

Cord complications: associated risk factors and perinatal outcome

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ABSTRACT

Objective: To assess the perinatal outcome in patients with cord presentation and cord prolapse over a period of 2 years and to assess the obstetric risk factors associated with these cord complications. **Design:** Retrospective case study. **Setting:** A tertiary health care centre of India. **Sample:** All cases of cord presentation and cord prolapse diagnosed in the department over a period of 2 years (2009-2010). **Methods:** The information regarding maternal presentation at the time of admission, mode of delivery, and neonatal outcome was retrieved from case sheets of patients available in Medical Record Department. **Maternal factors** in terms of age, parity, gestational age, mode of presentation, mode of delivery were analysed. **Foetal outcome** was assessed by Diagnosis to Delivery Interval, APGAR score at 0 minutes and 5 minutes, foetal weight and need for NICU admission. **Results:** There were 53 cases of cord complications, out of which 7 (13.20%) had cord presentation and 46 (86.80%) had cord prolapse. Among these 46 patients, 11 patients developed cord prolapse in labour room (3 after artificial rupture of membranes and 8 after spontaneous rupture of membranes), rest 34 patients presented in emergency with cord prolapse. There were 79.24% multiparous patients, 16 patients had malpresentations and breech was commonest malpresentation. Forty one patients had positive cord pulsations at the time of admission, all these patients underwent emergency caesarean section and all had live babies. Twelve patients reported to us with absent cord pulsation, 3 among these underwent section for obstructed labour with hand and cord prolapse, rest 9 delivered vaginally. The average DDI was 26.00 minutes, DDI in patients developed cord prolapse in hospital was 18.90 minutes \pm 5.48 minutes, whereas in patients admitted with cord prolapse as emergency, the DDI was 29.34 minutes \pm 6.37 minutes ($p < 0.05$). **Conclusion:** Analysis of the study concluded that the deliv-

ry interval between cord prolapse and delivery of the foetus is very important. Shortening of this interval can decrease neonatal complication at birth and reduce NICU admission.

Keywords: Cord Complications; Perinatal; Caesarean Section

1. INTRODUCTION

Umbilical cord prolapse is a rare obstetric complication usually necessitating emergent delivery. It is life threatening emergency for the foetus as the blood flow through the umbilical vein is compromised by cord compression. The incidence of cord prolapse reported in literature ranges from 0.1% - 0.6% and has remained constant over the last century [1]. A number of unavoidable risk factors have been associated with increased incidence of cord prolapse which include malpresentation, prematurity, multiple gestations, premature rupture of membranes & polyhydramnios. Remarkably high correlation of cord prolapse and obstetric interventions such as foetal scalp electrode application, insertion of intrauterine catheter, induction of labour with artificial rupture of membranes (ARM) is reported. Post natal mortality and morbidity has fallen significantly as a result of advances in management of cord prolapse and NICU care. Diagnosis to Delivery Interval (DDI) of 20 minutes - 30 minutes has been recommended by various international obstetric societies [2,3]. The primary objective of this study was to assess the perinatal outcome in patients of cord prolapse and cord presentation over a period of 2 years. A secondary objective was to assess the obstetric risk factors associated with these cord complications.

2. METHODS

This was a retrospective study conducted at Pt. B D Sharma PGIMS Rohtak, a tertiary health care unit with an average of 11,000 - 12,000 deliveries per year. The information was retrieved from case sheets of patients

available in Medical Record Department. Maternal condition at the time of admission in terms of age, parity, gestational age, foetal presentation, status of membranes and mode of delivery were statistically analysed (Independent sample T test). Different cord complications were defined as follows to made diagnosis. Overt cord prolapse was defined as the descent of the cord through the cervix in to the vagina or onto the vulva. Cord presentation meant the presence of one or more loops of umbilical cord between the fetal presenting part and the fetal membranes overlying the cervical os. At admission, the fetal condition was assessed and those with maturity of >32 weeks and positive cord pulsations were immediately shifted for caesarean section. In these patients, in order to alleviate pressure on cord, the cord was immediately placed high up in vagina, presenting part was elevated simultaneously and bladder filled with 500 ml normal saline (Vago method) [4-10] until the patient was on operating table. Foetal outcome was assessed in terms of neonatal weight, APGAR score at 0 minutes and 5 minutes and NICU admission. Neonatal asphyxia was identified by the pediatrician on clinical grounds. In the patients getting admitted in emergency with complaint of leaking per vaginum for varying duration, it was difficult to comment on exact time of cord prolapse. Thus, Diagnosis to Delivery Interval was calculated as the time between reporting of patient and delivery of the foetus.

3. RESULTS

Amongst 22,681 deliveries over a period of 2 years, 53 cases of umbilical cord complications were identified, giving the incidence of cord complication as 0.23 %. Out of these 53 patients, 18 (33.96%) patients reported to us with intact membranes and 35 (66.07%) patients reported to us with complaints of leaking per vaginum for varying duration and cord prolapse. In 18 patients with intact membranes, 7 had cord presentation, 3 patients developed cord prolapse after artificial rupture of membranes in the labour room and 8 admitted patients developed spontaneous leaking per vaginum leading to cord prolapse. The details regarding patient profile are described in **Table 1**.

Table 2 explains the risk factors of cord prolapse in our study. Malpresentation was the commonest cause and breech was the commonest malpresentation. The cervical dilatation at the time of presentation was <5 cm in 34 (64.11%) and >5 cm in 19 (35.89%) patients.

Table 3 shows about perinatal characteristics in the study. At admission, cord pulsations were present in 41 patients, rest of the fetuses (12) were already dead. All patients with positive cord pulsations were immediately shifted to operation theatre for urgent LSCS and all had live babies. The fetal maturity in these was 32 weeks (1),

33 weeks - 36 weeks (8), rest 32 were >36 weeks. Among these, birth weight of 18 babies was 1.5 kg to 2.5 kg, 23 babies were of 2.6 kg to 3.5 kg, and 2 babies weigh more than 3.6 kg. Apgar score was <5 at first minute in 8 neonates, in 5 neonates it remained <5 at 10 min and they were admitted in NICU. These 5 fetuses were born to mothers who had been admitted as emergencies with cord prolapse.

Of the 12 patients admitted with absent cord pulsations, 3 mothers had presented with obstructed labour and had to be taken up for section for the sake of mother. Rest 9 were delivered vaginally.

Table 1. Characteristic of patients with cord complications.

Characteristics	No. of patients	% of patient
Age group (years)		
<20	03	5.6
21 - 25	37	69.81
>25	13	24.52
Parity		
Nulliparous	11	20.75
multiparous	42	79.24
Gestational age (weeks)		
<37	09	16.98
>37	44	83.01
Presentation		
Vertex	37	69.81
Nonvertex	16	30.18
Cord complications		
Cord presentation	07	13.20
Cord prolapse in hospital	11	20.75
Cord prolapse at admission	35	67.92
Cervical dilatation (cm)		
<5	34	64.15
>5	19	35.84

Table 2. Risk factors for cord prolapse.

Sr. no.	Risk factor	No. of patients	% of patient
1	Multiparity	42	79.24
	Malpresentation	16	30.18
2	Breech	08	15.09
	Transverse lie	04	7.54
	Compound presentation	04	7.54
3	Unengaged head	09	16.98
4	Twins	02	3.77
5	Prematurity	09	16.98
6	Artificial rupture of membranes	03	7.54

Table 3. Perinatal characteristics.

Characteristic	No. of patients	% of patient
Cord pulsations at diagnosis		
Present	41	77.35
Absent	12	22.64
Fetal Maturity		
<28 wks	2	3.77
28 wks - 32 wks	2	3.77
33 wks - 36wks	5	9.43
≥37 wks	44	83.01
Apgar at 1 min.		
<5	10	18.86
>5	31	58.49
Fetal weight at birth(kg)		
<2.5	16	30.18
>2.5	37	69.81
Baby status		
Live	41	77.35
dead	12	22.64
Sex		
Male	35 (2 twins)	66.03
female	20	37.73
Mode of delivery		
Emer. LSCS	44	83.01
NVD	09	16.98
Baby admission		
NICU	5	9.43
With mother	36	67.92

The perinatal mortality in our study was 0.52 per 1000 births. The average DDI in our study was 26.00 minutes. In the patients who had developed leaking in the hospital, the DDI was 18.90 minutes \pm 5.48 minutes with no NICU admission and good Apgar score post delivery; whereas in patients admitted with cord prolapse as emergency, the DDI was 29.34 minutes \pm 6.37 minutes ($p < 0.05$).

4. DISCUSSION

Cord prolapse and cord presentation are the obstetric emergencies that change the management of a simple pregnancy and necessitate urgent delivery. They are associated with high perinatal mortality and morbidity. Successful outcome depends on several maternal and foetal factors. Incidence of cord prolapse in our study was 2.3 per 1000 deliveries. Other studies have reported the incidence of 1.5, 1.4 per 1000 deliveries, 2.7 and 2.8 per 1000 deliveries [2,4-6].

Associated risk factors are those that predispose a woman to have incompletely filled pelvis in the presence

of ruptured membranes. In the present study, the risk factors for cord presentation and cord prolapse were found in 39 (71.07%) patients. Multiparity is associated with increased risk of cord prolapse. It is accounted by the fact that in multipara, the engagement of presenting part occurs late, and as a result with rupture of membranes, cord slips down in vagina. In our study, 79.24% patients were multiparous and 8 (15.09%) were $>P4$. Malpresentations were present in 16 (30.18%) and breech was commonest malpresentation. Prematurity was a cause in 9 (16.98%) patients. Other studies on risk factors associated with cord prolapse have also reported the same factors [7,8].

The perinatal mortality in our study was 0.52 per 1000 births. All these deaths were unavoidable as all had absent cord pulsations at the time of presentation. A few studies reported high perinatal mortality [2,9]. Literature suggests that cord prolapse occurring outside the hospital is consistently associated with a high perinatal mortality rate (38% - 42%). In contrast, cord prolapse in a labour room where patient is under monitoring, the perinatal mortality is very low (0% - 3%).

The cause of fetal distress in cord prolapse is cord compression and urgent caesarean section relieves that compression. Studies revealed that DDI >30 minutes associated with lower Apgar score [1]. In our study DDI was found 26.00 minutes which is well within the recommended range and comparable with other studies reported on cord prolapse. According to international bodies, the time required to perform an emergency cesarean section should not exceed 30 minutes [4]. The ACOG also recommends incision time of 20 minutes - 30 minutes to appropriate emergency caesarean section in patient of cord prolapse. Literature suggests that DDI alone is not the only contributing factor [9-12]. The other factors like degree of cord compression, length of cord prolapsed, prior hypoxia, CTG abnormalities may influence foetal outcome. In spite of widespread prevalence of risk factors of cord prolapse, this problem is very rare. It may be attributed to tone of the cord, its collagenous contents, and its relation to lower segment. Studies also suggest that intrapartum USG in patients prone for developing cord prolapse before ARM may decrease the incidence of cord prolapse [2,4].

The perinatal mortality and morbidity due to cord prolapse has significantly improved over past century as a result of advances in labour management, improved surgical techniques and neonatal intensive care. However, studies have revealed that perinatal outcome can further be improved by a multiprofessional obstetric emergency training sessions [3]. In our study, patients who had developed cord prolapsed in the labor room had average DDI of 18.90 min, and no NICU admission. While pa-

tients, who presented with cord prolapse, had an average DDI of 29.34 min. This may be because of the extra time, required in preparing patient for operation theatre. The literature suggests that the main reason, why units fail to comply with the 30 minutes target, delay in shifting patient to theatre [3]. Thus in order to achieve the advocated DDI of <30 minutes, planned protocols for the management of cord prolapse and the necessary drill of the routine staff to shift the patient on to OT table at the earliest, needs to be strongly followed in the labour rooms.

5. CONCLUSIONS

In our study, we concluded that the delivery interval between cord prolapse and delivery of the foetus is very important. Shortening of this interval can decrease neonatal complication at birth and reduce NICU admission. The preparatory time of patient for operation theatre and her shifting to operation theatre where sister and paramedical staff plays important role, is very crucial for the patient. So, there should be written protocol for the staff, alarming system in labour room to alert the whole team should be there, to decrease DDI and improve neonatal outcome.

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