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Endoscopic determination of umbilical cord complications in labor

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1 Introduction

Umbilical cord complications play a leading role in the structure of perinatal morbidity and mortality.

Thus, according to BRUCE et al. [2], who analyzed 8038 deliveries, various types of umbilical cord complications caused still-birth in 14.5%, asphyxia in 6.4% and postnatal deaths in 3.1%.

Almost the same results were obtained by other authors [8, 10].

However, when the presence of umbilical cord pathology is diagnosed in time and the proper obstetrical tactics are chosen, the morbidity and mortality rate do not differ from average data [5, 8, 10].

2 Material and Method

60 women with premature rupture of membranes were examined in labor. Indications for endoscopic examination of the fetus were based on suspected umbilical cord pathology after cardiocography, which showed signs of fetal hypoxia with no other apparent cause.

For endoscopic examination we used the intra-operational cholodochofibroscope "Olympus" / Japan / with detectable distal end. The length of endoscopic zond is 65 cm, it's thickness is 5,8 mm the angle of vision is 75°. For sterilisation of endoscope we used 96% alcohol for 90 min. The fibroscope was introduced into the amniotic cavity through the cervical channel under constant manual control. The smallest dilatation of

Curriculum vitae

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the cervix, necessary for the introduction of fibroscope is 2 cm, but it's also possible to perform endoscopic examination at the beginning of II period of labor. The further movements of fibroscope were under visual control to avoid possible trauma for fetus and women. The distance between the distal end of the fibroscope and the subject varies from 3 to 50 mm. The procedure lasts for not more than 15 min. and does not cause any discomfort to the women. As there is no data in literature on possible effects for the child and mother and we had no experience prior to this study, all the newborns and puerperas underwent thorough examination. In this study we compared results obtained in two groups of women with umbilical cord complications in both groups;

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group I (60 cases) examined endoscopically in labor and group II (60 cases) without endoscopic examination. For evaluation of the status of newborns in our examination we used APGAR score.

3 Results

To detect possible umbilical cord loops around the fetal neck, the end of the fibroscope was inserted into the amniotic cavity as deep as 20–25 cm. In fetuses thus examined a single loop of the umbilical cord around the neck was found in 23 cases (38.3%), which appeared as a blue-white cord-like structure with dark-blue vessels under its surface. When the loop is found it is possible to determine the degree of its tightness and the number of loops around the neck. In 4 cases (6.7%) two loops of the umbilical cord around the fetal neck filling the cervical groove were seen (Fig. 1). In cases when two loops were seen it was not always possible to determine if there were more loops around the neck (three, four or

more), as the ones already seen were thick enough to fill the groove completely.

On the next stage of examination when the endoscope is introduced to the depth of 35–40 cm. into the amniotic cavity in some cases it was possible to see the umbilical cord still further and to visualise its loops around the torso or extremities of the fetus (7 cases – 11.7%).

The diagnosis of knots in the umbilical cord presents a more complicated problem as it is not always possible to follow the full length of the cord, while the knot may be situated in that part of it which is behind or under the body of the fetus. But when the knot is in the part of the cord which is observed it can be distinguished from a false knot (Fig. 2).

In 57 cases (95%) the results of endoscopic examination coincided with ones after the birth. In 3 cases (5%) the results were false-negative, probably due to high turbidity of amniotic fluid. In 10 fetuses with the characteristic changes of F. H. R. no umbilical cord anomalies were found.

Fig. 1. Double looping of the umbilical cord around fetal neck.

The fact that the discovery of umbilical cord complications in early stages of labor and reasonable assessment of possible hazards to the fetus resulting from such complications led to re-evaluation of the whole obstetrical situation and to an increased number of operative deliveries (Tab. I) while there was a noted decrease in the number of intranatal deaths and fetuses born with severe asphyxia (Tab. II).

Tab. I. Incidence and type of operative deliveries in both groups.

type of operation	group I (examined endoscopically)	group II (not examined endoscopically)
caesarean section	7 (11.7%)	3 (5%)
forceps deliveries	16 (26.7%)	9 (15%)
deliveries by vacuum-extraction	2 (3.3%)	6 (9%)
perineotomia	24 (40%)	15 (25%)

Tab. II. Incidence of complications for the fetuses both groups.

type of complication	group I (examined endoscopically)	group II (not examined endoscopically)
moderate asphyxia (APGAR score – 5–6)	12 (20%)	14 (23.3%)
severe asphyxia (APGAR score – 1–4)	2 (3.3%)	8 (13.3%)
intranatal deaths	1 (1.7%)	6 (10%)

Early neonatal period was uncomplicated in all cases. Postpartum period was normal in 41 women (68.3%), complicated by subinvolution of the uterus in 5 (8.3%), endometritis in 1 (1.7%), postpartum subfebrility in 6 cases (10%). We saw no dependence between the cases of postpartum infection and time of introduction of the scope to the delivery.

Fig. 2. True knot of the umbilical cord.

4 Discussion

Umbilical cord pathology is the most common cause of acute fetal hypoxia during labor. Various methods were proposed for diagnosis of umbilical cord complications. The most characteristic EKG and FKG symptoms are persistent variations of the fetal cardiac tone's amplitude and systolic murmur. The percentage of diagnostic mistakes is 30% [1, 6].

According to JAMES et al. [7], MENDEZ-BAUER et al. [9], DEMIDOV et al. [4], whose studies were based on cardiotocographical determination of umbilical cord pathology V-or W-shaped, early and variable decelerations and transient accelerations can be registered in these cases.

However, the number of diagnostical mistakes in attempts to determine the presence of disorders of the umbilical cord in their studies were as high

as 20 to 40%. The special methods to detect such disorders proposed by HON, BLOCH led to a still bigger number of successful diagnoses. DEMIDOV et al. [3] used ultrasonic scanning and DOPPLER — sond equipment for detecting umbilical cord pathology. Their findings proved to be true in 80.5%. The wrong data they obtained according to their opinion was due to marked thinness of the umbilical cord and high motor activity of the fetus.

Recently the paper appeared presented by TAKE-MURA et al. [11], dealing with endoscopic examination in labor but without detailed description of umbilical cord, let alone its pathology.

The method presented in this paper not only enables detecting umbilical cord pathology but also to determine its particular type with high degree of reliability and, if necessary to change obstetrical tactics in the early stages of labor for the benefit of the fetus.

Summary

Umbilical cord complications are the most frequent cause of perinatal morbidity and mortality [2, 8, 10]. But when the umbilical pathology is diagnosed in time the prognosis for the fetus is better.

60 women with premature rupture of membranes were examined in labor with the help of an endoscope which was inserted into the amniotic cavity.

The indications for the endoscopic examinations were suspicious on umbilical cord pathology after cardiotocography. In our study we also compared results obtained in two groups with the umbilical cord pathology: Group I — examined endoscopically in labor and group II (60 cases) — without endoscopic examination.

For detection of possible looping of umbilical cord around the fetal neck one should insert the distal end of fibroscope as deep as 20–25 cm. In cases of a single loop around the neck (23 cases — 38.3%) a blue-white cord-like structure with dark-blue vessels under its surface can be visualised.

Thus, we diagnosed the presence of two and more loops around the fetal neck also around its body and extremities.

The determination of true and false knots of the umbilical cord during labor is a more complicated task because it

is not always possible to follow the full length of the cord.

In 95% the endoscopic results coincided with ones after the birth. In 5% the results were false negative.

When the pathology of the umbilical cord was diagnosed in time the whole obstetrical tactic was changed. Thus the number of caesarean sections in I group was 11.7% against 5% in the II group; forceps deliveries were in 26.7% in the I group against 15% in the II; deliveries by vacuum-extraction were in 3.3% against 9% in the II group.

When comparing the results for the fetus the number of intranatal deaths were higher in 6 cases in the II group, the number of neonates, born with severe asphyxia was also higher in 4 cases.

In recent years great progress has been obtained in the diagnosis of umbilical cord pathology with the use of ECG, FCG, cardiotocography [1, 3, 4, 5, 6, 9]. But the number of false results was 20–40%. The use of endoscopic examination makes it possible to reduce the number of diagnostical mistakes. Endoscopic examination allows to determine the concrete type of umbilical cord pathology which helps to choose the proper obstetrical tactic for the benefit of the fetus.

Keywords: Endoscopic examination, extremities, loops of umbilical cord around fetal neck, torso, true and false knots, umbilical cord complications.

Zusammenfassung

Endoskopische Überwachung von Nabelschnurkomplikationen unter der Geburt

Nabelschnurkomplikationen sind die häufigste Ursache in perinatalen Morbiditäts- und Mortalitätsstatistiken [2, 8, 10]. Können die Komplikationen jedoch rechtzeitig diagnostiziert werden, ergibt sich eine günstigere Prognose für den Feten.

Wir untersuchten 60 Frauen mit vorzeitigem Blasensprung (Gruppe I) und setzten während der Geburt ein Endoskop in die Amnionhöhle ein. Als Indikation für die Endoskopie galt ein Verdacht auf Nabelschnurkomplikationen nach kardiotokographischer Überwachung. Die Ergebnisse wurden mit einer Kontrollgruppe (Gruppe II) verglichen, die ebenfalls aus 60 Frauen mit Nabelschnurkomplikationen bestand, in der aber keine endoskopische Überwachung vorgenommen wurde.

Um Nabelschnurumschlingungen um den Hals auffinden zu können, sollte das distale Ende etwa 20–25 cm tief eingeschoben werden. Liegt nur eine einzige Schlinge um den Hals vor (23 Fälle – 38,3%), so kann man diese als blau-weiße schnürige Struktur mit tiefblauen Gefäßen unter der Oberfläche wahrnehmen. Auch zwei und mehr Umschlingungen um den Hals wie um Körper und Extremitäten konnten wir auf diesem Wege nachweisen.

Weitaus schwieriger ist die Diagnose wahrer bzw. falscher Knoten, da es nicht immer möglich ist, die Nabelschnur in ihrer ganzen Länge zu verfolgen.

In 95% erwies sich die endoskopische Diagnose als richtig, 5% der Ergebnisse waren falsch negativ.

Im Falle der rechtzeitigen Diagnose einer Nabelschnurkomplikation wurde das geburtshilfliche Vorgehen der Situation angepaßt; d.h., die Rate der Kaiserschnitte lag in Gruppe I bei 11,7% gegenüber 5% in der Gruppe II. Zangenentbindungen kamen in Gruppe I mit 26,7% vor, in Gruppe II mit 15%. Vakuumextraktionen wurden zu nur 3,3% in der Gruppe I durchgeführt, in Gruppe II dagegen zu 9%.

Vergleicht man die Gruppen unter dem Gesichtspunkt der fetalen Mortalität und Morbidität, so war erstens die intranatale Sterblichkeit in Gruppe II sechsmal höher als in Gruppe I und zweitens die Anzahl der Neugeborenen mit schwerer Asphyxie in Gruppe II vierfach erhöht gegenüber der Gruppe I.

In den letzten Jahren konnte Nabelschnurkomplikationen durch Einsatz von ECG, FCG und CTG häufig erfolgreich prognostiziert werden [1, 3, 4, 5, 6, 9]. Dennoch lag die Rate von falschen Diagnosen zwischen 20 und 40%. Die endoskopische Überwachung ermöglicht es, Fehldiagnosen zu reduzieren. Sie ermöglicht weiterhin eine Aussage darüber, welche Art von Nabelschnurkomplikation vorliegt, so daß Entscheidungshilfen für das adäquate geburtshilfliche Vorgehen gegeben werden.

Schlüsselwörter: Endoskopische Überwachung, Körper und Extremitäten, Nabelschnurkomplikationen, Nabelschnurumschlingungen um Hals, Körper und Extremitäten, wahre und falsche Knoten.

Résumé

Le diagnostic endoscopique des complications ombilicales pendant le travail

Les complications ombilicales sont la cause la plus fréquente de la mortalité et la morbidité périnatales [2, 8, 10]. Le pronostic fetal est meilleur lorsque la pathologie ombilicale est diagnostiquée plus tôt.

60 parturientes ont été examinées pendant le travail après rupture prématurée des membranes, à l'aide d'un endoscope qui a été introduit dans la cavité amniotique.

Les indications de l'examen endoscopique étaient liées à la suspicion cardiotocographique de la pathologie ombilicale. Nous présentons dans ce travail les résultats obtenus dans deux groupes à pathologie cordonale: le groupe I – ayant été examiné endoscopiquement pendant le travail et le groupe II (60 cas) – sans investigation endoscopique.

Afin d'observer des circulaires du cordon il est nécessaire d'introduire l'endoscope d'environ 20 à 25 cm. En cas de circulaire unique nous avons visualisé dans 23 cas – 38,3% une structure ressemblant à un cordon bleu-blanchâtre avec des vaisseaux bleu-sombre, au dessous de sa surface.

Par ailleurs nous avons pu observer des circulaires multiples, autour du cou, du corps et des extrémités fœtales.

L'observation de noeuds vrais ou faux du cordon pendant le travail est plus ardue du fait qu'il n'est pas toujours possible de suivre le cordon sur toute sa longueur.

Le résultat endoscopique correspondait au diagnostic postnatal dans 95% des cas; 5% étaient des faux-négatifs.

Toute la tactique obstétricale était changée lorsque un cordon ombilical pathologique avait pu être observé. Le taux de césariennes s'élevait à 11,7% alors qu'il n'était que de 5% dans le groupe témoin. Le recours au forceps passait à 26,7% contre 15%; celui de la ventouse de 3,3% contre 9%.

La comparaison des résultats foetaux montre que la mortalité intranatale était 6 fois plus élevée dans le groupe II, le nombre de nouveau-nés avec asphyxie sévère était 4 fois plus élevé.

De grands progrès ont pu être obtenus ces dernières années dans le diagnostic de la pathologie ombilicale à l'aide de l'ECG, et la cardiotocographie [1, 3, 4, 5, 6, 9]. La proportion de faux résultats restait cependant d'environ 20 à 40%. L'utilisation de l'examen endoscopique permet d'éviter des erreurs de diagnostic. L'examen endoscopique permet de déterminer un type concret de pathologie ombilicale et aide au choix d'une tactique obstétricale adéquate pour le profit de l'enfant.

Mots-clés: Circulaires du cordon autour du cou, du corps ou des extrémités, complications du cordon ombilical, examen endoscopique, noeuds vrais ou faux du cordon.

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