

Nuchal Cord Encirclement & Birth Weight

Sumya Tahir Sayhood

Department of Obstetric and Gynecology, College of Medicine, University of Tikrit, Tikrit, Iraq

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Abstract

Nuchal cord encirclement is defined as the condition in which the umbilical cord is wound at least once around the neck of the fetus. The ultrasound is one of the very helpful tools for evaluation of fetus with possible Nuchal cord entanglement, especially color flow Doppler ultrasonography which is a reliable tool to detect Nuchal coiling of the umbilical cord, and therefore color Doppler waveforms assessment in nuchal cord entanglements might be helpful for clinicians to decide a closer surveillance in labor by using intra-partum cardio-toco-graphy. The aim of the study was to determine if the presence of a single or multiple nuchal cord encirclement has a negative effect on fetal growth. This study was conducted at Tikrit Teaching Hospital. All live borns, single and multiple births during the study period (August 2008 to July 2009) were examined they were 3972 including term and preterm labor. Of them 271 have nuchal cord encirclement, of those 34 have multiple encirclement and 237 have single encirclement. The collected data were divided into those with encirclement and those without. The effect of nuchal cord on the birth weight according to the gestational age, sex of the neonate and the parity of the mother has been evaluated. There was no significant association between the diagnosis of growth restriction and the presence of cord encirclement. The mean birth weight was not significantly different in the presence of a single or multiple nuchal cord encirclement than without encirclement. The conclusion was that whether the nuchal cord encirclement is single or multiple, it has no significant effect on birth weight.

التفاف الحبل السري ووزن الطفل ساعة الولادة

سمية طاهر صيهود

المستخلص

التفاف الحبل السري حول الرقبة يعرف على أنه الحبل السري يلتف على الاقل مرة واحدة حول رقبة الجنين. يعتبر السونار واحد من اكثر الادوات المستخدمة في تقييم وضع الجنين الذي لديه احتمالية التفاف الحبل السري خصوصا الدوبلر الملون الذي يمتلك قابلية تشخيصية عالية لذا يساعد الاطباء السريريين في تقييم وضع الجنين خلال الولادة. ان الهدف من هذه الدراسة هو لتحديد اذا كان التفاف الحبل السري حول الرقبة مرة أو أكثر له تأثيرات سلبية على وزن الجنين ونموه داخل الرحم. اجريت الدراسة في مستشفى تكريت التعليمي، كل الولادات الحية للاطفال شملتهم الدراسة في الفترة من اب 2008 حتى تموز 2009، وكان عددهم 3972 والذين يتضمنون اطفال خدج واطفال كاملين. 271 منهم لديهم التفاف الحبل السري، 34 منهم أكثر من مرة و 237 مرة واحدة. العينات قسمت الى تلك التي تتضمن اطفال لا يعانون من التفاف الحبل السري واطفال لديهم التفاف. ان تأثيرات التفاف الحبل السري حول الرقبة حسب عمر وجنس الجنين قيمت ولا يوجد رابط يذكر بين التفاف الحبل السري وتأخر نمو الجنين داخل الرحم. معدل وزن الطفل ساعة الولادة لم يتأثر بوجود لفة واحدة أو أكثر حول الرقبة. الاستنتاج كان عدم وجود أي تأثير لعدد لفات الحبل السري حول الرقبة على وزن الجنين ساعة الولادة.

Introduction

Fetal growth

Human fetal growth is characterized by sequential patterns of tissue and organ growth differentiation, and maturation. These patterns are determined by maternal provision of substrate, placenta transfer of these substrate, and fetal growth potential, which governed by the genome (1). Fetal growth has been divided into three consecutive cell growth phases (2). The initial phase of hyperplasia occurs during the 1st 16 weeks and is characterized by a rapid increase in cell number. The 2nd phase which extends up to 32 weeks included both cellular hyperplasia and hypertrophy. After 32 weeks, fetal growth occurs via cellular hypertrophy, during this phase that most fetal fat and glycogen deposition takes place. The corresponding fetal growth rate during these three cell growth phases are from 5 gm per day at 15 weeks, 15-20 gm per day at 24 weeks and 30-35 gm per day at 34 weeks respectively (3-6).

Umbilical Cord

The umbilical cord forms the major connection between the fetus and the placenta. It is derived from the stalk and receives a closed covering of amniotic epithelium (7-9).

The constituents of the umbilical cord are:

1. The covering epithelium.
2. Wharton's jelly.
3. Blood vessels
4. The umbilical vesicles and its duct.
5. The allantois

The Nuchal cord encirclement

The cord is often coiled around the fetal body limbs or neck, but seldom does it give rise to any serious trouble (10,11). Fortunately coiling of the cord around the neck is an uncommon cause of fetal death (12,13). Tension on the cord then occur during the 2nd stage of labor when the fetus descend in the birth canal such tension may obstruct

the fetopelvic circulation leading to fetal distress (14,15).

Subjects and methods

This study was conducted at Tikrit Teaching Hospital for the period from August 2008 to July 2009. Certain items were measured for all infants born in the delivery room during this period. These items were arranged in a questionnaire sheet as follow:

1. Order number
2. Sex.
3. Fetal weight.
4. Gestational age.
5. Maternal causes of low birth weight.
6. Fetal and neonatal causes of low birth weight.
7. Congenital anomalies of the infant.

After that the data collected were the newborn divided into those with nuchal cord encirclement and those without. The encirclement group was divided according to gestational age (term and preterm), their birth weight number of encirclement, and sex of the neonate. Those who born with intrauterine growth restriction (IUGR) were divided into 2 groups, those with nuchal cord encirclement, and those without, the IUGR group with nuchal cord encirclement that have causes for IUGR were excluded from the study. Computer program was used to calculate P value using Chi-square test to determine the significance of the statistical association.

Results

Total number of the deliveries during the study period was 4655. Only 3972 were involved in the study because of loss of some data of the other 683 newborn so they excluded from the study. Of them 271 had nuchal cord encirclement (NCE); giving incidence

6%. The number of IUGR was 323 live births. In 146 IUGR newborn there were identified causes for IUGR, only 8 of them had NCE giving incidence (8/146) 5.5%. One hundred seventy seven IUGR newborn had no obvious causes, only 6 of them had NCE giving incidence of (6/177) 3.4%. Thus total number of NCE in IUGR group was 14 (8 with identified causes and 6

without), giving incidence of (14/323) 4.3%. The causes of IUGR group with NCE includes were;

1. Hypertension.
2. Congenital anomalies.
3. Anemia.
4. Twin.
5. Heart disease.
6. Hyperthyroidism.
7. Repetitive attacks of bleeding.

Table (1):- Comparisons between NCE group with those without NCE in relation to IUGR.

IUGR	With encirclement		Without		X ² value
	No.	%	No.	%	
With causes	8	5.5	138	94.5	0.359
Without	6	3.4	171	96.6	
Total	14	4.3	309	95.7	

Not significant

Table (2):- Comparisons between NCE group with those without NCE in regard to birth weight.

Birth weight(preterm & term)	With encirclement		Without		Total		P value
	No.	%	No.	%	No.	%	
<2.5 Kg	21	6.4	309	93.6	330	8.3	>0.05
≥2.5 Kg	250	6.8	3392	93.2	3642	91.7	
Total	271	6.8	3701	93.2	3972	100	

Not significant

Table(3):- Comparisons between single and multiple NCE in relation to birth weight.

Birth weight	Single encirclement		Multiple encirclement		Total NCE	
	No.	%	No.	%	No.	%
<2.5Kg	21	100	0	0	21	7.7
≥2.5Kg	250	88.4	29	11.6	250	92.3
Total	271	89.3	29	10.7	271	100

Table (4):- Comparisons between term and preterm newborn in relation to number of encirclements

Gestational age	Single encirclement		Multiple encirclement		Total	P value
	No.	%	No.	%		
33-36wk	7	50	7	50	14	0.0001*
37-42wk	235	91.4	22	9.6	257	
Total	242	89.3	29	10.7	271	

* Significant

Table (5):- The relation between the sex of the neonate and the number of encirclements.

Sex	Single encirclement		Multiple encirclement		Total	X ² value
	No.	%	No.	%		
Male	101	82.8	11	11.2	122	0.694
Female	141	88.7	18	11.3	159	
Total	242	88.3	29	11.7	271	

Not significant

Discussion

The umbilical cord or funis, extends from the fetal umbilicus to the fetal surface of the placenta or chorionic plate (16,17). Mc Lennan (18) noted, in a study, of 1115 vaginal deliveries, that no clinical indicators warned of stillbirth risk from umbilical cord complication. Larson *et al.* (19) stated that prenatal ultrasound examination permit the visualization of umbilical cord encirclement around the fetal neck, and nuchal cord encirclement are associated with a longer umbilical cord and with non reassuring fetal heart rate patterns during labor. This was shown in our study by longer umbilical cord length with more nuchal cord encirclement. For single encirclement the cord length ranged between 55-64 cm, while with multiple encirclement, cord length ranged between 65-94 cm. The current study revealed that birth weights were not different in the presence of a single or multiple cord encirclement than with no encirclement

(3.400±650g, 3.200±600g and 3.150±700g respectively). This was in concordance with that of Carey & Rayburn and Mc Lennan (16, 18), who stated that birth weight not different in the presence of a single or multiple nuchal cord encirclement than with no encirclement after controlling for gestational age (20,21). The present research also showed that the mean birth weight was not different in the presence of a single or multiple nuchal cord encirclement, and there was no association between the diagnosis of growth restriction and the presence of a cord encirclement (6.8% and 93.2% respectively; P>0.05).

Conclusion

1. Birth weight is unaffected by a single or multiple nuchal cord encirclement.
2. There was no association between the diagnosis of growth

restriction and the presence of cord encirclement.

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