Medico-legal issues of the nuchal cord at birth

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Abstract: Introduction. The aim of this study was to identify the incidence of the nuchal cord at birth in our clinic, it's impact on the fetal and neonatal evolution in correlation with the adopted way of delivery and to debate the medico-legal associated issues related to this condition.

Material and methods. The study included the evaluation of 1996 women that delivered in Clinical Emergency Hospital “Saint John”, “Bucur” Maternity from January 1st, 2015 to December 31st, 2015. We studied the presence and type of the nuchal cord at delivery, the APGAR score, the correlation between APGAR score and nuchal cord identification and the antepartum ultrasound diagnosis of the nuchal cord.

Results. Our retrospective study included 819 patients. The delivery mode was: vaginal in 67.28% and by Caesarean section in 32.72% cases. The APGAR score less than 7 represented 0.5%. It was identified that cord pathology did not correlate well with the APGAR score. The children with APGAR score less than 7 were delivered in most of cases by Caesarian section (64.3%), but only 15.3% of the indication were for fetal distress. Ultrasound prenatal scan identified multiple nuchal cord loop in 34.7% cases and was confirmed in 93% cases after delivery.

Conclusion. Nuchal cord at birth is a frequent finding and the study shows that, in most case there is no association between its presence and poor neonatal outcome. The presence of nuchal cord at ultrasound scan in the third trimester or in the labour ward does not impose Caesarian section delivery.

Key Words: nuchal cord, antepartum diagnosis, medico-legal implication, APGAR score.

The new provisions of the Penal Code concerning the fetus arises serious issues concerning medical liability related to birth assistance but also to the prenatal diagnosis. Among the many factors the nuchal cord can affect neonatal outcome by different mechanisms that can causefetal hypoxia and neonatal asphyxia followed by cerebral palsy [1].

The nuchal cord is described as the umbilical cord around the fetal neck. It is classified as simple or multiple, loose or tight with the compression of the fetal neck. The term nuchal cord represents an umbilical cord that passes 360 degrees around the fetal neck [2]. The nuchal cord can be diagnosed before birth only by using ultrasound. Without ultrasound scan the presence of nuchal cord remains an intrapartum finding which can affect neonatal outcome and may have maternal important psychological effects arising medico-legal issues. When a poor neonatal state of various degree (from low APGAR index, respiratory distress, low tonus or in the worse scenario neurological impairment and asphyxicencephalopathy) is involved, usually medico-legal expertise is required in order to establish medical liability. In the absence of clinical guidelines concerning the mandatory of prenatal diagnosis of the nuchal cord

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and its management the best way to act and is difficult to settle.

The aim of this study was to identify the incidence of the nuchal cord at birth in our clinic, its impact on the fetal and neonatal evolution in correlation with the adopted way of delivery and to debate the medico-legal associated issues related to this condition.

MATERIAL AND METHODS

The study included the evaluation of 1996 women that delivered in Clinical Emergency Hospital “Saint John”, “Bucur” Maternity from January 1st, 2015 to December 31st, 2015. It is a retrospective study that imposed the evaluation of the medical file of each patient. There were selected only the pregnancies where the fetus presented fetal nuchal cord at delivery time. The study was focused on the following parameters: epidemiological data, presence and type of the nuchal cord at delivery, the APGAR score, the correlation between APGAR score and nuchal cord identification and the antepartum ultrasound diagnosis of the nuchal cord.

The information was centralized in a database created using SPSS, version 19.9 and statistical analysis of all patients was conducted in SPSS. All data were coded numerically. There were calculated frequencies and combinations of parameters and correlations between parameters using the Pearson correlation P value <0.05 was considered statistically significant.

RESULTS

Our study included a retrospective evaluation of 1996 patients. Among them 819 new born were found with nuchal cord presence at birth, which represents an incidence of 24.37% births. Most women in the study group were aged at the time of delivery between 26 and 30 years, representing 33% of total ranks followed by women between 19 and 25 years with a rate of 28.3%.

The delivery mode was: vaginal in 67.28% cases while Cesarean section was necessary in 32.72% cases. 98.3% of the babies were born in cranial presentation, 1.3% in breech presentation and only 0.4% in transverse presentation. The umbilical cord pathology occurred more frequent in male newborn 54.3% and in 45.7% female.

It was observed that the majority of the babies were born with APGAR score of 9 (n = 549), (67.03%) followed by those with 10 APGAR score (n = 143), (17.46%), 8 APGAR score (n = 98), (11.97%) 7 APGAR score (n = 19), 6 APGAR score (n = 7), 4 APGAR score (n = 1), 3 APGAR score (n = 1) and one case with APGAR score 1 of 1 point (n = 1). The APGAR score less than 7 represented only 0.5% of the total. It was identified that cord pathology did not correlate well with the APGAR score. The children with APGAR score less than 7 were delivered in most of cases by Cesarean section (64.3%), but only 15.3% of the indications were for fetal distress.

We evaluated the children days of hospitalization and APGAR score in children with nuchal cord. From this statistical analysis it was observed a negative correlation (R = -0.314 for p = 0.000) statistically significant between APGAR score of children with umbilical cord pathology and number of days of hospitalization of patients. This is shown by the value of p which is less than 0.05.

In 398 cases of 819 cases the umbilical cord pathology was identified using ultrasound examination. A number of 122 patients did not benefit of prenatal care or ultrasound examination. Among the patients with ultrasound umbilical cord anomalies it was observed the nuchal cord in 380 cases, real nuchal knot in 7 cases (confirmed after delivery) and umbilical cord prolapse in 2 situations.

A percentage of 32.72% cases of patients with nuchal cord delivered by Cesarean section justified by different reasons. We were interested by fetal distress as the main indication which proved as low (3.4%). Moreover the babies delivered by Cesarean section for fetal distress had an APGAR score less than 7 in 1.5% of cases. Correlating the figures the incidence of C section was not influenced by antepartum nuchal cord ultrasound identification.

Ultrasound prenatal scan identified multiple nuchal cord in 34.7% cases and was confirmed in 93% cases after delivery as multiple, but the number of loops observed in ultrasound were less than after delivery in 24.3% cases. It was noted a special case with 5 nuchal cord loops that imposed Cesarean section for fetal distress. In that case the pregnancy was not benefit of prenatal care.

DISCUSSION

The prevalence of nuchal cord at delivery, as related 28.2-33.7% [3, 4] apparently increases in advancing gestations [5]. About 25–50% constituted at one time during pregnancy will resolve by delivery time [6] and more than 60% of fetuses will have a nuchal cord present at some time during pregnancy [7]. According to the literature, that nuchal cord is associated with non reassuring fetal heart rate during labor [8]. A study investigating cerebral palsy in infants reported that a tight nuchal cord is a risk factor for spastic cerebral palsy and spastic quadriplegia [1].

The diagnosis of a nuchal cord is not routinely made until delivery; however, it may be suspected before delivery due to the presence of variable decelerations in the fetal heart rate on the cardio tographic recording during labor [9].

Nuchal cord can be identified by ultrasound before birth. Ultrasound diagnosis of a nuchal cord was first described in 1982 by Jouppila and Kirkinen [10] and
since then there have been a few case reports in which ultrasound diagnosis has helped obstetric management [11]. More accurate for diagnosis is the use of color Doppler imaging which can also provide information of the flow restriction in the loops [12]. Generally, the accuracy is higher with color Doppler imaging and it may have a particular advantage in the presence of ruptured membranes when considering the lack of amniotic fluid the diagnosis can be difficult. Three-dimensional ultrasound has little advantage over color Doppler imaging [13].

A lot of studies debated over the influence of nuchal cord on perinatal outcomes, and some studies have focused on the effect of multiple, tight nuchal cords and association with other abnormalities such as poor cord coiling, scarce Wharton jelly etc. Many nuchal cords can be predicted easily using antenatal Doppler ultrasonography [14], and have been reported to be associated with decreased conditions that impairs neonatal outcome: low birth weight [15], increased risk of meconium aspiration during labor [16], fetal distress [17], and emergency cesarean delivery [18].

The presence of a nuchal cord has been associated with many factors in the mother, fetus, cord, labor and with a less good fetal outcome. There are reports of associations with breech presentation, increased fetal activity [19], a male fetus, abnormal umbilical artery Doppler findings [20], abnormal ductusvenosus [21], variable decelerations of the fetal heart rate [22], induction of labor [23], emergency lower segment Cesarean section [24], low APGAR scores [25], stillbirth [26], neonatal anemia [27], cerebral palsy [28], shoulder dystocia [29]. The impact of a nuchal cord on induction of labor is unknown and are not enough studies in this group of women. In a recent retrospective case control study Rhoades et al. observe that a nuchal cord was actually an independent risk factor for induction of labor [30].

Prenatal diagnosis is probable to be of limited use in an uncomplicated cephalic pregnancy. It seems appropriate that if the diagnosis is done in the third trimester the sonographer should ask about fetal movements and investigate fetal growth, amniotic fluid volume and fetal cardiotocography to detect the fetus at risk and intervene if these parameters are not optimal [31].

Nuchal cord has been consistently associated with an increased rate of fetal heart rate abnormalities, so there has been care that this might cause to a higher chance of Cesarean section for presumed fetal distress [32].

Involving nuchal cord as a risk factor for adverse perinatal outcome, might increase cesarean rates on patient’s request due to maternal anxiety [33].

Most cases of nuchal cord are not associated with perinatal morbidity and mortality. Cardiorespiratory and neurological signs and symptoms are associated with unique physical features that occur secondary to tight cord-round-the-neck [34]. A small number of studies have present that nuchal cord and or tight cord-round-the-neck (tCAN syndrome) can influence the outcome of delivery and may have long-term effects on the infant [35] and but as a causal factor for stillbirth it is uncertain [36, 37]. It is the physical characteristics of tCAN syndrome that distinguishes it from birth asphyxia. Umbilical cord abnormalities are considered as one of the main factor responsible for birth asphyxia. The occurrence of tCAN symptomatology seems to produce both in the presence of normal and depressed APGAR scores [38].

The main mechanisms involved in fetal hypoxia and even encephalopathy are compression of umbilical cord, compression of carotid artery, congestion of venous blood flow. Umbilical cord compression may induce obstruction of blood flow first in thin walled umbilical vein, while blood continues to be pumped through the thicker walled umbilical arteries thus determining hypovolemia and hypotension resulting in acidosis [39]. Anemia and mild respiratory distress may appear [40, 41].

Considering all those possible risks and adverse there can be raised two important legal issues related to the deliveries of fetuses with nuchal cord, concerning the obligation of prenatally diagnostic of the condition and concerning the obstetrical management of such a pregnancy.

The results of our study failed to identify a strong correlation between the presence of nuchal cord diagnosed prenatally and the poor neonatal outcome. In Romania there is no obligation in the recommended guidelines for ultrasound evaluation late in the third trimester or before birth. To note the presence of a nuchal cord in otherwise a normal pregnancy can only induce anxiety for the couple and a possible culpable if anything goes wrong. Moreover at the couple insistence it can raise the C section rate without reasonable benefits.

On the other hand being warned of a possible condition that can turn into a problem or worsen and ad to other pathology (such IUGR, Oligoamnios, prematurity) during labour can be of tremendous help for the obstetrician. The fetal heart rate monitoring (CTG) continuous or intermittent is the most important sign of fetal distress and is an mandatory with or without the diagnostic of nuchal cord. As stated above, the presence of nuchal cord in labour can manifest by abnormal patterns of fetal heart rate (variable decelerations, bradycardia) and impose immediate action in order to prevent fetal hypoxia. Although nuchal cord is not an indication for C section delivery by itself it can turn into one at any time during labour and especially after membrane rupture. Therefore lacking of optimal monitoring of the fetal heart rate can involve medical liability.
CONCLUSIONS

Nuchal cord at birth is a frequent finding and the study shows that, in most case there is no association between its presence and poor neonatal outcome. Association with other prognosis factors such as oligoamnios, chronic fetal distress, IUGR or acute intrapartum accidents are prone to raise de risk for low APGAR index, emergency Cesarean section or instrumental delivery.

Considering the low association with poor neonatal outcome antepartum diagnosis of the nuchal cord is not mandatory in practice and the obstetrician cannot be liable for not performing it.

The presence of nuchal cord at ultrasound scan in the third trimester or in the labour ward does not impose Cesarean section delivery since in the majority of cases the birth is uneventful and the risks of C section are not justified.

The most frequent sign of nuchal cord pathology is the occurrence of fetal hearth abnormalities on CTG which usually commend active attitude of the obstetrician in order to extract the fetus from the unfavourable environment.

Conflict of interest. The authors declare that they have no conflict of interest concerning this article.

References