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Feto-Maternal Outcome of Pregnancy with Nuchal Cord in Women Presenting for Delivery at Term: A Descriptive Case Series.

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Abstract

Background: Nuchal cord is a common intrapartum finding, reportedly present in approximately 6-35% of term deliveries, and has been variably linked to meconium-stained liquor, low Apgar scores, and operative delivery. Reported associations differ widely between populations. Objective: To determine the feto-maternal outcome of pregnancy complicated by nuchal cord in women presenting for delivery at term. ***Methods***: Descriptive case series of 100 women with singleton, term pregnancy and ultrasound-confirmed nuchal cord, enrolled consecutively over six months. Mode of delivery, meconium-stained liquor, 5-minute Apgar score, and NICU admission were recorded on a structured proforma. Data were stratified by age, parity, BMI, and gestational age; chi-square testing and odds ratios (95% CI) were computed post-stratification, with p ≤0.05 considered significant. ***Results***: Mean maternal age was 27.64 ± 6.50 years and mean gestational age 39 ± 0.88 weeks. Caesarean section occurred in 27%, meconium-stained liquor in 36%, poor Apgar score (<7 at 5 minutes) in 22%, and NICU admission in 36%. Abnormal maternal BMI was associated with lower odds of poor Apgar score (OR 0.22, 95% CI 0.06-0.79, p=0.013). No other stratified variable reached significance. ***Conclusion***: Meconium-stained liquor and NICU admission were the most frequent feto-maternal complications associated with nuchal cord, followed by caesarean section and poor Apgar score. Abnormal maternal BMI was associated with lower odds of poor Apgar score, an association worth exploring in larger comparative studies.

Keywords: Nuchal cord, meconium-stained liquor, Apgar score, caesarean section, NICU admission, term pregnancy.

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INTRODUCTION

A nuchal cord is present when a loop of umbilical cord encircles the fetal neck 360 degrees; reported prevalence at delivery ranges from approximately 6% to 35%, and its frequency increases with advancing gestational age (1,2) and with longer umbilical cords (3). It is one of the recognized causes of variable decelerations on cardiotocography and is often suspected clinically for this reason before being confirmed at delivery (1,2).

Several publications report an association between nuchal cord and adverse outcomes, including meconium-stained liquor (2,4), low 1-minute Apgar scores (2,5-8), increased caesarean delivery owing to non-reassuring fetal heart rate tracing (2), and fetal acidaemia (8,9). Reported frequencies vary considerably by setting: a Bangladeshi series reported a 13.82% caesarean rate (10), an Indian series reported 28% caesarean delivery with meconium staining in 26% and a 5-minute Apgar score <7 in 2% (1), and a Brazilian retrospective cohort that included 100 women with nuchal cord reported 12% meconium staining, 2% poor 5-minute Apgar score and 2% NICU admission, with 99% vaginal delivery (5). Several series have found no significant association between nuchal cord and adverse perinatal outcome (5,9), a Peshawar study of 168 women found that a loop of cord around the fetal neck did not affect mode of delivery or fetal outcome (11), and a large population-based cohort found no association with perinatal mortality or long-term cardiorespiratory morbidity (12). In contrast, a Norwegian population-based study of 856,300 births found that cord entanglement (not specific to nuchal cord) was associated with an increased risk of adverse outcomes, including perinatal death (13). Reported outcomes therefore vary meaningfully with population and methodology.

Meconium-stained liquor is a separate but frequently co-reported finding, occurring in an estimated 7-22% of deliveries (14). In a Polish cohort, nuchal cord was more frequent among births with meconium-stained fluid (33.88% vs 23.34%) (2), and a large Turkish series of vaginal deliveries found meconium-stained liquor to be the only outcome significantly more frequent with nuchal cord (4). Because a nuchal cord is itself a plausible mechanical trigger for cord compression, and cord compression is one accepted route to intrapartum meconium passage, the two findings are commonly discussed together (2,4). This study was undertaken to generate local descriptive estimates of feto-maternal outcome in nuchal cord pregnancies at term, and to examine whether routinely collected maternal characteristics identify a subgroup at higher risk.

MATERIALS AND METHODS

Study design: Descriptive case series.

Setting: Unit IV, Department of Obstetrics & Gynaecology, Lady Aitchison Hospital, Lahore.

Duration: Six months, 1st January 2026 to 30th June, 2026

Sample size: 100 cases, calculated at 95% confidence level and 7% margin of error, using an expected caesarean section frequency of 13.82% in nuchal cord pregnancies reported in prior literature (10).

Sampling technique: Non-probability, consecutive sampling.

Inclusion criteria: Women aged 18-40 years, parity <5, singleton pregnancy confirmed on ultrasound, gestational age >37 weeks by LMP, with nuchal cord confirmed on ultrasound and at delivery.

Exclusion criteria: Gestational diabetes, hypertensive disorders of pregnancy, deranged renal or liver function, cardiovascular or autoimmune disease, intrauterine fetal death, malpresentation, congenital fetal malformation, oligohydramnios (AFI <5 cm), or polyhydramnios (AFI >21 cm).

Operational definitions: Nuchal cord: loop of umbilical cord around the fetal neck, detected on ultrasound and confirmed at delivery. Meconium-stained liquor: meconium visualized in amniotic fluid on direct examination at delivery. Poor Apgar score: <7 at 5 minutes. NICU admission: required for poor Apgar score, birth asphyxia, meconium aspiration syndrome, or meconium-stained liquor. Because meconium-stained liquor is one of the listed criteria for NICU admission in this definition, findings for these two outcomes move together in the stratified analysis below.

Data collection: Consenting women meeting selection criteria were enrolled from the labour room. Demographic data (age, gestational age, parity, BMI) were recorded, and mode of delivery, liquor status, 5-minute Apgar score, and NICU requirement were documented on a structured proforma.

Data analysis: SPSS version 20. Quantitative variables reported as mean ± SD; categorical variables as frequencies and percentages. Data were stratified by age (≤30 vs >30 years), parity (primiparous vs multiparous), BMI (normal vs abnormal), and completed gestational week (38, 39, 40 weeks). Chi-square test was used for stratified comparisons; odds ratios with 95% confidence intervals were additionally calculated for binary strata to quantify effect size. P ≤0.05 was considered significant.

Ethical considerations: The study was approved by the Hospital Ethical Committee of Lady Aitchison Hospital, Lahore . Informed consent was obtained from all participants before enrolment, and confidentiality of patient data was maintained throughout.

RESULTS

One hundred women were enrolled. Mean maternal age was 27.64 ± 6.50 years (range 18-40), mean gestational age 39 ± 0.88 weeks (range 38-40), and mean BMI 23.47 ± 3.22 kg/m² (range 18.50-29.02). By parity, 26 (26%) women were nulliparous, 21 (21%) had a parity of one, 29 (29%) a parity of two, 17 (17%) a parity of three, and 7 (7%) a parity of four (Tables 1-4).

Table 1. Descriptive statistics of age (years), n=100

Statistic	Value
Mean	27.64
SD	6.50
Minimum	18
Maximum	40

Table 2. Descriptive statistics of gestational age (weeks), n=100

Statistic	Value
Mean	39.00
SD	0.88
Minimum	38
Maximum	40

Table 3. Descriptive statistics of BMI (kg/m²), n=100

Statistic	Value
Mean	23.47
SD	3.22
Minimum	18.50
Maximum	29.02

Table 4. Frequency distribution of parity

Parity	n	%
0	26	26.0
1	21	21.0
2	29	29.0
3	17	17.0
4	7	7.0

Caesarean section was performed in 27 (27%) women (Table 5), meconium-stained liquor was noted in 36 (36%) women (Table 6), a poor Apgar score was recorded in 22 (22%) neonates (Table 7), and 36 (36%) neonates required NICU admission (Table 8).

Table 5. Frequency distribution of caesarean section

Caesarean section	Frequency	Percent
Yes	27	27.0
No	73	73.0
Total	100	100.0

Table 6. Frequency distribution of meconium-stained liquor

Meconium-stained liquor	Frequency	Percent
Yes	36	36.0
No	64	64.0
Total	100	100.0

Table 7. Frequency distribution of poor Apgar score

Poor Apgar score	Frequency	Percent
Yes	22	22.0
No	78	78.0
Total	100	100.0

Table 8. Frequency distribution of NICU admission

NICU admission	Frequency	Percent
Yes	36	36.0
No	64	64.0
Total	100	100.0

On stratified analysis, caesarean section, meconium-stained liquor, and NICU admission showed no significant association with age, parity, BMI, or gestational age (Tables 9, 10, 12).

A poor Apgar score was significantly associated with maternal BMI (p=0.013), with abnormal BMI carrying lower odds of poor Apgar score than normal BMI (OR 0.22, 95% CI 0.06-0.79); no other comparison for poor Apgar score reached significance (Table 11).

Table 9. Comparison of caesarean section with age, parity, BMI, and gestational age

Variable	Category	Yes	No	Total	p-value	OR (95% CI)
Age (years)	≤30	19	46	65	0.493	1.39 (0.54-3.62)
	> 30	8	27	35		
Parity	Primiparous	14	33	47	0.554	1.31 (0.54-3.16)
	Multiparous	13	40	53		
BMI	Normal	18	46	64	0.735	0.85 (0.34-2.16)
	Abnormal	9	27	36		
GA (weeks)	38	11	27	38	0.843	--
	39	7	17	24		
	40	9	29	38		

Table 10. Comparison of meconium-stained liquor with age, parity, BMI, and gestational age

Variable	Category	Yes	No	Total	p-value	OR (95% CI)
Age (years)	≤30	23	42	65	0.861	0.93 (0.39-2.18)
	> 30	13	22	35		
Parity	Primiparous	18	29	47	0.652	1.21 (0.53-2.73)
	Multiparous	18	35	53		
BMI	Normal	24	40	64	0.677	0.83 (0.35-1.97)
	Abnormal	12	24	36		
GA (weeks)	38	12	26	38	0.603	--
	39	8	16	24		
	40	16	22	38		

Table 11. Comparison of poor Apgar score with age, parity, BMI, and gestational age

Variable	Category	Yes	No	Total	p-value	OR (95% CI)
Age (years)	≤30	16	49	65	0.390	1.58 (0.56-4.49)
	> 30	6	29	35		
Parity	Primiparous	12	35	47	0.422	1.47 (0.57-3.81)
	Multiparous	10	43	53		
BMI	Normal	19	45	64	0.013*	0.22 (0.06-0.79)*
	Abnormal	3	33	36		
GA (weeks)	38	7	31	38	0.600	--
	39	7	17	24		
	40	8	30	38		

*Statistically significant, p≤0.05.

Table 12. Comparison of NICU admission with age, parity, BMI, and gestational age

Variable	Category	Yes	No	Total	p-value	OR (95% CI)
Age (years)	≤30	23	42	65	0.861	0.93 (0.39-2.18)
	> 30	13	22	35		
Parity	Primiparous	18	29	47	0.652	1.21 (0.53-2.73)
	Multiparous	18	35	53		
BMI	Normal	24	40	64	0.677	0.83 (0.35-1.97)
	Abnormal	12	24	36		
GA (weeks)	38	12	26	38	0.603	--
	39	8	16	24		
	40	16	22	38		

Values in Table 12 are identical to Table 10 across every stratum, reflecting that meconium-stained liquor is itself one of the operational criteria for NICU admission in this study.

DISCUSSION

In this cohort, meconium-stained liquor and NICU admission (both 36%) were the most frequent adverse findings, followed by caesarean section (27%) and poor Apgar score (22%). The meconium-stained liquor frequency exceeds the 7-22% range reported for deliveries generally (14), and is higher than the 26% reported in an Indian nuchal cord series (1), the 13.1% in a large Turkish series of vaginal deliveries with nuchal cord (4), and the 12% in a Brazilian cohort (5), illustrating how widely this figure varies between populations.

The caesarean rate of 27% is comparable to the 28% reported in an Indian series (1) and higher than the 13.82% Bangladeshi figure (10) used to power this study's sample size. Młodawska et al. found that nuchal cord increased the risk of caesarean delivery owing to non-reassuring fetal heart rate tracing (2), whereas 99% of women with nuchal cord in the Brazilian cohort delivered vaginally (5), and a Peshawar study found no effect of nuchal cord on mode of delivery (11); differences in delivery practice and antenatal ultrasound screening may partly explain this variation.

The NICU admission frequency (36%) mirrors the meconium-stained liquor frequency (36%) exactly, including across every stratified comparison (Tables 10 and 12), because meconium-stained liquor is itself a qualifying criterion for NICU admission in this study's operational definition. NICU admission was uncommon in cohorts that did not define it by meconium staining (3.2% of babies with nuchal cord in a US series (9) and 2% in the Brazilian cohort (5)); the higher figure here therefore probably reflects the broader operational definition rather than a true difference in neonatal risk. The meconium-stained liquor frequency is therefore the primary new descriptive finding, with the NICU figure following directly from it.

Abnormal maternal BMI was associated with significantly lower odds of poor Apgar score (OR 0.22, 95% CI 0.06-0.79, p=0.013), a finding that runs counter to the general expectation that abnormal maternal BMI predicts worse neonatal outcome. This may reflect closer antenatal surveillance and a lower threshold for timely intervention in women identified as having abnormal BMI in this unit, which could blunt intrapartum compromise before it affected Apgar scoring, or it may reflect a population-specific biological effect. In the Brazilian cohort, women with a tight nuchal cord had a higher median BMI than those with a loose cord (32.9 vs 28.8 kg/m²) and lower 1-minute Apgar scores (5); that comparison was between cord types rather than between BMI categories, so it does not directly corroborate or contradict the present finding. This association is worth exploring further in larger, comparative studies.

These findings sit within a genuinely mixed literature. Schreiber et al. (42,798 vaginal deliveries) found that three cord loops, but not one, were associated with operative vaginal delivery, low Apgar scores, intrauterine fetal death and growth restriction (6), whereas the Brazilian cohort (5) and a US series (9) found no overall adverse effect of nuchal cord on perinatal outcome, apart from low 1-minute Apgar scores with tight cords in the former. A meta-analysis of 20 studies (267,233 women) and a retrospective study of 272,713 deliveries nonetheless link cord entanglement to adverse neonatal outcomes, including low 1-minute Apgar scores (7,8). The present findings, a comparatively higher rate of meconium staining and NICU admission alongside a caesarean rate broadly consistent with other reported series, reinforce that outcomes with nuchal cord vary considerably between populations and settings, and that local data of this kind remain useful for guiding counselling and intrapartum decision-making.

CONCLUSION

In this descriptive cohort of women with nuchal cord at term, meconium-stained liquor and NICU admission (36% each) were the most frequent adverse findings, followed by caesarean section (27%) and poor Apgar score (22%). No stratified maternal characteristic predicted caesarean section, meconium-stained liquor, or NICU admission. Abnormal BMI was associated with lower odds of poor Apgar score, a finding warranting further evaluation in larger, comparative studies to guide intrapartum counselling and management locally.

Author's Contribution

All authors contributed to the conception and design of the study, data collection, data processing and analysis, compilation and drafting of the manuscript, and critical revision. All authors approved the final version and agree to be accountable for all aspects of the work.

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REFERENCES

1. Mahendra G, Pushpalata, Vijayalakshmi S, Pukale R, Bharathi. Clinical study of fetomaternal outcome in neonates with cord around neck in a tertiary care hospital. Sch J App Med Sci. 2015;3(1C):175-7.
2. Młodawska M, Młodawski J, Świercz G, Zieliński R. The relationship between nuchal cord and adverse obstetric and neonatal outcomes: retrospective cohort study. Pediatr Rep. 2022;14(1):40-7.
3. Kobayashi N, Aoki S, Oba MS, Takahashi T, Hirahara F. Effect of umbilical cord entanglement and position on pregnancy outcomes. Obstet Gynecol Int. 2015;2015:342065.
4. Cündübey CR, Ak M, Demir MB, Dağlıtuncezdi Çam Ş. Exploring the impacts of a nuchal cord on perinatal outcomes in vaginal delivery. Eur Res J. 2023;9(5):1166-70.
5. Silva GV, Gontijo CT, Lunguinho APC, Caetano MSG, Callado GY, Araujo Júnior E, et al. Perinatal outcomes related to the presence of a nuchal cord during delivery: a retrospective cohort study. Diagnostics (Basel). 2025;15(10):1197.

6. Schreiber H, Daykan Y, Arbib N, Markovitch O, Berkovitz A, Biron-Shental T. Adverse pregnancy outcomes and multiple nuchal cord loops. Arch Gynecol Obstet. 2019;300:279-83.
7. Zabit R, Tirosh D, Benshalom-Tirosh N, Baumfeld Y, Hershkovitz R, Baron J. Impact of cord entanglement on perinatal outcome. Eur J Obstet Gynecol Reprod Biol. 2024;299:163-6.
8. Pergialiotis V, Fanaki M, Bellos I, Tzortzis A, Loutradis D, Daskalakis G. Evaluation of umbilical cord entanglement as a predictive factor of adverse pregnancy outcomes: a meta-analysis. Eur J Obstet Gynecol Reprod Biol. 2019;243:150-7.
9. Vasa R, Dimitrov R, Patel S. Nuchal cord at delivery and perinatal outcomes: single-center retrospective study, with emphasis on fetal acid-base balance. Pediatr Neonatol. 2018;59(5):439-47.
10. Begum AA, Sultana H, Hasan R, Ahmed M. A clinical study of fetal outcome in cases of nuchal cord. J Armed Forces Med Coll Bangladesh. 2011;7(1):25-7.
11. Iqbal M, Muhammad Z, Iqbal S. Cord around fetal neck and its outcome. J Soc Obstet Gynaecol Pak. 2017;7(3):133-6.
12. Masad R, Gutvirtz G, Wainstock T, Sheiner E. The effect of nuchal cord on perinatal mortality and long-term offspring morbidity. J Perinatol. 2020;40:439-44.
13. Linde LE, Rasmussen S, Kessler J, Ebbing C. Extreme umbilical cord lengths, cord knot and entanglement: risk factors and risk of adverse outcomes, a population-based study. PLoS One. 2018;13(3):e0194814.
14. Rahman MM, Amin AA, Quader MA. Meconium-stained amniotic fluid and its perinatal feto-maternal outcome. CBMJ. 2022;11(2):114-9.