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Original Research Article

Evaluation of umbilical cord complication and its relation with foetal outcome

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ABSTRACT

Background: There are numerous umbilical cord abnormalities ranging from false knots, which have no clinical significance, to vasa previa, which could cause foetal loss. With availability of more sophisticated prenatal ultrasound techniques, many can be detected early in utero, however many of these are not apparent till delivery. In this study primary objective was to study correlation of umbilical cord complications and foetal outcome. Authors also outlined available courses of action to avert their morbidity and mortality.

Methods: Prospective case control study was conducted in Department of Obstetrics and Gynaecology of M.G.M. Medical College and M. Y. Hospitals, Indore. Antenatal women with more than 28 weeks gestation were included. 500 cases with cord abnormalities were followed till delivery and were compared to the 500 controls with normal cord findings. Data was recorded in predesigned coded case report forms and statistical analysis was performed.

Results: Of all the cord complications studied nuchal cord was the commonest i.e. 66.2% followed by abnormal cord length 12.4%. Incidence of cord prolapse was 7.2%. Single umbilical artery, cord knot and abnormal umbilical artery flow were found in 4%, 1.38% and 0.68% respectively.

Conclusions: The presence of nuchal cord per se is not found to be an indication of operative delivery. However, these cases require close intrapartum monitoring. Gross cord abnormality was associated with still birth, intra uterine growth restriction and intrapartum or immediate post-natal complication.

Keywords: Cord knots, Cord prolapsed, Nuchal cord, Single umbilical artery

INTRODUCTION

In placental mammals the umbilical cord (also called the navel string, birth cord or funiculus umbilicalis) is a conduit between the developing embryo or fetus and the placenta.¹ Baden in 1955 wrote: "intra uterine life, which is sustained only by two small arteries and a tortuous vein coursing through a long flexible cord, hangs by a very delicate thread".² During prenatal development, the umbilical cord is physiologically and genetically part of the fetus and (in humans) normally contains

two arteries (the umbilical arteries) and one vein (the umbilical vein), buried within Wharton's jelly. It contains one vein, which carries oxygenated, nutrient-rich blood to the fetus, and two arteries that carry deoxygenated, nutrient-depleted blood away.³ Hence any umbilical cord abnormalities during the course of pregnancy and labour are associated with foetal complications.

Although the detection rate of umbilical cord abnormalities is continuously increasing with the

improvement of radiological technology, and the fact that ultrasound scanning can distinguish umbilical cord conditions, this information has not exerted much impact on the management of labour to date. Authors believe prenatal detection of umbilical cord abnormalities must decreased the number of emergent caesarean sections and intrauterine foetal death. There are many umbilical cord abnormalities ranging from false knots, which have no clinical significance, to vasa previa, which could cause foetal demise. With availability of more advanced emerging prenatal ultrasound techniques, many can be detected early in utero, however many of these are not apparent till delivery. Abnormality of Umbilical cord, if diagnosed early, can save the foetal loss as well as physical and mental trauma to the mother.

METHODS

A Prospective study conducted in Department of obstetrics and gynaecology MGMMC Indore India from 2014 to 2015. Ethical approval was taken by institutional ethical committee. All antenatal women with gestation period 28 week onwards are taken, case selection done randomly and daily. Found out case diagnosed with cord complication and followed them till delivery. Detail history were taken in every case and general examination was done. Routine investigation including CBC, ABO Rh, Urine analysis, HIV, HBsAg, VDRL, blood sugar, blood urea was done. Ultrasound and colour Doppler also done. Examine the cord and placenta and finding were reconfirmed during and after delivery.

Examination of umbilical cord

By ultrasound after 28 weeks of pregnancy: routine ultrasound and obstetrics colour Doppler at the time of delivery and after the delivery for the following Presence of any loop (single/double) around foetal neck, shoulder and trunk. Cord loops tight or loose during C-section, number of loops of cord and positions, knots of cord (true/false) and, other cord abnormalities (haematoma, cyst, velamentous insertion).

Foetal outcome

Was recorded after delivery on the basis of: APGAR score at 1 and 5 minutes, NICU admission, congenital anomalies, perinatal mortality. Basic demographic characteristics clinical presentation and laboratory findings were recorded in predesigned case report from all studied cases. Numerically coded data entered in MS excel 2007 worksheet and logical validation and editing was done before analysis.

RESULTS

Age of the majority of patients (60.4%) was within the range of 21-25 years, as expected as this age group consists of most fertile women. Multigravida comprised 61.2% and primigravida 38.8% which simulates some

other like Gardiner et al; but Adinma didn't find any relation of parity with nuchal cord.⁴

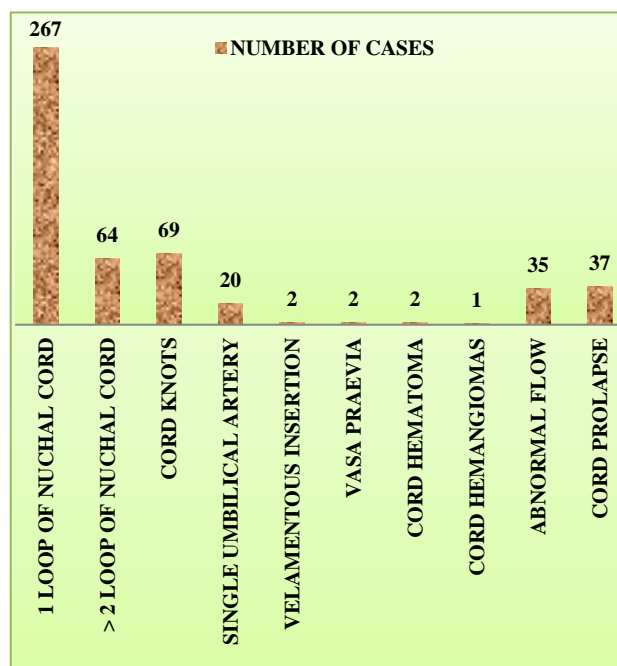


Figure 1: Distribution of cases according to cord complications.

Incidence of cord complications came out to be 66.2% (Figure 1). Among these maxima were nuchal cord which made 331 of the total 500 cord complications making an incidence of 6.47%. Single loop of cord was reported to be in 270 cases, rest were multiple loops of cord. Of these 139 women, with nuchal cord underwent caesarean. Maximum C-sections were performed for multiple loops of cord at neck (Table 1).

Table 1: Mode of delivery.

Mode of delivery	Study group A		Control group B	
	No.	%	No.	%
Vaginal	280	56%	392	78.4%
Caesarean	220	44%	108	21.6%

No differences in demographics or outcomes, judged as clinically significant, were associated with a tight nuchal cord. Foetal outcome was unaffected in single loop of cord however 3 or >loops were associated with an Apgar score <5 (Table 2).

Table 2: Distribution of cases according to fetal outcome.

Apgar score	Study group A	
	No.	%
Apgar score of neonate		
<4	20	4
4-7	34	6.8
>7	410	82

Cord knots were seen in 69 cases of which 34 were false knot and 35 true knot Logistic regression analysis was used to compare pregnancy outcomes of the affected cases with those of the general obstetric population. The incidence of true knot was 0.68%. Fetuses with true umbilical knots are at a four-fold increased risk of stillbirth.

The incidence of umbilical cord prolapsed is 0.7%. Among the women with cord prolapse, 92% were delivered by emergency caesarean section. Fetal demise was found in 98% of the women upon admission. This study shows that cord prolapse is associated with severe fetal consequences. This is attributed to the fact that most cases presented with absent pulsations in prolapsed cord, delayed referral and transport facilities are further additions. A total of 20 cases had single umbilical artery determined by ultrasound study conducted at present institute. Of the infants with a single umbilical artery, 20% or more are reported to have associated fetal anomalies, including cardiovascular abnormalities, gastrointestinal (GI) defects, esophageal atresia, a variety of renal defects, and multiple anomaly syndrome.

Among the 20 cases reported with abnormal flow in umbilical artery diagnosed by Doppler velocimetry, there were 6 survivors and 14 deaths (10 foetal and 4 neonatal deaths). Non-survivors had a significantly lower gestational age at diagnosis and delivery. Non-surviving live-born neonates had lower Apgar scores and were significantly smaller; however, there were no differences in proportion or severity of fetal growth restriction in survivors and non-survivors. Predictors of non-survival were the presence of reversed end-diastolic flow and oligohydramnios. Perinatal mortality for reversed end-diastolic flow was 1.4% and for absent end-diastolic flow 1.2%.

Velamentous insertion of cord occurred in only 1 case which reported to present setting with severe bleeding for which emergency ceasrean section was performed, baby had poor apgar score at 1min and 5min and was admitted in neonatal care unit of present institute.

Table 3: Distribution of cases according to perinatal outcome.

Outcome	Study group A	
	No.	%
Live birth	336	67.2
NICU admission	128	25.6
Early neonatal death	15	3
Late neonatal death	18	3.6
Still birth	36	7.2
FSB	28	5.6
MSB	08	1.6

Present study shows that maximum of perinatal cases were unaffected but severe fatal outcome were noticed

with cord prolapsed and abnormal uterine artery flow (Table 3).

DISCUSSION

The incidence of nuchal cord in present study was 66.2% of all cord complications studied (331 out of 500) and total incidence of complications is 6.62% (500 of 5112). Nuchal cords that form early can resolve at any time or persist until term and coils may form shortly before delivery.^{5,6} The reported incidence in Indian population varied from 5.3% to 10.9% which is in concordance with present study. But Clapp et al and Shrestha observed quite higher (24%) incidence.^{7,8} The mean cord length was 57.87 ± 12.6 and ranged between 22cm and 124cm. The mean cord length for male babies were significantly more than the females (58.16cm versus 57.59 cm). The mean umbilical cord length associated with loops was significantly higher than that of the study population 63.58cm versus 57.28cm. Shoulder dystocia, hand prolapse in a transverse lying foetus, abruptio placentae and prolonged second stage of labour had shorter cords while foetal distress, cord prolapse and meconium stained liquor had longer cords when compared with the mean umbilical cord length of the study population. Extremes of cord length could predispose to certain intrapartum complications.

Prolapse of the umbilical cord complicated 7.2% (n=37) of all deliveries included in the study (n=500). Independent risk factors for cord prolapse identified by a backward, stepwise multivariate logistic regression model were: malpresentation, hydramnios, true knot of the umbilical cord, preterm delivery, induction of labor, grandmultiparity (>five deliveries), lack of prenatal care. Newborns delivered after umbilical cord prolapse graded lower Apgar scores, less than 7, at 5 min (OR=11.9, 95% CI 7.9–17.9), and had longer hospitalizations (mean 5.4 ± 3.5 days vs. 2.9 ± 2.1 days; $P < 0.001$). Moreover, higher rates of perinatal mortality were noted in the cord prolapse group vs. the control group (OR=6.4, 95% CI 4.5–9.0). Using a multiple logistic regression model controlling for possible confounders, such as preterm delivery, hydramnios, etc, umbilical cord prolapse was found to be an independent contributing factor to perinatal mortality.

Single umbilical artery occurs in fewer than 4% (20 out of 500) of all the complications seen. Single umbilical artery also occurs more often in fetal demise than in live births, and there appears to be an association between isolated single umbilical artery and an increased risk for small-for-gestational age (SGA) infants and pregnancy-induced hypertension (but not for spontaneous preterm birth).^{9,10} The incidence can be overestimated with gross examination of the cord, especially if the portion close to the placenta is examined, because the arteries may fuse close to the placenta.¹¹ Abnormal umbilical artery flow was seen in 35 cases out of 5112 deliveries and 500 complications making an incidence of 0.68% pregnant

women confirmed by ultrasound were evaluated by umbilical artery Doppler velocimetry after 28 weeks of gestation. Outcome of the pregnancy was recorded for the normal Doppler group (n=465 cord complications) and abnormal Doppler group (n=35 cord complications). Abnormal Doppler group consisted of low-end diastolic flow group (n=25) and absent or reversed end diastolic flow (REDF) group (n=10). Foetal outcome was poor with low Apgar <7 in 29 babies. This outcome is similar to study conducted by Deshmukh Anshul et al.¹² The incidence of umbilical cord knot was found out to be 1.38% which is comparable to study conducted by Airas U (15) et al they analysed 288 singleton pregnancies with a true umbilical knot among the women who gave birth at Kuopio University Hospital from January 1990 to December 1999.¹³ The incidence of true knot was 1.25% and it was associated with advanced maternal age, multiparity, previous miscarriages, obesity, prolonged gravidity, long cord, and maternal anaemia. The women having a foetus with a cord knot underwent caesarean delivery less frequently than unaffected controls.

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