

# The influence of health-seeking behavior on the incidence and perinatal outcome of umbilical cord prolapse in Nigeria

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**Objectives:** To determine the influence of health-seeking behavior of urban women in South-West Nigeria on the incidence and perinatal outcome of umbilical cord prolapse (UCP).

**Methods:** A retrospective study comparing two groups of urban women using information extracted from medical records of patients who had UCP, and were managed at the University College Hospital Ibadan, Nigeria from January 1st 1995 to December 31st 2005. The data was analyzed using SPSS software (version 15). Analysis included simple tabulation, proportion and comparison of incidence, perinatal morbidity, and mortality of UCP between the two groups of women using Chi-square or Fisher's exact test. Odds ratio (OR) and 95% confidence intervals (CI) were calculated whenever necessary. *P*-value of 0.05 or less was statistically significant.

**Results:** Women without prenatal care were more likely to have fetuses with UCP (54, 75%), than in women who had prenatal care (18, 25%). The risk of perinatal death from UCP was higher in women without prenatal care, as compared with those who received prenatal care (OR 3.02, 95% CI: 0.879 to 10.356; *P*-value = 0.061). The risk of perinatal morbidity and neonatal intensive care admission was also higher among women without prenatal care as compared with women who received prenatal care (OR 4.09, 95% CI: 1.03 to 16.30; *P*-value = 0.041). The overall perinatal mortality rate in the study population was 403 per 1000 total births, and this was five times more than that of the hospital perinatal mortality rate of 80 per 1000 total births during the study period. The perinatal mortality rate was higher among women without prenatal care, 463 per 1000 total births, as compared with 222 per 1000 total births in women who received prenatal care. Perinatal death before arrival at the hospital is less likely to occur in women with prenatal care when compared with women without prenatal care (OR 0.0635; 95% CI: 0.0052 to 0.776; *P*-value = 0.03).

**Conclusion:** A high index of suspicion and an identification of risk factors, with early diagnosis, prompt intervention, and provision of health care facilities can reduce the incidence and poor outcome of UCP in developing countries.

**Keywords:** prenatal care, incidence, apgar scores, perinatal morbidity, perinatal mortality

## Introduction

The umbilicus forms a major connection between the fetus and the placenta. It plays a major role in the exchange of nutrients, gases, and metabolites between the mother and the fetus.

Prolapse of the umbilical cord is a condition in which the umbilical cord lies beside or below the presenting part following rupture of the fetal membranes.<sup>1,2</sup> It is called cord presentation when the fetal membranes are still intact.<sup>1,2</sup>

Umbilical cord prolapse (UCP) is a rare obstetric emergency with life-threatening consequences to the fetus. It can result in serious obstetric complications that

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significantly affect fetal health. The outcome of UCP is highly dependent on the speed and appropriateness of the intervention offered.<sup>3</sup> The risks to the mother often arise as a result of problems associated with the kind of intervention, such as cesarean section, used to rescue the baby.<sup>4</sup> There is, however, an increase risk of fetal brain damage or death arising from acute hypoxia in cases of UCP, with a perinatal mortality rate of 9% to 49%.<sup>5,6</sup> Having said that, the perinatal mortality rate associated with cord presentation is however slightly lower than in UCP.<sup>2,7</sup>

The incidence of cord prolapse has remained unchanged over a period of years, varying from 0.20% to 0.50%, or 1 in 200 to 1 in 500 deliveries. However, the perinatal mortality rate has fallen to between 36 and 162 per 1000 births within the past few decades, due to immediate delivery by cesarean section and improved neonatal intensive care facilities.<sup>1,8,9</sup> Unfortunately, there is still a significantly higher rate of perinatal mortality in developing countries, as compared with developed countries, as a result of poor obstetric care and utilization of available health facilities.

The etiology of cord prolapse is usually multifactorial,<sup>10,11</sup> however breech presentation is the commonest single cause, accounting for 40%–50% of cases, especially flexed breech.<sup>10,12</sup> Apart from breech presentation, other conditions that interfere with close application of the presenting part to the lower segment of the uterus and the pelvic brim also predispose to cord prolapse.<sup>13,14</sup> These conditions include prematurity <37 weeks; low birth weight <2.5 kg; transverse, oblique, and unstable lie; congenital abnormality of the uterus and pelvis; multiple pregnancy, especially the second twin; low placenta and other abnormal placentations; polyhydramnios; and uterine fibroids.<sup>1,13</sup> lack of close application of the presenting part can also result from obstetric manipulations such as external cephalic version, internal podalic version of the second twin, manual rotation, placement of an intrauterine pressure catheter and artificial rupture of membranes with an unengaged presenting part, amniotomy, abnormality of the umbilical cord, fetus of male gender, and fetal hypotonia.<sup>13</sup>

There are two types of UCP: overt and occult UCP. In overt cord prolapse, the cord is beyond the fetal presenting part and the fetal membranes are invariably ruptured. However, in occult UCP, the cord is alongside, but not past, the fetal membranes, which are either ruptured or intact. Perinatal morbidity and mortality in cord prolapse occurs as a result of compression of the umbilical cord by the presenting part and/or spasm of the cord vessels due to drop in temperature between intrauterine and extravaginal environment;<sup>9</sup> hence the

need to prevent cord compression by the presenting part, and also replacement of the cord within the vagina before definitive management.<sup>15,16</sup> Immediate delivery is the ideal if the fetus is alive and sufficiently mature as fetal survival depends on the time interval between diagnosis and delivery.<sup>17–21</sup> Measures that can be taken before delivery include immediate resuscitative intervention (such as calling for assistance); venous access; minimal handling of the cord outside the vagina to prevent vasospasm (including the use of surgical packs soaked in warm saline); elevating the presenting part manually, or by instilling 500–750 mL of saline to prevent cord compression; and changing maternal position to knee-chest or a head-down tilt, preferably in left-lateral position. Excessive displacement of the presenting part may encourage more cord prolapse.<sup>15–17</sup> Removal of the hand once the presenting part is above the pelvic brim and applies continuous suprapubic pressure. Tocolysis can be considered while preparing for cesarean section if there are persistent fetal heart rate abnormalities despite attempts to prevent compression mechanically, and when delivery is likely to be delayed.

The justification for this study is borne out of the observation of increasing utilization of alternative unorthodox obstetric services among pregnant urban women in Nigeria, such as mission homes, and the associated obstetric sequelae. Most of the catastrophic obstetric complications that are observed occur among this group, primarily as a result of failing to arrive early enough at the hospital to seek appropriate intervention. Most of the leading causes of both maternal and perinatal morbidity and mortality need early diagnosis, along with prompt and appropriate intervention. UCP falls into this category of requiring prompt delivery in order to successfully salvage the baby. In light of this, a retrospective study was conducted in order to determine the influence of prenatal care and health-seeking behaviors on the incidence and perinatal outcome of UCP.

## Materials and methods

This is a tertiary hospital based retrospective study designed to determine how health-seeking behavior affects the incidence and the perinatal outcome of UCP in South West Nigeria.

The study period was from January 1, 1995 to December 31, 2005, covering 78 cases of UCP that were seen at the University College Hospital, Ibadan, Nigeria. Six cases were excluded from the analysis because the medical records contained inadequate information.

Information of the remaining 72 cases of UCP was obtained from the labor and delivery register and the relevant

case notes retrieved from the hospital medical records. Adequate prenatal care was defined as consisting of at least four prenatal visits in the index pregnancy and/or at least one prenatal visit within the 2–4 weeks preceding the occurrence of UCP. Inadequate prenatal, or no prenatal care, is defined as poor compliance with prenatal clinic visits or nonattendance at the prenatal clinic in the four weeks preceding occurrence of cord prolapse. Data such as age, prenatal care status, mode of delivery, and perinatal outcomes, Apgar scores, admission to neonatal intensive care unit, and timing of perinatal death were obtained and entered into a computer running Statistical Package for Social Science (Version 15 for Windows; SPSS Inc. Chicago, IL, USA). These were analyzed using simple tabulations and proportions. Comparison of the incidence of UCP and perinatal morbidity and mortality between women who received adequate prenatal care, and women who did not, were determined using Chi-square and Fisher's exact test. Odds ratio (OR) at 95% confidence intervals (CI) was calculated to determine the impact of utilization of prenatal care facilities on the incidence and perinatal morbidity and mortality of UCP. *P*-values less than or equal to 0.05 were adduced as statistically significant.

## Results

During the study period there were 16,566 deliveries in this hospital, and 78 cases of UCP were managed, giving a crude incidence rate of 0.47%, or 1 in 212 deliveries.

Table 1 shows age group distribution and prenatal care status of patients presenting with UCP from 1995 to 2005 at the University College Hospital, Ibadan, Nigeria. It shows that the age of the patients varied between 15 years and 40 years, and that the highest prevalence was in the 25–34-year-old age group. The mean age was 29.2 years. There were 54 patients (75%) without prenatal care by trained health care personnel, and 18 patients (25%) with prenatal care who had UCP and were treated in the labor and delivery facilities of University College Hospital, Ibadan, during the study period.

**Table 1** Demographic data of incidence of umbilical cord prolapse in women with and without prenatal care

Age in years	Prenatal care	No prenatal care	Total
15–24	5	11	16
25–34	8	33	41
≥35	5	10	15
Total	18 (25%)	54 (75%)	72

**Notes:** Chi square: 1.55; Degree of freedom: 2; *P*-Value: 0.461; There is no statistical significant difference in the age group of women with and without prenatal care in regards to incidence of umbilical cord prolapse.

Table 2 shows mode of delivery and prenatal care status. Thirty-six (or 50% of cases) were delivered by emergency cesarean section, and nine (or 12.5%) had assisted vaginal delivery. Spontaneous vaginal delivery was allowed in 12 cases (16.7%) in which 10 fetuses were dead. Two live babies were delivered spontaneously vaginally before operative delivery could be carried out.

Table 3 shows neonatal outcomes between women with, and without, prenatal care. There were 29 perinatal deaths overall, with 25 perinatal deaths (86.2%) occurring in women without prenatal care, compared with four perinatal deaths (16.8%) in women with prenatal care. The perinatal mortality among women without prenatal care was higher; 25 (46.3%) without prenatal care as compared with 4 (22.2%) in women with prenatal care.

Table 4 shows the Apgar scores at 5 minutes of the 43 surviving babies and the prenatal status of their mothers. Twenty-one babies (49%) had Apgar scores at 5 minutes of greater than 7, and did not require neonatal intensive care admission; this was almost equally divided between women with prenatal care and those without. However, 22 babies (51%) had Apgar scores at 5 minutes of less than 7; most of them needed neonatal intensive care admission. Of these, 4 babies (18.2%) were from mothers who had prenatal care, and 18 babies (81.2%) from women who had not had prenatal care. There is a higher proportion of perinatal morbidity (defined by Apgar scores at 5 minutes of less than 7) in women with no prenatal care.

Table 5 shows the timing of perinatal death and the maternal prenatal status. A majority of the perinatal deaths – 22 in total or 76% – probably occurred before the arrival of the patients to the hospital, and were diagnosed at presentation. However, seven perinatal deaths (24%) occurred

**Table 2** Comparison of modes of delivery between women with prenatal care and without prenatal care with umbilical cord prolapse

Mode of delivery	Prenatal care	No prenatal care	Total
Emergency cesarean section	10	26	36
Forceps or vacuum delivery	4	5	9
Assisted vaginal breech delivery	1	6	7
Spontaneous vaginal delivery	2	10	12
Destructive operation	1	7	8
Total	18	54	72

**Notes:** Chi square: 3.5; degree of freedom: 4 and *P*-value: 0.478; There is no statistical significant difference in the mode of delivery between women with prenatal care and without prenatal care.

**Table 3** The perinatal outcome between women with prenatal care and without prenatal care

Perinatal outcome	Prenatal care	No prenatal care	Total
Surviving beyond perinatal period	14	29	43
Perinatal death	4	25	29
Total	18	54	72

**Notes:** P-value: 0.61, not statistically significant. The relative risk of perinatal death is 3.02, 95% CI (0.879 to 10.356) at a P-value of 0.061. However, there is no statistical significant difference of perinatal death between women who had inadequate prenatal visits compared with women who received adequate prenatal care.

**Abbreviation:** CI: Confidence interval.

in hospitalized patients. Among the perinatal deaths on arrival, 21 (95.5%) occurred in women without prenatal care as compared to one perinatal death (4.5%) in women with prenatal care.

## Discussion

The presence of the umbilical cord in the birth canal or fornices, either by prolapse or presentation, is a potential obstetric catastrophe for the fetus, and a cause of significant concern to the mother, labor and delivery staff. However, awareness of high-risk patients in the prenatal clinic visits may help facilitate speedy diagnosis and delivery if prolapse occurs. Women with transverse, oblique or unstable lie should be offered elective admission to hospital at 37 + 6 weeks of gestation, or sooner if there are signs of labor or suspicious of ruptured membranes. Even more so, women with noncephalic presentation and preterm prelabor rupture of the membranes should be offered admission. In-patient care will minimize delay in diagnosis and management of UCP. Labor or rupture of the membranes with a fetus in an abnormal lie is an indication for cesarean section. Bradycardia and variable decelerations of fetal heart rate are associated with cord prolapse, and their presence should prompt vaginal or speculum examination, regardless of gestational age, in order to diagnose UCP.

**Table 4** Apgar scores of surviving babies between women with prenatal care and no prenatal care with umbilical cord prolapse

Apgar scores	Prenatal care	No prenatal care	Total
Apgar scores in 5 minutes $\geq$ 7	10 (71.4%)	11 (37.9%)	21 (48.8%)
Apgar scores in 5 minutes < 7	4 (28.6%)	18 (62.1%)	22 (51.2%)
Total	14	29	43

**Notes:** The relative risk of perinatal morbidity and neonatal intensive care unit admission is 4.09, 95% CI (1.03 to 16.30) at a P-value of 0.041. There is a statistical significant difference of Apgar scores at 5 minutes between babies of women with prenatal care and without prenatal care.

**Abbreviation:** CI: Confidence interval

**Table 5** Comparison of timing of perinatal death between women with prenatal care and without prenatal care with umbilical cord prolapse

Timing of perinatal death	Prenatal care	No prenatal care	Total
Perinatal death before arrival in hospital	1	21	22
Perinatal care in hospital	3	4	7
Total	4	25	29

**Notes:** The odds ratio of perinatal death before arrival in hospital is 0.0635: 95% confidence interval (0.0052 to 0.776) at P-value of 0.03 between women with prenatal care and without prenatal care. There is a statistical significant difference between women with prenatal care and without in regards to timing of perinatal death.

The incidence of UCP varies widely in many places.<sup>5,22</sup> The prevalence of 0.47% (1 in 212 deliveries) in this study is comparable to other studies of 1 in 385, 1 in 277, and 1 in 426 deliveries.<sup>5,12,22</sup> It also falls within the range of 1 in 200–500 deliveries reported in similar studies elsewhere.<sup>8,9,23</sup> Moreover, this study showed that the risk of UCP was three times higher among women with inadequate or no prenatal care as compared with those who had routine prenatal care visits.

When cord prolapse occurs, immediate delivery is the ideal if the fetus is alive and viable.<sup>7,20,21</sup> The choice of mode of delivery and the promptness of attention are extremely important, since both factors are important determinants in the fetal and maternal outcome.<sup>24</sup>

In this study 50 fetuses (69.4%) were alive at the time of presentation; 36 (72.0%) were delivered by emergency cesarean section, 9 (18.0%) had assisted vaginal delivery by obstetric forceps or vacuum extraction. Cesarean section has been widely advocated in cases of UCP, especially if the fetus is alive, so as to reduce perinatal morbidity and mortality.<sup>10,13,25</sup> The cesarean section rate in this study was 50%, as against the hospital cesarean section rate during the study period of 18.5%. These cases were operated on either because the cervix was not fully dilated<sup>10</sup> to allow assisted vaginal delivery, or for strictly obstetric indications.<sup>25</sup> Though the cesarean section rate for cord prolapse in this study is about three times that of hospital rate for same period, it is comparable to cesarean section rates for UCP in other studies.<sup>26</sup>

There is still a place for vaginal delivery in UCP in selected cases when the fetus is alive, especially if the cervix is fully dilated and delivery is imminent. This is well demonstrated in this study where nine deliveries (12.5%) were accomplished by assisted vaginal delivery. This mode of delivery should be considered as alternative to cesarean section when the condition is suitable without compromising

the mother and the baby. This is of utmost importance in developing countries where there is strong aversion to cesarean section in a majority of the patients, prolonged decision-to-delivery interval, and high rates of loss to follow up. Some of the cesarean section patients may choose to use mission homes and traditional birth attendants in their subsequent pregnancies for prenatal care and deliveries in order to avoid repeat cesarean sections. These decisions may result in uterine rupture and its associated sequelae.

Spontaneous vaginal delivery occurred in 12 cases (16.7%) in this series because most of the fetuses were dead, and there were no contraindications to vaginal delivery.

The prognosis for the fetus depends on a number of factors, which include the gestational age, duration of cord prolapse before intervention, stage of labour, rapidity, efficiency of first aid, definitive management, and effective neonatal intensive care.<sup>20, 27–29</sup> The risk of perinatal morbidity and neonatal intensive care unit admission (as judged by the presence of 5-minute Apgar scores of less than 7) was statistically significantly higher among women without prenatal care, as compared with women with prenatal care (OR 4.09, 95% CI: 1.03 to 16.30;  $P$ -value = 0.041).

The perinatal mortality rate varies between patients with prenatal care and those without prenatal care. The overall perinatal death in this study was 29, of which 25 (86.2%) occurred among women without prenatal care while 4 (13.8%) occurred in women with adequate prenatal care visits. However, there was no statistically significant difference in the risk of perinatal death between women with prenatal care and those without (OR 3.02, 95% CI: 0.879 to 10.356;  $P$ -value = 0.061). The proportion of perinatal death among viable fetuses with UCP was 40.3% in this study. Hence, the perinatal mortality rate in the study population was 403 per 1000 total births; five times higher than the overall hospital perinatal mortality rate of 80 per 1000 total births during the study period.<sup>7</sup> The perinatal mortality rate was higher among women without prenatal care (463 per 1000 total births), as compared to women with adequate prenatal care (222 per 1000 total births).

The risk of perinatal death before arrival at hospital is less in women with prenatal care than in women without prenatal care (OR 0.0635; 95% CI: 0.0052 to 0.776;  $P$ -value = 0.03). Women with adequate prenatal care are more likely to be knowledgeable about the danger signals of pregnancy, and present early to the hospital as soon as they sense that there are problems. However, women without prenatal care may try other unorthodox options, such as mission homes and/or uncertified traditional birth attendants in the community,

before presenting to the hospital. This may explain why they have a higher proportion of perinatal death on arrival at the hospital, as compared with women who had adequate prenatal care.

Debriefing should be offered to all women with UCP by a suitably trained professional to reduce psychological disorders such as postnatal depression, post-traumatic stress disorders, or fear of further childbirth. They should also be counselled to utilize prenatal services and seek help whenever necessary in their next pregnancy.

## Conclusion

It is obvious from this study that the risk of UCP is higher among women who have poor prenatal care, constituting 75% of the study population. Therefore, provision of efficient, accessible, and affordable prenatal care services would help reduce the incidence of cord prolapse in our clinical environment, and also decrease the associated perinatal morbidity and mortality.

The prevention and reduction of perinatal morbidity and mortality associated with UCP depends on making antenatal care services readily and easily available in areas where they are most needed. Therefore the various conditions that predispose to UCP should be identified early during prenatal visits, where prompt and appropriate remedies can be instituted. Most women who did not receive prenatal care often delayed seeking help when UCP occurred. However, women who received prenatal care often present promptly to the hospital, where they usually received prenatal care, or to the nearest available health facilities to seek help.

An early resort to cesarean section, proper and effective prenatal care, and properly supervised hospital delivery are recommended to reduce or prevent the complications associated with cord prolapse.

## Disclosure

The authors report no conflicts of interest in this work.

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