0.5 percent of these are pregnancies are at <27 weeks gestation and one percent are at 27 to 34 weeks gestation (7). Conservative management is the preferred management strategy at PPRM when the pregnancy is between 24-34weeks gestation. During follow-up of patients after PPRM, patients are at any time subject to experiencing lots of complications, maternal and fetal, including chorioamnionitis,

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placental abruption and preterm birth secondary to preterm labor alone. Also umbilical cord prolapse is an expected complication due to ruptured membranes and preterm babies (8).

In this study, we aimed to analyze the umbilical cord prolapse rates in PPRM patients between 24 weeks and 33 weeks and 6 days of gestation, being followed in our perinatal medicine inpatient clinic and to describe the associated factors with umbilical cord prolapse.

### **Material and methods**

This retrospective descriptive study is conducted in Department of Obstetrics and Gynecology, Maternal-Fetal Medicine Unit, Sanliurfa Education and Research Hospital, Sanliurfa, Turkey. Retrospectively collected data is acquired from patients who have been hospitalized due to PPRM between 24 weeks and 33 weeks and 6 days gestation, between September 2017 and June 2018. The unit is a busy tertiary centre at east of Turkey getting referral patients from the region with approximately 40000-45000 deliveries in a year. Approval and permission for the study about provision of patient data is taken from institutional board. The patients included in the study are all inpatients and are followed in perinatal clinic. Patients who are delivered due to indications not related to PPRM, like severe preeclampsia or abnormal obstetrical Doppler are not included in the study. If delivery is started spontaneously in 24 hours after membrane rupture, they are defined as preterm labor and were not included in the study. All patients were followed in clinic up to 34th gestational week unless there was an additional indication of termination. The diagnosis of overt umbilical cord prolapse is based on visualization or palpation of the umbilical cord ahead of the presenting part.

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Demographic data of patients, gestational age at hospitalization, fetal presentation at admission, delivery time, delivery indications and total follow-up time to delivery of each case are recorded. Cord prolapse rate is calculated and also patient specific factors associated with cord prolapse are evaluated.

### Results

During this period total 107 pregnant patients were admitted for preterm premature membrane rupture between 24 weeks and 33 weeks and 6 days gestation. 14 patients rejected hospitalization and were discharged prior to 34th gestational week. Three patients were delivered due to abnormal umbilical artery Doppler and fetal growth retardation. Two patients were delivered due to severe preeclampsia and they are excluded from the study. Total 88 patients are included in this study. Three of these were twin pregnancies. The other 85 were singleton. Mean maternal age was  $29\pm 4.8$  years. Median gravida was three (1-8). Mean body mass index was 26.3. Median gestational age at hospitalization was 30 weeks (24-33 weeks). 48 of presented fetuses were at vertex presentation at admission to hospital. 19 were at breech presentation and 21 were at transverse situs. Mean follow-up time to delivery was  $6.9\pm 3.8$  days (2 - 37 days). Delivery indications and distribution are reported in **Table 1**. 17 patients have been followed up to 34th weeks. The delivery started spontaneously or verified by cesarean section due to complications before 34th weeks at 71 patients. Three patients were delivered due to umbilical cord prolapse. The data of patients with umbilical cord prolapse are reported in **Table 2**. 47 patients are delivered vaginally and 41 patients are delivered by cesarean section, 25 of them due to previous cesarean section history. All babies are delivered alive, no intrauterine fetal death have been resulted.

**Table 1:** Delivery indications, delivery type and distribution of patients

Delivery indications	Number of patients	Vaginal delivery / Cesarean section	Gestational age at delivery (median)
Spontaneous Labor	55	36 / 19	31 (25-33 weeks)
34th week of gestation (elective)	17	10 / 7	34 weeks
Fetal distress	7	0 / 7	32 (30-33 weeks)
Placental abruption	4	0 / 4	31 (29-32 weeks)
Umbilical cord prolapse	3	0 / 3	28 (27-28 weeks)
Chorioamnionitis	2	0 / 2	29 (28-30 weeks)

**Table 2:** Distribution of patients with umbilical cord prolapse

	Fetus presentation	GA at delivery	Gravida	Number of fetuses	BMI	Follow-up time to Delivery (days)
Case 1	Transverse situs	28	6	Singleton	28	6
Case 2	Transverse situs	28	3	Singleton	24	4
Case 3	Breech presentation	27	2	Twins	21	5

**Abbreviations:** Gestational age (GA); body mass index (BMI)

## Discussion

In this study umbilical cord prolapse rate was 3.4% in 88 PPROM patients between 24 weeks and 33 weeks and 6 days of gestation. This rate seems significantly higher than the general incidence at live births. Malpresentation and higher prematurity were the primary associated factors with umbilical cord prolapse after PPROM patients at follow-up.

Prematurely delivering infants have a higher rate of umbilical cord prolapse, probably due to the smaller fetus compared to amniotic fluid volume and the increased frequency of malpresentation among premature fetuses (6, 9). In this study, median gestational age at delivery was 31 weeks; but in cord prolapse indicated patients, that was 28 weeks. This shows the association of membrane rupture at earlier gestational ages with umbilical cord prolapse. The higher gestational age seems to be protective against umbilical cord prolapse.

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The higher risk of umbilical cord prolapse at multiparas seems to be associated with natural course of labor. Membrane rupture occurs prior to engagement of presenting part more frequently at multiparas. In one report of 30 patients with cord prolapse, two-thirds of the women were para six or more and one patient experienced cord prolapse in two successive deliveries (9). In this study, all cord prolapse cases were multipara but this cannot be attributed to multiparity because median parity was three in the study. The higher risk of umbilical cord prolapse in multiple gestations is confined to the non-presenting fetuses, in which malpresentation is more common (10). One of the total three twin pregnancies resulted with cord prolapse in the study. Because malpresentation of one fetus is more frequent at multiple gestations, multiple gestations have higher risk for umbilical cord prolapse after PPRM.

Malpresentation is the most important factor associated with cord prolapse. In one review, the overall frequency of cord prolapse in vertex, breech, and transverse lies was 0.24, 3.5, and 9.6 percent, respectively in live births at all gestational ages. Nevertheless, most cord prolapses occur with vertex presentations because of the relatively low incidence of non-cephalic presentations in live term births. But due to higher incidence of malpresentation and abnormal situs in preterm gestations, malpresentation is the most influential factor on umbilical cord prolapse after PPRM. Two of cases were in breech presentation and the other one was at transverse situs in the study. All were at non-vertex presentation.

Mean follow-up time was 7 days and maximum followed patient was followed for 37 days up to 34th week of gestation. All cord prolapses occurred in the first week after admission and mean follow-up time was five days at patients complicated with cord prolapse. The first week after membrane rupture seems to be the most risky time for cord prolapse after PPRM.

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Neonatal outcomes are prominently better after cord prolapse if the it occurs while in clinic at the hospital, whereas if it occurs at home or outside, the morbidity and mortality are both higher. 18-fold increase in perinatal mortality is reported if umbilical cord prolapse occurs outside the hospital, even compared with an unmonitored fetus whose cord prolapsed while in the hospital (11).

To best our knowledge, this is the first study evaluating the umbilical cord prolapse rates and associated risk factors after follow-up of PPRM patients, especially at 24 weeks and 33 weeks and 6 days of gestation. This is major strengths of the present study. But limitations of the study are its retrospective design and small study population.

### **Conclusion**

In conclusion, umbilical cord prolapse risk factors are generally unmodifiable, but awareness of patients at high risk about the situation, may provide to make the diagnosis quickly and emergent delivery when prolapse occurs. Especially women with malpresentation should be educated about the signs, symptoms, and management of cord prolapse and instruct them to call their provider upon spontaneous rupture of membranes or the onset of labor.

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