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Assessment of Perinatal Outcome and Mode of Delivery in Patients Diagnosed with Nuchal Cord

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ABSTRACT

Background: Nuchal cord is a common obstetric condition in which umbilical cord become wrapped around fetal neck. Although many pregnancies remains uncomplicated, nuchal cord may increase risk of fetal distress, operative delivery and poor neonatal outcomes. **Objective:** To assess the perinatal outcome and mode of delivery in patients diagnosed with nuchal cord. **Study Design:** Cross sectional study. **Duration and Place of Study:** This study was conducted from 04 February 2025 to 04 May 2025 at the Department of Obstetrics and Gynaecology, Lady Reading Hospital, Peshawar. **Methodology:** A total of 110 pregnant women aged 18 to 40 years with gestational age more than 37 weeks and confirmed diagnosis of nuchal cord on prenatal ultrasound were included. Demographic details, mode of delivery, fetal distress and Apgar score were recorded on structured proforma. Data analysis was carried out by using Statistical Package for Social Sciences version 27. **Results:** The mean age of patients was 29.33 ± 5.30 years and mean gestational age was 39.00 ± 1.14 weeks. Vaginal delivery was more common and occurred in 69 (62.7%) patients, whilst caesarean section was performed in 41 (37.3%) cases. Fetal distress was observed in 32 (29.1%) patients and low Apgar score were found in 27 (24.5%) neonates. Significant association were observed between body mass index and mode of delivery (p=0.039), hypertension and mode of delivery (p=0.009), and gestational age with low Apgar score (p=0.015). **Conclusion:** Vaginal delivery remains common in patients with nuchal cord. Increased body mass index and advanced gestational age were associated with adverse perinatal outcome.

INTRODUCTION

Nuchal cord represents a common condition in obstetrics whereby the umbilical cord surrounds the baby's neck.[1] The prevalence of this condition occurs commonly during labor and increases with an increase in gestational age because of the increased length of the umbilical cord as well as fetal movements.[2] Despite the fact that most pregnancies with nuchal cord occur without any serious complications, this condition may lead to the constriction of the umbilical vessels, which in turn limits the oxygen supply to the fetus.[3] Nuchal cord diagnosis is carried out either prenatally through ultrasonography and color Doppler examination or during labor. Given the risk of fetal injury from this condition, it is one of the important factors in obstetric medicine.

The method of delivery in a patient who has a nuchal cord is still an important issue in obstetrics because of the fear both in the practitioner and mother that the fetus could get distressed during labor.[4] For the majority of women with a nuchal cord, delivery by the vaginal route will not pose any risk of complication, especially if the fetal heart rate remains normal and there are no issues with labor.[5] However, in cases where the nuchal cord is taut or when multiple turns occur around the neck of the fetus, cesarean delivery becomes necessary if cardiotocography reveals a problem, labor is prolonged, or there are other indications that the fetus is distressed.[6]

The outcome of pregnancies with nuchal cords depends significantly on how compressed the cord is and for how long the flow of blood to the fetus has been reduced.[7] Fetal distress is another common complication and is characterized by an abnormal pattern of heart rate during delivery, such as bradycardia and variable decelerations.[8] There have also been documented instances where the newborns had low Apgar scores at one minute and five minutes, indicating temporary hypoxia due to the tight umbilical cord wrapped around the neck of the baby.[9] Severe birth asphyxia may lead to neonates being admitted to the neonatal intensive care unit, while in extreme circumstances, death has also been recorded among neonates.[10]

The occurrence of nuchal cord has been noted during pregnancy and labor, but the exact effect of this condition on the mode of delivery and outcomes for both mother and

infant has not yet been established fully. Pregnant women with nuchal cords tend to be unnecessarily anxious about their health status and at higher risk of requiring surgical delivery due to fear of fetal problems. The results of many researches conducted by different authors regarding the relationship of nuchal cords and fetal problems differ considerably. This study will help in assessing the perinatal outcome and mode of delivery in patients diagnosed with nuchal cord, so that timely management strategies can be planned and unnecessary interventions may be reduced.

METHODOLOGY

This cross-sectional study was performed from 04 February 2025 to 04 May 2025 at the Obstetrics & Gynecology Department of Lady Reading Hospital. Ethical approval for the study was obtained from hospital ethical review board before start of data collection. The 110 sample size was calculated by using WHO sample size calculator with 95% confidence level and 8% margin of error, while taking expected frequency of caesarean section in patients with nuchal cord as 24%.[11]

Inclusion Criteria

Pregnant women aged 18 to 40 years, with gestational age more than 37 weeks, and confirmed diagnosis of nuchal cord on prenatal ultrasound examination were included in the study. Nuchal cord was considered as presence of umbilical cord wrapped around the fetal neck one or more times on ultrasound examination.

Exclusion Criteria

Patients were excluded with congenital abnormalities, vaginal infections, and bleeding disorders.

After obtaining informed written consent, demographic information was recorded including age, BMI, socio economic status, residence, history of diabetes and hypertension. Patients diagnosed with nuchal cord were assessed for mode of delivery and perinatal outcome under supervision of consultant having minimum 5 years post-fellowship experience. Caesarean section was considered as surgical delivery of newborn through incision over abdomen and uterus, while normal vaginal delivery was considered as spontaneous labour without induction or augmentation with medications. Fetal distress was labelled when fetal heart rate was more than 160/min or less than 120/min on cardiotocography. Low Apgar scores was considered when Apgar score at 1 minute was less than 5 by using scoring system based on Activity, Pulse, Grimace, Appearance and Respiration.

Data analysis was carried out by using IBM SPSS version 27. Numerical variables including age, height, weight, BMI and gestational age were presented as mean ± standard deviation. Categorical variables including mode of delivery, fetal distress, low Apgar score, diabetes, hypertension, socio economic status and residence were presented as frequencies and percentages. Mode of delivery and perinatal outcome were stratified according to age, BMI, gestational age, diabetes, hypertension, socio economic status and residence. Post-stratification Chi-square test or Fisher's exact test was applied where appropriate while p-value ≤0.05 was considered significant.

RESULTS

The study assessed perinatal outcome and mode of delivery in patients diagnosed with nuchal cord. The mean age of the participants was 29.33 ± 5.30 years, with a mean gestational age of 39.00 ± 1.14 weeks. The mean weight was 71.14 ± 9.89 kg, mean height was 1.60 ± 0.06 m, and the mean BMI was 27.70 ± 2.96 kg/m^2. Majority of the patients were from low socioeconomic background, 52 (47.3%), followed by middle, 44 (40.0%), and high, 14 (12.7%). Diabetes were present in 20 (18.2%) patients, whilst hypertension was observed in 15 (13.6%) of the study participants (Table-I).

Table I

Patient Demographics

Demographics	Mean ± SD / n (%)
Age (years)	29.33 ± 5.30
Gestational Age (weeks)	39.00 ± 1.14
Weight (kg)	71.14 ± 9.89
Height (m)	1.60 ± 0.06
BMI (kg/m^2)	27.70 ± 2.96
Socioeconomic Status	
High n (%)	14 (12.7%)
Middle n (%)	44 (40.0%)
Low n (%)	52 (47.3%)
Diabetes	
Yes n (%)	20 (18.2%)
No n (%)	90 (81.8%)
Hypertension	
Yes n (%)	15 (13.6%)
No n (%)	95 (86.4%)

Regarding mode of delivery, vaginal delivery was more common, occurring in 69 (62.70%) patients, as compared to caesarean section which was performed in 41 (37.30%) patients. Fetal distress were noted in 32 (29.10%) of the cases, whilst a low Apgar score were recorded in 27 (24.50%) of the neonates (Table-II).

Table II

Mode of Delivery and Perinatal Outcomes in Patients with Nuchal Cord

Variable	Frequency	%age
Mode of Delivery		
C-Section	41	37.30%
Vaginal	69	62.70%
Total	110	100%
Fetal Distress		
Yes	32	29.10%
No	78	70.90%
Total	110	100%
Low Apgar Score		
Yes	27	24.50%
No	83	75.50%
Total	110	100%

When assessing the association of mode of delivery with demographic factors, a statistically significant association were found between BMI and mode of delivery, where patients with BMI >25 kg/m^2 had considerably higher caesarean section rate of 38 (42.2%) as compared to only 3 (15.0%) in those with BMI ≤25 kg/m^2(p = 0.039). Furthermore, hypertension showed a highly significant association with mode of delivery (p = 0.009), where normotensive patients had a notably higher caesarean section rate of 40 (42.1%) as compared to hypertensive patients in whom only 1 (6.7%) undergone caesarean section (Table-III).

Table III

Association of Mode of Delivery with Demographic Factors in Patients with Nuchal Cord

Demographic Factors	Subgroup	Mode of Delivery		p-value
		C-Section n(%)	Vaginal n(%)	
Age Group (years)	≤30	24 (32.0%)	51 (68.0%)	0.094
	>30	17 (48.6%)	18 (51.4%)	
Gestational Age (weeks)	≤39	20 (36.4%)	35 (63.6%)	0.844
	>39	21 (38.2%)	34 (61.8%)	
BMI (kg/m^2)	≤25	3 (15.0%)	17 (85.0%)	0.039*
	>25	38 (42.2%)	52 (57.8%)	
Socioeconomic Status	High	4 (28.6%)	10 (71.4%)	0.185*
	Middle	21 (47.7%)	23 (52.3%)	
	Low	16 (30.8%)	36 (69.2%)	
Diabetes	Yes	11 (55.0%)	9 (45.0%)	0.070
	No	30 (33.3%)	60 (66.7%)	
Hypertension	Yes	1 (6.7%)	14 (93.3%)	0.009*
	No	40 (42.1%)	55 (57.9%)	

*Fischer Exact Test

Amongst perinatal outcomes, a statistically significant association were observed between gestational age and low Apgar score (p = 0.015), where neonates born to mothers with gestational age >39 weeks had a considerably higher rate of low Apgar score, 19 (34.5%), as compared to those born at ≤39 weeks in which low Apgar score were recorded in only 8 (14.5%) of the neonates (Table-IV).

Table IV

Association of Perinatal Outcomes with Demographic Factors in Patients with Nuchal Cord

Demographic Factors	Subgroup	Fetal Distress		p-value	Low Apgar Score		p-value
		Yes n(%)	No n(%)		Yes n(%)	No n(%)	
Age Group (years)	≤30	22 (29.3%)	53 (70.7%)	0.935	18 (24.0%)	57 (76.0%)	0.846
	>30	10 (28.6%)	25 (71.4%)		9 (25.7%)	26 (74.3%)	
Gestational Age (weeks)	≤39	12 (21.8%)	43 (78.2%)	0.093	8 (14.5%)	47 (85.5%)	0.015
	>39	20 (36.4%)	35 (63.6%)		19 (34.5%)	36 (65.5%)	
BMI (kg/m^2)	≤25	6 (30.0%)	14 (70.0%)	0.921	6 (30.0%)	14 (70.0%)	0.531
	>25	26 (28.9%)	64 (71.1%)		21 (23.3%)	69 (76.7%)	
Socioeconomic Status	High	1 (7.1%)	13 (92.9%)	0.088*	3 (21.4%)	11 (78.6%)	1.000*
	Middle	12 (27.3%)	32 (72.7%)		11 (25.0%)	33 (75.0%)	
	Low	19 (36.5%)	33 (63.5%)		13 (25.0%)	39 (75.0%)	
Diabetes	Yes	7 (35.0%)	13 (65.0%)	0.520	6 (30.0%)	14 (70.0%)	0.531
	No	25 (27.8%)	65 (72.2%)		21 (23.3%)	69 (76.7%)	
Hypertension	Yes	5 (33.3%)	10 (66.7%)	0.762*	5 (33.3%)	10 (66.7%)	0.395*
	No	27 (28.4%)	68 (71.6%)		22 (23.2%)	73 (76.8%)	

*Fischer Exact Test

DISCUSSION

The majority of the study subjects, constituting 52 individuals (47.3%), had a low social economic status. The average Body Mass Index (BMI) in the study group was 27.70 ± 2.96 kg/m2, indicating that the BMI of the subjects falls within the overweight category. The development of adipose tissue at the pelvic level and being overweight or obese increases the possibility of cephalopelvic disproportion and decreased uterine contractility. Consequently, this leads to an increased possibility of operative delivery. Vaginal delivery proved to be the most prevalent method used in deliveries, with 69 mothers (62.70%) undergoing vaginal delivery while 41 mothers (37.30%) had cesarean section deliveries. There is a statistical correlation between BMI and cesarean section delivery because women whose BMI >25 kg/m2 delivered their babies through cesarean section more than those whose BMI ≤25 kg/m2 (42.2% vs. 15.0%; p = 0.039). This conclusion can be scientifically explained by the adverse effect of extra adipose tissue on the myometrial contractility.

In the present study, vaginal delivery were the more common mode of delivery, occurring in 69 (62.70%) patients, whilst caesarean section were performed in 41 (37.30%) cases. This finding is in agreement with Iqbal *et al.* [11] who reported vaginal delivery in 66.6% and operative delivery in 33.3% of nuchal cord cases, suggesting that vaginal delivery remains feasible in majority of such pregnancies. Similarly, Ansam *et al.* [12] reported vaginal delivery in 76% and caesarean section in 24% of nuchal cord cases, which is comparable to the findings of present study. Hemalatha Devi *et al.* [13] also reported a high vaginal delivery rate of 83% in nuchal cord pregnancies. These comparable findings across different studies may be explained by the fact that a loose or single loop of nuchal cord does not necessarily obstruct the birth canal or causes significant haemodynamic compromise, thereby allowing successful vaginal delivery in majority of cases. In contrast, Silva *et al.* [14] reported a considerably higher caesarean section rate of 99% in their nuchal cord group, which is markedly different from the present study findings. This discrepancy may be attributed to differences in institutional protocols, clinical decision-making practices, or a higher proportion of tight nuchal cord cases in their cohort, as tight nuchal cord is known to causes more severe vascular compression and foetal compromise.

Fetal distress were observed in 32 (29.10%) of the cases in the present study, which is consistent with the scientific understanding that nuchal cord causes intermittent compression of umbilical vessels, leading to reduced foetal oxygenation and subsequent cardiotocographic abnormalities. This is supported by Najam *et al.* [15] who reported significantly increased fetal heart rate abnormalities in nuchal cord group, although they did not found an increase in caesarean section rate, which is somewhat different from the present study where

fetal distress contributed to the operative delivery rate. Low Apgar score were recorded in 27 (24.50%) of neonates in the present study. In comparison, Manzoor *et al.* [16] reported Apgar score less than 5 in 46% of neonates, which is considerably higher than the present findings. This difference may reflects variation in study populations, cord tightness, or differences in intrapartum foetal monitoring practices. Zahoor *et al.* [17] reported that infants born vaginally with nuchal cord had lower 1-minute Apgar score (p = 0.008), which is in partial agreement with the present study findings, although both studies confirmed that neonatal outcome generally remained satisfactory.

A statistically significant association were found between elevated BMI and caesarean section rate in the present study, where patients with BMI >25 kg/m^2 had a higher operative delivery rate of 38 (42.2%) as compared to only 3 (15.0%) in those with BMI ≤25 kg/m^2 (p = 0.039). This finding is biologically plausible as excess adipose tissue in overweight women impairs myometrial contractility and may leads to dysfunctional labour, thereby increasing the likelihood of operative intervention. Shereen *et al.* [18] reported that BMI were not significantly associated with nuchal cord or its outcomes, which is in contrast to the present study, and this difference may be because their study focused on incidence of nuchal cord rather than mode of delivery in relation to BMI. A highly significant association were also observed between hypertension and mode of delivery (p = 0.009) in the present study, where normotensive patients had a higher caesarean section rate of 40 (42.1%) as compared to hypertensive patients in whom only 1 (6.7%) undergone caesarean section. This finding appears counterintuitive but may be explained by the fact that hypertensive patients were likely managed with early induction of labour under close monitoring, which may have resulted in more favourable cervical conditions and successful vaginal deliveries, whilst avoidance of surgical risks associated with hypertension may have further influenced clinical decision-making towards vaginal route.

A statistically significant association were found between gestational age and low Apgar score (p = 0.015), where neonates born at gestational age >39 weeks had a notably higher rate of low Apgar score, 19 (34.5%), as compared to 8 (14.5%) in those born at ≤39 weeks. This finding is scientifically explained by the physiological reduction in amniotic fluid volume at advanced gestational ages, which reduces the cushioning effect around the umbilical cord and makes it more vulnerable to sustained compression *via* the nuchal loop, thereby increasing the risk of neonatal depression. Tariq *et al.* [19] reported that poor Apgar score <7 were present in 41.1% of nuchal cord cases and found no significant association with gestational age (p = 0.641), which is in partial contrast to the present study. Lambers *et al.* [20] also did not found statistically significant differences in gestational age outcomes, which further highlights that the relationship between gestational age and neonatal depression in nuchal cord cases may varies across different clinical settings and populations.

There are various limitations of the current study that need to be noted while considering the results obtained from this research. First of all, this study took place in a single center only. This limited the results obtained from this study in relation to its applicability in other populations as well. There was also a smaller sample size in the current study, making it difficult to analyze certain factors in relation to the results. Furthermore, there was no control group included in the current study.

CONCLUSION

The present study demonstrates that vaginal delivery remains the more common and viable method of delivery for women having their babies in the presence of nuchal cord condition, and routine cesarean section is not recommended in cases when a diagnosis of nuchal cord exists. The following factors were identified by researchers as statistically significant contributors to the incidence of cesarean section: elevated body mass index and the lack of hypertension; and advanced gestational age was a statistically significant predictor of Apgar score lower than seven.

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