Results of delivery in umbilical cord prolapse

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ABSTRACT

Objective: To review the peripartum clinical course of patients whose pregnancies were complicated by umbilical cord prolapse and to evaluate its impact on neonatal outcome.

Methods: All cases of cord prolapse managed in King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia between 1990-2000 were identified. There were 111 patients identified among 55,789 deliveries. Each maternal and fetal chart was reviewed for parity, age, gestational age, fetal presentation, status of membranes, time from diagnosis to delivery, mode of delivery, baby weight, Apgar scores and cord blood hydrogen ion concentration (PH). The data collected was analyzed using Gold Stat Software Package, and statistical significance was established by using analysis of variance and Chi-square.

Results: The incidence of cord prolapse was found to be one in 503 cases (1.99 per thousand deliveries) in our study. Seventy-two (64.9%) of the fetuses were in vertex presentation and 39 (35.1%) were non-vertex, including breech and transverse presentations. Ninety one point nine percent were singletons and 8% were twins. At the time of diagnosis in 15 (13.5%) membranes were artificially ruptured and in 96 (86.5%), they were spontaneously ruptured. The cervix was fully dilated in 10% and minimally dilated in 100 (90%). Regarding mode of delivery, 7 (6.5%) were vaginal deliveries and 104 (93.5%) were cesarean sections. The interval from diagnosis to delivery ranged from 10 minutes to >20 minutes. Six (5.4%) of the babies were delivered in 10 minutes, 49 (44.1%) in 20 minutes and 56 (50.5%) in more than 20 minutes. Apgar score was less than 7 in 44 (39.6%) of the babies at one minute and in 5 (4.5%) of the babies at 5 minutes. Cord PH was less than 7 in 2 (1.8%) cases and more than 7 in 109 (98.2%). Forty-one (36.9%) of the babies were admitted in neonatal intensive care unit. There was no perinatal mortality in our study group.

Conclusion: In our review, we found that cord prolapse is not associated with higher rates of perinatal mortality or morbidity and our study supports clinical management of cord prolapse by cesarean section. The interval from diagnosis to delivery may not be the only determinant of neonatal outcome.

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Prolapse of the umbilical cord is a rare obstetric emergency occurring with a reported incidence of one in 200-700 births.[1-3] Perinatal mortality due to a cord prolapse is reported to be between 3.5% and 19%.[3] A number of unavoidable risk factors have been reported to be associated with the cord prolapse, they include malpresentation, multiple gestation, prematurity, multiparity, premature rupture of membranes, polyhydramnios and small fetus.[2-5] Prompt diagnosis and immediate delivery of the fetus are essential to reduce perinatal mortality and morbidity.[6,7] Since blood flow to the fetus through the prolapsed cord is restricted, several maneuvers have been reported to alleviate cord compression for optimal fetal outcome.[6] These include elevation of the presenting part above the pelvic brim manually or by bladder filling with 500-700 ml of sterile saline and with administration of a tocolytic agent.[6,8,9] Despite emergency delivery, cord prolapse leads to

significant perinatal morbidity and it has been reported that former maneuvers may prove beneficial in lowering incidence of neonatal asphyxia.[10] The present study was undertaken to find the incidence of cord-prolapse at our teaching hospital in the Kingdom of Saudi Arabia, (KSA) to evaluate the peripartum factors related to cord prolapse and its impact on neonatal outcome.

Methods. All cases of cord prolapse identified in King Khalid University Hospital, Riyadh, KSA, between 1990-2000 were included in the study. There were 111 cases of cord prolapse among 55,789 deliveries. Data pertaining to maternal age, parity, gestational age at delivery, fetal presentation, status of membranes, interval from diagnosis to delivery, baby weight, apgar scores and cord blood hydrogen ion concentration (PH) were retrieved from medical charts.

The diagnosis of cord prolapse was made by palpating the cord and from the severe decelerations of the fetal heart rate recorded during monitoring. Appropriate maneuvers were employed to diminish cord compression. The status of cervix at the diagnosis of cord prolapse whether fully or minimally dilated was also noted. To study the impact of the diagnosis to delivery interval on certain peripartum factors and neonatal outcome, the cases were grouped into those delivered at 10, 20 or >20 minutes, after the diagnosis was made. Also, comparison was made between preterm, and term cases of cord prolapse. In case of twin pregnancies, only the twin with prolapsed cord was included in the study.

The statistical analysis of the data was carried out using Stat Pac Gold Software Package and significance was established by using Chi-square and one way analysis of variance.

Results. The incidence of cord prolapse was found to be 1 in 503 cases (1.99/1000 cases) in our study. The demographic, intrapartum and neonatal characteristics of the study group of 111 cases is summarized in **Table 1**. Regarding maternal age, it was found that fewer numbers of women belonged to younger and older age groups; a greater number 57 (51.4%) belonged to medium age group of 26-35 years. The mean age was 31.6 ± 6.28. Ten (9%) of them were primigravidas and of the remaining multigravida, 19 (17.1%) were grand multipara. Of the total of 111 cases, 31 (27.9%) were preterm pregnancies <37 weeks of gestation. Seventy-two (64.9%) of the fetuses were in vertex presentation and 39 (35.1%) were non-vertex including breech and transverse presentations. One hundred and two babies (91.9%) were singletons and 9 (8.1%) were twins. At the time of diagnosis of cord prolapse, in 15 (13.5%) of the cases, the membranes were artificially ruptured and in 96 (86.5%), they were spontaneously ruptured. The cervix was fully dilated in 11 (10%) cases and minimally dilated in 100 (90%). Labor was spontaneous in 100 (90%) and induced in 11 (10%)

Table 1 - Demographic, intrapartum and neonatal characteristics of cord prolapse cases.

Characteristics	n	(%)
Maternal age (years)		
<25	20	(18)
26-35	57	(51.4)
>35	34	(30.6)
Gestational age (weeks)		
<37 week	31	(27.9)
≥37 weeks	80	(72.1)
Fetal presentation		
Vertex	72	(64.9)
Breech	33	(29.7)
Transverse	6	(5.4)
Parity		
0	10	(9)
1-7	82	(73.9)
>8	19	(17.1)
Fetal number		
Singleton	102	(91.9)
Twin	9	(8.1)
Status of membranes		
Artificially ruptured	15	(13.5)
Spontaneously ruptured	96	(86.5)
Onset of labor		
Spontaneous	100	(90)
Induced	11	(10)
Mode of delivery		
Vaginal	7	(6.5)
Cesarean	104	(93.5)
Cervical dilation		
Fully dilated	11	(10)
Minimally dilated	100	(90)
Time interval from diagnosis to delivery		
10 minutes	6	(5.4)
20 minutes	49	(44.1)
>20 minutes	56	(50.5)
Apgar score (one minute)		
<7	44	(39.6)
≥7	67	(60.3)
Apgar score (5 minutes)		
<7	5	(4.5)
≥7	106	(95.5)
Cord PH		
<7	2	(1.8)
≥7	109	(98.2)
NICU admissions	41	(36.9)

PH - blood hydrogen ion concentration, NICU - neonatal intensive care unit

cases. Regarding mode of delivery, 7 (6.5%) were vaginal deliveries and 104 (93.5%) were cesarean sections. The interval from diagnosis to delivery ranged from 10 minutes to >20 minutes; 6 (5.4%) of the babies were delivered within 10 minutes, 49 (44.1%) within 20 minutes and 56 (50.5%) after more than 20 minutes. The

Table 2 - Comparison of some of the characteristics of preterm and term cord prolapse cases.

Characteristics	Gestational age at delivery (weeks)		p-value
	<37 n=31 mean ± SD	≥37 n=80 mean ± SD	
Maternal age	29.9 ± 6.3	32.2 ± 6.2	0.0849
Baby weight	2061 ± 0.8	3412 ± 0.4	<0.00001
Apgar one minute	5.4 ± 1.9	6.9 ± 1.6	0.0001*
Apgar 5 minutes	7.96 ± 1.3	8.7 ± 1.2	0.0053*
Cord PH	7.1 ± 0.09	7.2 ± 0.1	<0.00001

* - significant, PH - blood hydrogen ion concentration

Table 3 - Different diagnosis to delivery intervals in relation to status of cervix and mode of delivery in cord prolapse cases.

Time from diagnosis to delivery	Mode of delivery		Status of cervix	
	Vaginal n=7 n (%)	C. Section n=104 n (%)	Fully dilated n=111 n (%)	Min. dilated n=100 n (%)
10 mins (n=6)	6 (5.4)	0 (0)	6 (5.4)	0 (0)
20 mins (n=49)	1 (0.9)	48 (43.2)	1 (0.9)	48 (43.2)
>20 mins (n=56)	0 (0)	56 (50.5)	4 (3.7)	52 (46.8)
p-value	<0.00001*		<0.0001*	

* - significant, C - cesarean, Min. minimal

Table 4 - Time from diagnosis to delivery interval in relation to different characteristics.

Characteristics	Time from diagnosis to delivery Mean ± SD			p-value
	10 mins	20 mins	>20 mins	
Age	32.7 ± 7.3	31.2 ± 6.2	31.9 ± 6.3	0.7797
Parity	7.8 ± 2.0	5.2 ± 3.2	5.6 ± 3.0	0.1425
Baby weight	3381 ± 0.7	2831 ± 0.9	3154 ± 0.6	0.0703
Apgar one minute	5.3 ± 3.0	6.2 ± 1.6	6.8 ± 1.7	0.0605
Apgar 5 minutes	7.0 ± 3.5	8.4 ± 0.9	8.7 ± 0.9	0.0073*
Cord PH	7.1 ± 0.2	7.2 ± 0.1	7.2 ± 0.8	0.1399

One way analysis of variance was used* - significant
PH - blood hydrogen ion concentration

mean birth weight of these babies was 3035 ± 0.81 (range 570-4500 gms). Apgar score was <7 in 44 (39.6%) of the babies at one minute and in 5 (4.5%) of the babies at 5 minutes. Cord PH was <7 in 2 (1.8%) cases and >7 in 109 (98.2%) cases. Forty-one (36.9%) of the babies were admitted in neonatal intensive care unit (NICU). However, there was no perinatal mortality in our study group. Maternal age, baby weight, apgar scores and cord PH were compared among the 2 groups; those delivered at <37 weeks and >37 weeks of gestation **(Table 2)**. Baby weight, apgar scores at one and 5 minutes and cord PH differed significantly in these 2 groups.

The mode of delivery and status of cervix was separately analyzed in relation to the 3 groups of diagnosis to delivery interval (10 minutes (min), 20 min, and >20 min). This is presented in **Table 3**. Regarding mode of delivery, it was observed that when the interval was less, there were more vaginal deliveries and less cesarean sections and vice versa. This association between mode of delivery and diagnosis to delivery interval was found to be statistically significant (P <0.05). When the cervix was fully dilated the diagnosis to delivery interval was less and when the cervix was only minimally dilated, this interval was greater. The relation between these 2 was also found to be statistically significant (P <0.05). **Table 4** shows the relation of time from diagnosis to delivery with different treatments (age, parity, baby weight, apgar scores and cord PH). Of all these, significant differences were evident among these groups of different diagnosis to delivery interval, only regarding apgar score at 5 minute (P=0.0073).

Discussion. The incidence of cord prolapse is similar to previous reports.[1,3] In our study population, cord prolapse occurred mostly in middle aged women and in term, vertex and singleton pregnancies, which is in contrast to some of the earlier studies.[2,3,7] However, the high occurrence of cord prolapse in grandmultipara is similar. Most of the cases were in spontaneous labor, and only a few were induced (10%), suggesting that induction of labor does not seem to increase the risk of cord prolapse.[4,11] It has been reported that cord prolapse is associated with higher rates of perinatal morbidity and mortality.[7,12] These have steadily decreased over time as a result of advances in Perinatology and Neonatology. In this study, cord prolapse did not influence perinatal outcome. This could be attributed to the early detection of cord prolapse and appropriate obstetric management. Once the diagnosis of cord prolapse is confirmed, the fetus has to be rapidly delivered, usually by cesarean section.[1,11,13] The higher incidence of cesarean section (93.5%) in our study is justified as an attempt at fetal salvage. Apgar score at 5 minutes, and cord PH, were <7 only in a few cases which are in contrast to study[11] which, showed that cord prolapse increases fetal hypoxemia and asphyxia and although a substantiate

proportion of neonates were admitted to NICU (36.9%), there was no perinatal mortality in our study. This is in accordance with an earlier report that showed that perinatal mortality is less likely to occur among cases delivered by cesarean section.[14] The short diagnosis to delivery interval was the other factor that diminished perinatal mortality and morbidity.[1,11] However, use of analysis of variance to compare the different diagnosis to delivery intervals in terms of perinatal outcome did not show any such association, though apgar score at 5 minute different significantly (P=0.0073) among the 3 groups; higher apgar score was found in group with interval of >20 minutes. This is similar to a study [10] which suggested that since asphyxiated neonate had a shorter time from diagnosis to delivery, this interval may not be the only determinant of neonatal outcome.

Our study also demonstrated that cord prolapse in term pregnancies is associated with a better perinatal outcome compared to preterm pregnancies. This finding is similar to some earlier report[14] which showed that low birth weight and prematurity are strongly associated with a cord prolapse.

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