

Perinatal outcomes of sonographically detected nuchal cord in southeastern Turkey

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Summary

Purpose: To investigate the outcomes of pregnancies with a sonographically detected nuchal cord (NC) from a single center in southeastern Turkey. **Materials and Methods:** A retrospective study was carried out at Maternity and Child Health Hospital Diyarbakır, Turkey, between 2011 and 2013. A total of 477 pregnancies with sonographically detected NC during the second and third trimester of gestation (20–40 weeks) were included. The control group consisted of 1,043 randomly selected pregnancies without NC matched for gestational age at the time of ultrasound examination. Outcome variables, including maternal age, parity, gestational age at delivery, mode of delivery, intrapartum fetal heart abnormalities, meconium-stained amniotic fluid, birth weight, and one- and five-minute Apgar scores, were compared between the two groups. **Results:** There were no statistically significant differences in any of the outcome variables between patients with sonographically detected NC and controls. **Conclusions:** The presence of NC indicates a need for increased care but is not associated with adverse perinatal outcomes.

Key words: Nuchal cord; Perinatal outcome; Screening.

Introduction

Nuchal cord (NC) is defined as an umbilical cord that passes 360° around the fetal neck, with prevalence rates ranging from 6% to 37% [1]. The incidence of NC diagnosed on ultrasonography has been reported to increase linearly with advancing gestation, being 5.8% at 20 weeks, 22% at 30 weeks, and 29% at 42 weeks [2-4]. Data from these studies also suggest that many cases of NC presenting in late gestation resolve before delivery. NC can be classified according to the nature (tight or loose) and number of loops (single, double, or multiple). While loose loops can be easily slipped over the fetal head, tight loops require clamping before untwining during delivery. The prevalence rates of single, double, and multiple NCs at delivery were reported to be 10.6%, 2.5%, and 0.1%, respectively [2]. A single-looped NC may be associated with variable fetal heart rate decelerations but does not compromise fetal well-being or influence clinical management. In contrast, multiple NC demands special care due to the risk of intermittent cord compression.

The detection rate of NC is increasing due to the widespread usage of ultrasonography during antenatal care, and color Doppler flow imaging has increased the accuracy of

this prenatal diagnosis. However, detection of NC may cause anxiety in both the pregnant woman and the physician due to its possible association with birth asphyxia. Although it does not influence the perinatal outcome in most cases, NC has been associated with a greater risk of perinatal morbidity, including fetal heart deceleration, umbilical artery acidemia, low five-minute Apgar score, meconium-stained amniotic fluid, fetal growth restriction, increased rate of cesarean section, admission to the neonatal intensive care unit, and even intrauterine fetal death [5-10]. Therefore, there is still debate regarding whether the patient should be informed about this probably negligible ultrasonographic finding.

The present study was performed to evaluate the outcomes of pregnancies with sonographically detected NC during the second and third trimesters of gestation from a single center in southeastern Turkey.

Materials and Methods

A retrospective study of all obstetric patients with sonographically identified NC at Diyarbakır Maternity and Child Health Hospital, Turkey, between January 2011 and December 2013 was conducted. The local ethics committee approved the study protocol.

A total of 477 pregnancies with sonographically detected NC during the second and third trimester of gestation were included as the study group. The control group consisted of 1,043 randomly selected pregnancies without NC matched for gestational age at the time of ultrasound examination. Exclusion criteria included multiple pregnancy, congenital anomalies, oligohydramnios, and polyhydramnios.

Indications for ultrasound examination were similar for both groups, and included second trimester anomaly scan and evaluation of fetal growth during the third trimester. Ultrasound examinations were performed using a two- to seven-MHz transabdominal transducer. Antepartum diagnosis of NC was confirmed with color Doppler imaging on axial views of the fetal neck.

The following data were retrieved from a computerized database: maternal age, parity, gestational age at delivery, meconium-stained amniotic fluid, mode of delivery (vaginal delivery or cesarean section), fetal distress during labor, indication for cesarean delivery, one- and five-minute Apgar scores, birth weight, and intrauterine fetal death. Gestational age was determined from the date of the last menstrual period and confirmed by ultrasonographic examination performed during the first trimester. Fetal distress during labor was defined as a non-reassuring fetal heart rate characterized by repetitive late or severe variable decelerations or prolonged bradycardia (fetal heart rate < 100 beats/minute for > three minutes) detected by an electronic fetal heart monitor.

All statistical analyses were performed using SPSS version 17.1. Differences were compared using the chi square test or Fisher's exact test for qualitative variables and Student's *t*-test for continuous variables, as appropriate. In all analyses, $p < 0.05$ was considered to indicate statistical significance.

Results

Of the 477 NC cases, 16.9% ($n = 81$) were detected during the second trimester and 83.1% ($n = 396$) were detected during the third trimester. Overall, the mean gestational age at diagnosis of NC was 32.6 (range 20–40) weeks. The study population included 405 cases (84.9%) with a single loop and 72 cases (15.1%) with double loops.

As shown in Table 1, there were no significant differences between patients with sonographically detected NC and controls with respect to maternal age, gestational age at sonography, or type of delivery. The rates of vaginal and cesarean deliveries in the NC group were 68.1% and 31.9%, respectively, while these values for the control group were 71.1% and 28.9%, respectively. The overall vaginal delivery rate was not significantly different between the two groups ($p = 0.234$). In a further sub-analysis, there were no statistically differences between NC and control groups in respect to indications for cesarean section ($p > 0.05$ for all).

With regards to the perinatal outcome, there were no significant differences in birth weight ($p = 0.44$), meconium-stained amniotic fluid ($p = 0.49$), or one- and five-minute Apgar scores ($p = 0.544$ and 0.539 , respectively) between the two groups. There were three (0.06%) and 18 (1.7%) cases of intrauterine fetal death in the NC group and the control group, respectively. NC was not associated with intrauterine fetal death ($p = 0.089$).

Table 1. — Baseline and neonatal characteristics of the study groups.

	Control (n=1043)	Nuchal cord group (n=477)	<i>p</i>
Maternal age (years)	27.6 ± 6.3	28.1 ± 6.4	0.157
Parity (n)	2 (1-13)	3 (1-12)	0.22
Gestational age at ultrasonography (weeks)	32.3 ± 3.8	32.6 ± 4.2	0.721
Gestational age at delivery (weeks)	37.6 ± 1.5	37.2 ± 1.8	0.521
Mode of delivery (n,%)			
Vaginal	742 (71.1)	325 (68.1)	0.234
Cesarean	301 (28.9)	152 (31.9)	
Fetal distress	30 (10.3)	22 (14.4)	0.15
Repeat cesarean	170 (56.4)	79 (51.9)	0.36
CPD	15 (5.1)	10 (6.5)	0.48
Others	86 (28.5)	41 (26.9)	0.72
Birth weight (g)	3220 ± 618	3258 ± 490	0.44
1-minute Apgar score	7.7 ± 1.4	7.8 ± 0.9	0.544
5-minute Apgar score	9.4 ± 1.5	9.6 ± 1.1	0.539
Intrauterine fetal death (n,%)	18 (1.7)	3 (0.06)	0.089
Meconium stained (n,%)	11 (1.1)	7 (1.5)	0.49

Values are given as mean ± SD, median (range) or number (percentage) as indicated. CPD: cephalopelvic disproportion.

Discussion

NC is a common finding in delivery, and many studies have suggested that the condition is benign. However, very few studies have investigated perinatal outcomes of antenatally detected NC. In addition, there is no consensus on counseling and management of patients with NC detected during the antenatal period or labor. The present data suggest that NC is not associated with adverse perinatal outcomes.

Several studies regarding the impacts of NC on intrapartum events and perinatal outcome have yielded conflicting results. A moderately tight NC has been suggested to impair cephalic venous blood flow only, whereas a very tight NC can compromise the umbilical circulation and produce systemic hypoxia, hypercapnia, and acidemia, and has also been implicated in fetal growth restriction and intrauterine fetal death [11-14]. Qin *et al.* prospectively studied 180 uncomplicated pregnancies in vertex presentation during labor, and reported no significant differences in pregnancy outcome with respect to evidence of fetal distress between NC and non-NC groups [15]. González-Quintero *et al.* did not find any association between sonographically detected NC and adverse perinatal outcomes [5]. Strong *et al.* reported significantly increased incidences of meconium-stained amniotic fluid and non-reassuring fetal heart rate patterns in NC cases with oligohydramnios [16]. In a large population-based study involving 24,392 deliveries with NC and 141,926 deliveries without NC, Sheiner *et al.* found that NC was not associated with adverse perinatal outcomes [17]. The present results

were generally in agreement with those of previous studies, i.e., the authors did not observe any increases in rates of intrapartum events or adverse perinatal outcomes in patients with NC.

NC is generally not considered an important factor in clinical management at delivery. Although the association between NC and Apgar score is still controversial, many reports support the conclusion that NC is not a major cause of fetal asphyxia and mortality [18,19]. Rhoades *et al.* found a significantly higher incidence of low five-minute Apgar score in NC cases [9]. Two independent research groups found significantly higher rates of low Apgar scores at one minute but not at five minutes among NC cases compared to controls [8,20]. In contrast, Assimakopoulos *et al.* reported lower Apgar scores at both one and five minutes in cases of NC [4]. Peregrine *et al.* reported that NC did not significantly increase the risk of Apgar score < 7 at one minute [21]. Singh *et al.* reported lower Apgar scores at one minute among NC cases with tight loops [3]. In the present study, the authors found no significant differences in Apgar scores at one and five minutes between the NC group and controls.

Questions regarding the appropriate mode of delivery in patients with NC are long-standing. Singh *et al.* reported that NC was not associated with increased frequencies of primary cesarean or vacuum deliveries [3]. Jauniaux *et al.* found a significantly higher incidence of emergency cesarean section in cases of NC compared to controls [8]. Larson *et al.* examined the records of 8,565 deliveries and reported that the presence of multiple NCs was associated with a greater need for operative vaginal delivery but not for cesarean section [20]. In contrast, other researchers found significantly lower rates of cesarean section among NC cases at the time of delivery [17, 22]. Therefore, although NC is not relevant for delivery procedures, it may have an effect on setting the optimal time for delivery [19]. The present findings indicate that NC does not increase the chance of cesarean delivery.

Conclusion

Sonographically detected NC during the second and third trimesters of gestation is not associated with adverse perinatal outcomes. Although some clinicians prefer not to verify NC and would not inform the patient to avoid anxiety, others suggest that determination of NC should become an integral part of third trimester ultrasonographic examination, and that in such cases the patient should be guided to monitor fetal movements. Such recommendations are reasonable but caution is needed to prevent causing the parents unnecessary anxiety and to avoid over-treatment in a condition for which there is no firm evidence of adverse effects. Patients whose pregnancies display NC may be advised to report to the hospital as early as possible after the onset of labor or spontaneous rupture of membranes for electronic fetal monitoring.

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