

# Umbilical Cord Prolapse And Emergency Caesarean Section - A Review Of 25 Cases

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## Abstract

Prolapse of the umbilical cord is an obstetric emergency demanding immediate attention. Delay in management is associated with significant perinatal morbidity and mortality, due mainly to prematurity and birth asphyxia, and occasionally congenital anomalies. We established a "Crash LSCS" protocol within our hospital in June 1997. This was done in order to facilitate the rapid conduct of a caesarean delivery in dire emergencies such as umbilical cord prolapse. This protocol outlined the procedures to be taken in the event of activation, from the method of activation, pre-operative patient preparation to staff response and delivery suite/operating theatre logistics. This paper presents the findings of our initial experience with this protocol in the management of umbilical cord prolapse.

## INTRODUCTION

Prolapse of the umbilical cord is an obstetric emergency demanding immediate attention. Delay in management is associated with significant perinatal morbidity and mortality<sup>1</sup>, due mainly to prematurity and birth asphyxia, and occasionally congenital anomalies<sup>2</sup>.

The main aims of management are an early diagnosis and temporising care through alleviation of compression on the prolapsed cord, carried out until emergency delivery of the baby can be effected. With the identification of risk factors which predispose to the prolapse of the umbilical cord, some cases may be anticipated, diagnosed early, or perhaps even prevented. Risk factors such as malpresentation, polyhydramnios, a high presenting part or a structural anomaly should alert the accoucheur to the increased possibility of cord prolapse.

Alleviation of pressure on the prolapsed cord until delivery can be achieved through measures such as digital disengagement of the presenting part, raising the maternal pelvis or filling of the maternal bladder<sup>3,4</sup>. Most data suggest that if the cervix is not completely dilated, prompt delivery through caesarean section offers the best chance for a favourable fetal outcome<sup>5,6,7</sup>. The time taken to safely achieve such delivery is important in order to limit the duration of cord compression. In such cases, the time taken to achieve the delivery, usually through a caesarean section, is of great importance. The time between the decision to

deliver by caesarean section and the actual delivery of the baby has been termed the "Decision to Delivery" (D-D) interval and guidelines have been drawn up by various international bodies as to what an acceptable interval is. The general consensus appears to favour a D-D interval of less than 20 to 30 minutes. These recommendations have far reaching implications to the planning of the delivery suite layout and obstetrics operating theatre services, particularly in today's climate towards medical litigation.

We established a "Crash LSCS" protocol within our hospital in June 1997. This was done in order to facilitate the rapid conduct of a caesarean delivery in dire emergencies such as umbilical cord prolapse. This protocol outlined the procedures to be taken in the event of activation, from the method of activation, pre-operative patient preparation to staff response and delivery suite/operating theatre logistics. This paper presents the findings of our initial experience with this protocol in the management of umbilical cord prolapse.

## MATERIALS AND METHODS

The aim of this study was to determine the contributory factors to umbilical cord prolapse and evaluate the D-D interval and the maternal and fetal outcome of this condition in our institution. We performed a retrospective review of 25 consecutive emergency caesarean sections for umbilical cord prolapse over a one-year period in our institution. All of these cases were carried out in compliance with our "Crash

caesarean section” protocol.

### **SETTING**

The Delivery Suite is 32 bedded and is staffed by a minimum of 16 midwives, 2 House Officers, 2 Medical Officers and 2 post-Membership Registrars at all times 24 hours a day. During their postings in the Delivery Suite, these personnel are dedicated exclusively to Delivery Suite with no other clinical commitments scheduled.

### **CRASH CAESAREAN SECTION PROTOCOL**

Activation of the protocol is through the hospital switchboard, which has a dedicated “hotline” for this purpose. Activation may be initiated by any staff of Medical Officer grade or higher, upon which an announcement is made over the hospital public address system announcing a “Code Green” in the location of activation. This activation sets in place various chains of events. The medical staff and relevant nursing staff covering the Delivery Suite proceed directly to the patient location to assist in patient preparation. An operating team and an anaesthetic team proceed directly to the Operating Theatre, where a team of OT nursing staff prepares to receive the patient. Similarly a team from the neonatal intensive care unit headed by a specialist neonatologist proceeds directly to the OT to prepare to receive the baby.

All attempts are made to ensure that activation of a “Crash caesarean section” does not compromise the level of care to patients, as the most senior person in each respective team is directly responsible for the conduct of the delivery. This is extended to the area of patients’ rights and informed consent. Efforts are made to explain the circumstances surrounding the emergency to the couple and the need for an urgent delivery.

### **STUDY METHOD**

A retrospective analysis of the 25 consecutive emergency caesarean sections for umbilical cord prolapse in the one year period between May 1997 and April 1998. All case records were retrieved and the relevant information recorded. Patient demographics, antenatal and intrapartum course, the indications for protocol activation, time of decision for activation, delivery time, intra-operative and post-operative complications were captured and studied.

### **RESULTS**

During the study period there were 25 emergency caesarean sections performed for umbilical cord prolapse. This

accounted for 21% of the 118 emergency caesarean sections, 0.74% of a total of 3,371 caesarean sections and corresponded to 0.15% of the 16,267 deliveries in that year.

The median maternal age was 30.6 (range 22-40). Ten patients were primigravida. Thirteen patients had previous normal vaginal deliveries and the remaining two patients had previous caesarean deliveries.

All but one patient had prior antenatal follow-up. However, six patients (24%) booked antenatal care after 28 weeks. The mean gestation at the time of booking was 18.8 weeks. The mean gestation at delivery was 37.2 weeks (30-41 weeks). Seventeen patients (68%) were at term.

### **PREDISPOSING FACTORS**

Antenatal risk factors were evident in 9 cases (36%). One patient had idiopathic polyhydramnios diagnosed at 35 weeks gestation with a cord prolapse after artificial rupture of membranes at 37 weeks. The only twin pregnancy in our series occurred in a patient with bicornuate uterus. She had preterm prelabour rupture of membranes at 35 weeks. The leading twin was a footling breech presenting with a prolapse of the umbilical cord.

There were 7 babies (28%) with breech presentation. Two mothers opted for a trial of vaginal breech delivery following antenatal diagnosis. Of the remaining five patients with unanticipated breech presentation, four had preterm pre-labour rupture of membranes between 34 and 36 weeks which were managed expectantly. They went into spontaneous labour and subsequently developed cord prolapse. The last patient had labour induction at term for pre-eclampsia.

Labour onset was spontaneous in 12 patients (48%). Five patients (20%) were induced and 8 patients (32%) had pre-labour rupture of membranes between 28 to 38 weeks. In 7 cases (28%), umbilical cord prolapse occurred immediately following amniotomy.

Electronic fetal monitoring by cardiotocography aided the diagnosis of umbilical cord prolapse in 7 cases (28%). In these cases, clinical suspicion was aroused and vaginal examination confirmed an umbilical cord prolapse following cardiotocographic changes such as variable decelerations and bradycardia. At the time of the emergency caesarean section, light to moderate meconium-stained liquor was found in 3 cases while clear liquor was found in the remaining cases.

### **OUTCOME**

The mean birth weight was 3005 (range 1610 to 4500) grams. The neonatal outcome was excellent with no perinatal mortality. The mean apgar scores at 5 minutes was 8.8 and none had a score below 7.

Only one baby in our series required neonatal intensive care. The baby was delivered by “Crash caesarean section” at 30 weeks for an umbilical cord prolapse following pre-labour rupture of membranes at 28 weeks managed conservatively with the baby in oblique lie. The child had mild respiratory distress requiring continuous positive airway pressure ventilation in the intensive care unit for 2 days. He subsequently required inpatient care in the neonatal special care nursery for 32 days and was discharged well on the thirty-seventh day of life. The child is presently well, on follow up at his third year of life.

All the emergency caesarean sections were performed under general anaesthesia. The mean diagnosis to delivery interval was 14.6 minutes (range 7-32). There were no significant anesthetic complications such as failed intubation or aspiration pneumonia. There were also no maternal surgical complications from the caesarean sections. The mean post-operative hospital stay was 4.2 (range 2-8) days. Two babies suffered superficial cuts in the course of the caesarean deliveries. Neither required any sutures nor any further follow up.

### **DISCUSSION**

Cord prolapse is an obstetric emergency as delay in management is associated with significantly increased neonatal morbidity and mortality. If the accident occurred outside the hospital, many babies would be dead or severely asphyxiated upon arrival in the hospital. Previous reports suggested that even if the neonates were delivered immediately after cord prolapse, the complication rate remained elevated<sup>2</sup>. This is related to the fact that fetal prematurity and congenital anomalies are major contributory factors. In our series 8 babies (32%) were delivered before 37 completed weeks of amenorrhoea.

Some epidemiological studies have shown that the incidence of cord prolapse has remained stable through the years<sup>1,2</sup> with a quoted rate of between 1 in 200 and 1 in 700. Our rate of 1 in 666 (0.15%) is in the low end of this quoted range. There is however conflicting evidence as to whether the fetal outcome is actually improved with better obstetric

care<sup>1,7,8,9</sup>. We believe that the neonatal outcome is improved with the practice of immediate caesarean section. In our study the vast majority of the cases have excellent outcome, with only 1 baby requiring NICU care and no cases of perinatal mortality.

The immediate management of umbilical cord prolapse is determined by 3 factors: fetal viability, fetal maturity and presence of any lethal fetal anomalies. Emergency delivery is recommended for a normally formed and sufficiently mature fetus. In the first stage of labour, a caesarean section is the only way to achieve early delivery, however with a completely dilated cervix, the obstetrician has a choice between instrumental vaginal delivery and caesarean section. Several studies have quoted more favourable fetal outcome with caesarean sections even in the second stage of labour<sup>6</sup>.

Upon diagnosis of umbilical cord prolapse, various manoeuvres have been advocated to alleviate pressure on the prolapsed cord. We found that digitally elevating the presenting part was quicker and the most important component in addition to other methods described in the literature such as urinary bladder distension with saline, pelvic elevation or tocolysis<sup>10</sup>.

KK Women's and Children's Hospital is a designated women's and children's hospital serving a population of approximately 3 million. The annual number of deliveries is approximately 16,000. In our institution, the maternal mortality rate is 12.8 per 100,000 deliveries and the perinatal mortality rate is 4.7 per 1000 total births.

As a tertiary referral centre for obstetrics and gynaecology, we have experienced personnel (obstetricians, neonatologists, anaesthetists, midwives, operating theatre nurses etc) and facilities available 24 hours a day. The “Code Green” protocol contributed to a short diagnosis-delivery interval averaging 14.3 minutes, which is well within international recommendations. The German Society of Gynaecology and Obstetrics recommends a decision to delivery time of less than 20 minutes. The American College of Obstetricians and Gynaecologists believes a decision to incision time of 30 minutes is appropriate. We believe that this rapid decision-to delivery interval contributes to reduce the morbidity of the cord prolapse. In our study of 25 cases, the decision-to-delivery interval exceeded the 20-minute guideline in 3 cases, and the 30-minute guideline in 1 case. In these cases the main cause for delay was a logistic problem in preparing an operating theatre.

There is a lack of consensus as to whether obstetric interventions are associated higher risk of cord prolapse<sup>9,11,12</sup>. In our series, a significant proportion (28%) of the patients had cord prolapse following an amniotomy. No other obstetric procedures were performed in our study group.

In our series, a predisposing factor was present in 36% of cases. These are 5,6,7,<sup>13</sup>: abnormal lie, malpresentation, prematurity, uterine anomaly, multiple pregnancy, polyhydramnios. When a patient has spontaneous rupture of membranes or an ominous cardiotocographic tracing, immediate vaginal examination enables umbilical cord prolapse to be diagnosed. In addition, patients should be educated on the early signs of labour or pre-labour rupture of membranes so that they present early for supervised hospital delivery as timely delivery could well make a difference between life and death for the baby.

### **CONCLUSION**

Umbilical cord prolapse is an infrequent obstetric emergency with a well documented grave fetal prognosis in the literature. A high index of suspicion and recognition of predisposing factors may allow for early detection and timely delivery, thereby minimizing perinatal morbidity and mortality. A multi-disciplinary approach to the organisation of an emergency caesarean section is essential to allow the rapid and safe conduct of an emergency caesarean section to minimize maternal and fetal risks in such an emergency.

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