

Nuchal Cord and Perinatal Outcome – A Case Control Study

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ABSTRACT

Background and Objective: The nuchal cord means the umbilical cord when it becomes wrapped around the fetal neck by 360 degree. It has been observed that the ultrasound finding of the nuchal cord not only makes the patient more apprehensive but leads to low threshold of the Caesarean section by the managing obstetrician as well. The purpose of this study was to determine the perinatal outcome associated with the cord around the neck in females presenting a hospital setting.

Methods: This case control study was conducted at Dr. Sulaiman al Habib Hospital Riyadh, Saudi Arabia. The data was collected retrospectively with the help of the predesigned proforma for six months and once the selected number of patients with the nuchal cord was enrolled, the total number of the patients was calculated. To create a control group every 12th patient without the nuchal cord was enrolled. Once the control group was formed then the primary and secondary outcomes were compared in both the groups.

Results: It was found that there is significant increase in fetal heart rate abnormalities in the nuchal cord group without increasing the rate of Caesarean section. However, the mean Appearance, Pulse, Grimace, Activity, and Respiration (apgar) score of the neonate in both the groups is not affected. The rate of admission to neonatal intensive care unit (NICU) also did not increase in our study group.

Conclusion: The nuchal cord though found to be associated with fetal heart rate abnormalities but does not increase the rate of Caesarean section. Hence all patients who have nuchal cord should be given trial of labor with continuous cardiotocographic (CTG) monitoring. It is also observed that the apgar score and NICU admission is not affected by the nuchal cord.

KEYWORDS: Pregnancy, Caesarean section, Nuchal cord, Cardiotocography (CTG).

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INTRODUCTION

The nuchal cord means the umbilical cord when it becomes wrapped around the fetal neck by 360°. Intrapartum finding of the umbilical cord around the neck is common and it is seen in about 33% of the normal delivery. Its prevalence is 6 – 55%, but

fortunately more than 50% of the nuchal cords resolve spontaneously before delivery.² The detection of nuchal cord seems to be a random event but it is found more commonly in fetuses with excessive movements or in those who have long umbilical cord.³

The primary misconception associated with the nuchal cord is that the baby is being strangulated or suffocated by having cord around the neck, but in fact the baby cannot breathe inside the uterus and this is the mother who has to deliver all the oxygen to the baby and needs to clear away all of the carbon dioxide, for the infant. This exchange is taking place in the placenta. The umbilical vessels in the umbilical cord are essential for the gas exchange that is happening in place of breathing while the fetus is inside the uterus. So, it does not matter if the cord is wrapped around the neck or the shoulder or the leg, the result will be the same. The patient may not have any problem throughout the pregnancy, however at the time of the delivery, as the fetus moves in to the birth canal the cord can become stretched or compressed.⁴

The nuchal cord is thought to be associated with the transient decrease of the umbilical cord blood flow, however the exact perinatal effect of presence of nuchal cord in a newborn is still under debate.⁵

There is no doubt that the nuchal cord is the potential risk for the perinatal distress, but it will occur only in those babies who have tight or multiple loops and the manifestation will be in the form of intra partum fetal heart rate deceleration, meconium staining of liquor, low Appearance, Pulse, Grimace, Activity, and Respiration (apgar) score at one minute and increased probability of lower segment Caesarean section.⁴ All these problems are rare and unfortunate but are natural processes. It is the responsibility of the dealing physician to recognize the fetal distress and react swiftly to prevent the permanent damage to the fetus.

For the purpose of the study the loose nuchal cord is defined as a cord that can be reduced during delivery by sliding the loop over the head or the body of the baby. In contrast, nuchal cord loops were considered tight if it must be clamped and cut to allow delivery of the baby.⁶

Currently no guide lines are available on counselling and management of the patients with

nuchal cord diagnosed antenatally on routine ultrasonography. This uncertainty leads the patients to believe that the nuchal cord is associated with the poor perinatal outcome and special care is needed to provide education to the pregnant women in order to reduce the maternal anxiety.⁷

The presence of the nuchal cord is not itself the indication of the Caesarean section, however such patients require close monitoring of the progress of labor and continuous electronic monitoring of the fetal heart rate.

It was assumed that even in the presence of the multiple loops of nuchal cord, the patient can be delivered vaginally with no significant morbidity, provided continuous electronic monitoring is done and the facility of the immediate operative delivery is available if need arise. The purpose of the study was to find the perinatal outcome, intra partum complications and mode of delivery in the patients with nuchal cord to contribute to the literature to reduce the fear of the patients associated with the nuchal cord and improving the chances of the vaginal delivery.

METHODS

It is a retrospective case control and was conducted in the labor ward of Dr. Sulaiman al-Habib hospital, Sweidi, Riyadh, Saudi Arabia. Our hospital is a 350 bedded multidisciplinary hospital.

The data was collected with the help of the predesigned proforma, which carried information about the age, parity, gestational age of the patients, mode of delivery, CTG abnormalities, apgar score of the baby and neonatal intensive care unit (NICU) admission in addition to the information about the presence or absence of the cord. The data was collected from first June 2019 till 31st December 2019, after getting the approval from our Institutional Review Board (IRB) with the approval no. HAP-01-R-082.

The data was collected retrospectively for six months and once the selected number of patients with the nuchal cord meeting the study inclusion and exclusion criteria were enrolled, the total number of the patients reviewed was calculated and it was 1049. To create a control group every 12th patient without the nuchal cord was enrolled. Once the control group was formed then the

primary and secondary outcomes were compared in both the groups.

The primary outcomes were mode of delivery and CTG abnormalities and the secondary outcome was apgar score and NICU admission.

All women having singleton, term pregnancies of 37 – 40 weeks with cephalic presentation and sudden onset of labor were enrolled for the study group. The patients with medical disorders and those requiring induction or elective Caesarean for any other obstetric indications were excluded.

STATISTICAL ANALYSIS

Once the data is collected it was entered in Statistical Package for the Social Sciences Program (SPSS) version 26 for analysis and different tests were applied. For all the quantitative data, Student t test was applied and chi square test was applied for the qualitative data respectively. The desired confidence interval is 95% with 10% margin of error. For all the tests P value of 0.05 and less was taken as statistically significant.

RESULTS

The total number of the patients studied was 1054 out of which 100 were found to have nuchal cord, so the frequency of the nuchal cord was 9.5%. Single loop of the cord was found as a more frequent finding as 73% (n = 73) of the patients were found to have a single loop around the neck while double loop was seen in 22% (n = 22) of the study population and in 5% (n = 5) of the patients three or more loops were detected. The cord was found to be loose in 72% (n = 72) while 28% (n = 28) had tight loop of the cord around the neck.

It was observed that the frequency of the early and variable decelerations was higher in the study group, as shown in table 1, the calculated P-value is

Table-1: Comparison of CTG abnormalities in both groups.

CTG Abnormalities	Nuchal Cord Group (n = 100)	Control Group (n = 100)
No abnormality	53 (53%)	69 (69%)
Early decelerations	20 (20%)	13 (13%)
Variable decelerations	15 (15%)	6 (6%)
Late decelerations	6 (6%)	7 (7%)
Others	6 (6%)	5 (5%)

0.000 after applying the chi square test which shows that the nuchal cord is associated with the significantly increased frequency of fetal heart rate abnormalities.

Though increased frequency of fetal distress manifested by the CTG abnormalities was found, however it was not found to be associated with the increase rate of the Caesarean section in the nuchal cord group, P-value 0.106. The decrease in the rate of instrumental delivery was noted in the study group which was statistically insignificant as shown in table 2.

Table-2: Comparison of mode of delivery in two groups.

Mode of Delivery	Nuchal Cord Group (n = 100)	Control Group (n = 100)
Vaginal delivery	74 (74%)	70 (70%)
Caesarean section	18 (18%)	16 (16%)
Instrumental delivery	08 (08%)	14 (14%)

The mean apgar score, after one minute was 8.7 in the control group and was 8.6 in the nuchal cord group, which is not statistically significant. The mean apgar score after 5 minutes was 9.5 in the control group while it was 9.3 in the study group, which is insignificant as well. (P-value is 0.006 and 0.087 respectively) but when the apgar score is compared between the control group and the patients having fetuses with tight loop, the mean apgar score after one minute was 8.7 and 8.5 respectively. The 5-minute apgar score was also affected it was 9.5 and 9.2 in the control and the group of the patients with tight loop respectively. The P-value after applying the independent sample t test was to 0.022 for the one-minute apgar, which is statistically significant. P-value of 0.002 was found for the 5-minute apgar score comparison which is also statistically significant. Therefore, it is concluded that the neonates born with tight loop can have low apgar score.

None of the babies in the study group were admitted in the NICU, while one baby (1%) was admitted in the control group. So, the immediate perinatal outcome is not affected by the nuchal cord, as the P-value is 0.406, that is statistically insignificant.

Hence the study came to the conclusion that the nuchal cord does not affect the apgar score of the baby if it is loose, however the tight loop can

decrease the apgar score, but does not increase the risk of the NICU admission of the baby.

In the present study only 5% (n = 5) of the patients were found to have three or more loops of cord around the neck, however 80% (n = 4) of them showed the early or late decelerations which was responsible for the significant increase in the rate of Caesarean section.

The current study depicted significantly increased risk of CTG abnormalities if the cord is tight and the tight loops are also found to be associated with the significant increase in rate of Caesarean section, as shown in graphs I and II, respectively.

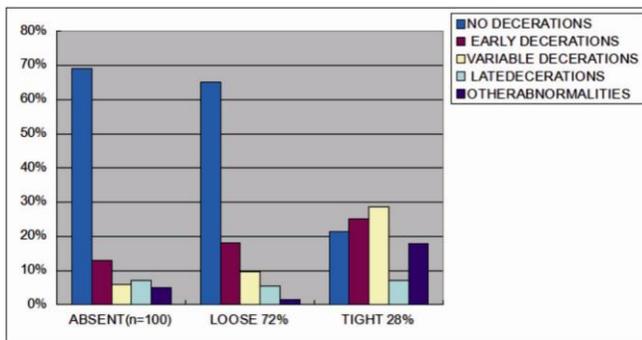


Fig.1: Comparison of CTG abnormalities in relation to tightness of cord.

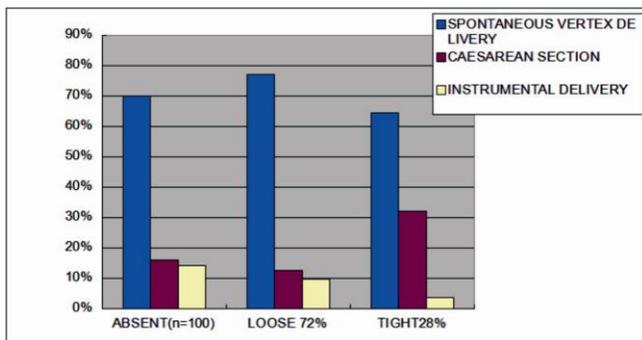


Fig.2: Comparison of mode of delivery in relation to tightness of cord.

DISCUSSION

The introduction of the doppler imaging in obstetrics has improved the accuracy of the detection of the nuchal cord, with sensitivity and specificity of 95.64% and 90.64% respectively.⁸ However conflicting evidence was found regarding

the effect of the nuchal cord on the perinatal outcome making it still a topic of the debate.⁹

The frequency of the nuchal cord found in the current study is lower than what was found in other studies. In one of the studies done in India² it was recorded as 17.14% and 19.6% is the recorded incidence in Rajistan by Joshi and colleagues.⁴ In one of the retrospective studies of an ethnically diverse inner-city population of the Chicago the frequency was found 23.5% which is higher than the present study as well.

It was found in the current study that the single loop of the cord is most common finding which was similar to the findings of the Joshi et al.⁴ Alnakash and her colleagues also reported the same findings in the study done in Iraq.³ Imai K¹¹ also reported that the single loop was the most dominant type of the nuchal cord.

It was observed that the frequency of the early and variable decelerations was higher in the study group, which is supported by the evidence collected by the Tagliaferri and colleagues in Italy.¹² Wang L and colleagues,¹³ Carter EB and colleagues,¹⁴ Mahendra G,¹⁵ Zhao F¹⁶ and Kong CW¹⁷ also found increased rate of fetal distress with the nuchal cord manifested by the CTG abnormalities. However, none of these studies showed increased rate of the Caesarean section which supported the observations recorded by the current study. However, no CTG abnormalities were observed by kesrouani A.¹⁸

No relationship of the adverse perinatal outcome was detected in the present study as the apgar score and NICU admission was not affected. Vasa R¹⁰ and Bahulekar² also had the same observation in their studies in United States of America and India respectively. Masad and colleagues study also supports the results of the present study.¹⁹ On the contrary Tayade and colleagues found that the nuchal cord is associated with the increased in the rate of Caesarean sections and increased incidence of low apgar score and the NICU admissions in addition to the CTG abnormalities.²⁰ Pergialiotis and colleagues also found that the cord entanglement is associated with the poor neonatal perinatal outcome.²¹

It was observed in the current study that the fetuses who have more than two loops of cord there is significant increase in rate of Caesarean section and fetal distress manifested by the CTG

abnormalities which is supported by the results of Schreiber and colleagues,²² Sepulveda W²³ and Weiner and colleagues.²⁴

We found significantly increased risk of CTG abnormalities if the cord is tight and the tight loops are also found to be associated with the significant increase in rate of Caesarean section without decrease in apgar score and the increase in the NICU admission. This is in contrary to the study by Joshi and colleagues⁴ who found no increase in the rate of Caesarean section but poor neonatal outcome was observed in terms of the low apgar score. Pessay M,²⁵ and Sangwan and colleagues²⁶ also found the increased neonatal morbidity associated with the tight loop of the cord. As the number of the patients who have the tight loop in the present study was low so more studies with tight loop of the cord are required to have the conclusive evidence.

CONCLUSION

Based on the results of the present study it was inferred that the nuchal cord is associated with increase fetal heart rate abnormalities but it does not affect the rate of Caesarean section. However, the rate of Caesarean section is increased in the patients if they have three or more than three loops of cord or the nuchal loops are tight. The current study also concluded that the perinatal outcome in terms of apgar score is also not affected if the loop of the nuchal cord is loose irrespective of the number of loops of cord, however the tight loop of the cord can be associated with decreased apgar score without increasing the NICU admission.

Fortunately, multiple tight loops are an infrequent finding so all patients should be given whole hearted trial of labor with continuous CTG monitoring as the chance of having vaginal delivery is very high.

LIMITATION OF THE STUDY

Sample size was limited in the study therefore further elaboration of the relationship of multiple and tight loops of the cord with the perinatal outcomes could not be determined.

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None to disclose.

CONFLICT OF INTEREST

None to declare.

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Author's Contribution

NS: Concept and design of the study, acquisition and analysis of data, drafting the manuscript, final approval of the manuscript.

MS, SH: Data collection and drafting the manuscript.

AS: Revising the manuscript for intellectual content.

RA & RN: Analysis and interpretation of data.

All Authors: Approval of the final version of the manuscript to be published.