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**MAGNETIC RESONANCE PELVIMETRY IN SUBCLINICAL FORMS OF NARROW PELVIS
 AND SHOULDER DYSTOCIA RISK ASSESSMENT**

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SUMMARY

ПЕЛЬВИОМЕТРИЯ С ПОМОЩЬЮ ПРИМИНЕНИЯ ЯДЕРНО-МАГНИТНОГО РЕЗОНАНСА ПРИ СУБКЛИНИЧЕСКИХ ФОРМАХ УЗКОГО ТАЗА И ОПРЕДЕЛЕНИЯ РИСКА В СЛУЧАЕ ДИСТОЦИИ ПЛЕЧИКОВ

Во многих странах точность измерений размеров наружного таза сомнительна. Распространенность подтипов субклинически узкого костного таза еще более затрудняет диагностику.

Цель: установить акушерские МР пельвиометрические и фетометрические референсные значения при оценке риска дистоции плечиков плода перед родами и сравнить МР пельвиометрию с наружными методами измерения.

Методы: обследованы 40 женщин с одноплодной беременностью в сроке 38-39 недель. МР пельвиометрия производилась на высокопольном 1,5 Т MRT. Все субклинические типы узкого костного таза были разделены на 3 степени. Проводилась также фетометрия. Риск дистоции определялся как минимальный, возможный и высокий.

Результаты: Абсолютно узкий таз был выявлен у 3 женщин. Диаметр костного таза, измеренный на МРТ, был нормальным у 14 (35%) женщин. Двенадцати женщинам (30%) со 2 степенью узкого таза и/или крупным плодом (>4000 г) при отсутствии других противопоказаний было рекомендовано родоразрешение через естественные родовые пути, но 6 из них выполнено КС.

Заключение: низкая частота выявления субклинически узкого костного таза при наружных измерениях может приводить к запоздалой интранатальной диагностики этой патологии. МР пельвиометрия выявляла субклиническое сужение костного таза. Дополнительные данные фетометрии помогли оценить риск дистоции плечиков перед родами.

Introduction. In many countries accuracy of external pelvis measurements is considered to be questionable because of the high mistake value (up to 1.5 - 5 cm). Subclinical narrow bone pelvis subtypes predominance make the diagnostics even more compli-

cated. Assessment of pelvic cavity form and detection of all pelvic distances, distances of fetus head and chest-with-shoulders circumference followed with conclusion about their relevarion or discrepancy can be provided by complex data of rentrenopelvime-

try, sonographic cephalometry and computed tomography (CT) [1, 2]. Using of CT and rentgenopelvimetry is followed by high radiation exposure which is undesirable or even unacceptable in pregnant women. In 1980s different investigators used sonography to determine pelvic distances but its accuracy was low compared with other visualization methods [2, 3]. Examination with external transducer allows to determine only true conjugate, localization and dimensions of fetus head, and in delivery – degree of uteral cervix opening. Transvaginal panoramic transducer also doesn't permit accurate measuring of all pelvic distances which is conditioned by echo reflecting from pelvic bones and decreases accuracy and information of imaging [2, 3, 4].

Another disadvantage of rentgenopelvimetry is difficulty in true measurements of fetus head detection because of image summation [5].

Magnetic resonance tomography is a highly informative non-radiation imaging modality which allows

to evaluate anatomical state of a pregnant woman's pelvis, to detect all distances between bones and to measure true size of obstetric planes of pregnant woman pelvis as far as accurately evaluate the main fetometric rates using magnetic resonance imaging [2, 6, 7, 8].

Purpose: to establish obstetrics MR pelvimetric and fetometric reference values in fetal shoulder dystocia risk assessment before labor and to compare MR pelvimetry to external pelvis measurement method.

Methods. 40 pregnant women with one fetus and considered contracted pelvis and/or large fetus were examined using high-field 1.5 T MRI scanner systems "Siemens" and "Toshiba". MR-pelvimetry was performed for anatomically contracted pelvis or its latent forms and high-grade risk of maternal dystocia using *Mengert, Borell and Fernström, Thurnau, Abitbol* indexes and our fetal-pelvic conformity index [2, 9, 10, 11] (Table 1).

Table 1

Different indexes of contracted pelvis: diagnostic effectiveness

Criteria	Index				
	Mengert	Borell and Fernström	Abitbol et al. («cephalopelvic disproportion index»)	Thurnau et al. («fetal-pelvic index»)	Fetal-pelvic conformity index
Sensitivity	45,2	45,2	58	58	51,6
Specifity	100	92,3	46,1	46,1	100
Accuracy	61,4	59,1	54,5	56,7	66
False-positive result	54,7	54,7	42	42	48,4
False-negative result	0	7,6	53,8	46,1	0

Latent forms of contracted pelvis were considered if from one to three its distances were lesser than 20 mm. We evaluated two grades of detected latent contracted pelvis (Puchko T.K. et al., 2005) [4]. I grade corresponds to pelvis narrowed up to 10 mm in any distance, and II grade – to pelvis narrowed from 10 up to 20 mm in any distance. Narrowing which exceeded 20 mm means true contracted pelvis and needs cesarean section delivery of pregnancy. To simplify too intricate classification of contracted pelvis we mention only four most frequent forms: dolichopellic pelvis, platypellic pelvis, uniform narrowing and other narrowing which included oblique displacement, oblique narrowing etc.

To determine different forms of contracted pelvis and different distance variability in such condition we used data of Russian National Guidance of Obstetrics by E.K. Aylamazyan (2009) and «Williams Obstetrics» Guidance T.G. Cunningham et al. (2001) [9, 10].

Providing MR-fetometry we measured biparietal and fronto-occipital distances of fetus head, circumference of chest with arms and median abdominal diameter which allowed us to suggest the fetal weight which has a great impact for clinically contracted pelvis and dystocia.

Suggested fetus weight using MR-fetometry data was calculated by Eik-Nes S.H. et al. tables (2001) and Puchko T.K. et al. schedules (2005). If possibility of shoulder dystocia risk was assessed we used schedules of dependence of chest-and-arms circumference from direct small pelvis distance for fetuses with suggested weight more than 3,75 kg and chest-and-arms circumference more than 38 cm. For fetuses with lesser weight estimation of shoulder dystocia risk can lesser be prognosed. Basing on mentioned schedules we considered three grades of risk such as minimal, possible and high.

Results. It was found that average distances of pelvis decreased depending on the grade of narrowing, as shown in Table 2.

It was also detected that in pregnant women who delivered by natural childbirth average distances of pelvis were significantly larger than in women delivered by cesarean section (Table 3).

In women with risk of clinically contracted pelvis averages of biparietal distance and fetus weight were higher compared with women without such risk. In the case of risk all the chosen indexes averages were significantly modified. For 13 women with risk of discrepancy biparietal distance was $10,0 \pm 0,4$ cm, fetus

Average distances of pelvis in women with normal and contracted pelvis (n=40) ($p < 0,05$)

Distance	Normal (n=5)	Grade of narrowing		
		I (n=9)	II (n=23)	III (n=3)
1. direct distance of entrance	13,0 (1,8)	12,7 (1,6)	12,7 (1,2)	11,2 (0,6)
2. direct distance of wide part of pelvical cavity	13,9 (1,1)	12,4 (0,7)	12,9 (1,3)	12,0 (1,4)
3. direct distance of narrow part of pelvical cavity	12,2 (0,9)	11,4 (0,9)	11,0 (0,7)	9,9 (1,6)
4. direct distance of appearance	9,0 (0,8)	8,3 (0,7)	8,5 (0,5)	7,6 (1,3)
5. the largest transversal distance of entrance	13,8 (1,2)	13,1 (0,5)	13,0 (0,5)	12,0 (0,5)
6. transversal distance of narrow part of pelvical cavity	12,2 (0,3)	11,9 (0,2)	11,0 (0,6)	10,0 (0,2)
7. interostal distance	11,5 (0,9)	11,5 (0,7)	11,3 (0,5)	10,5 (0,7)
8. bituberous distance	11,5 (0,9)	11,5 (0,9)	10,7 (1,1)	9,6 (0,4)

Note: distance + (SD)

Table 3

Average distances of pelvis in women with normal delivery and cesarean section (cm) (n=40) ($p < 0,05$)

Distance	Cesarean section (n=23)	Normal delivery (n=17)
1. direct distance of entrance	12,2 (1,4)	13,0 (1,0)
2. direct distance of wide part of pelvical cavity	12,8 (1,3)	13,0 (0,6)
3. direct distance of narrow part of pelvical cavity	10,9 (1,2)	11,3 (0,9)
4. direct distance of appearance	8,1 (0,6)	8,6 (0,7)
5. the largest transversal distance of entrance	13,0 (0,6)	13,2 (0,7)
6. transversal distance of narrow part of pelvical cavity	11,2 (0,7)	11,5 (0,7)
7. interostal distance	11,2 (0,8)	11,4 (0,4)
8. bituberous distance	10,9 (1,3)	11,0 (1,1)

Note: distance + (SD)

weight – 3860±647,7 g, Mengert index for entrance was 133,56±7,6 cm², for cavity – 97±6,8 cm², Borell and Fernström indexes were 28,8±1,7 cm, modified Thurnau index – 100%, modified Abitbol index – 100%.

For 27 women without risk of discrepancy biparietal distance was 9,8±0,5 cm, fetus weight – 3610±617,4 g, Mengert index for entrance was 170,0±20,1 cm², for cavity – 129,4±15,2 cm², Borell and Fernström indexes were 31,5±1,3 cm, modified Thurnau index – 37%, modified Abitbol index – 51,8%.

Averages of fetus weight and biparietal distance in infants born with normal delivery were lower compared with infants born with cesarean section: biparietal distance – 9,6±0,3 cm and 9,9±0,3 cm, respectively; postnatal infant weight was 3546±636,8 g and 3718±625 g, respectively.

Discussion. Subclinical types of narrow bone pelvis were found in 32 (80%) pregnancies. In many cases, external examination failed to reveal narrowing of the pelvis. Predominant dolichopellic pelvis (46%) was revealed by methods of external examinations in only 28% of cases, platypellic pelvis in 50% and uniformly narrowed in 44.4%. However, in normal bone pelvis external measurement showed normal values

only in 80% of cases. Grade III narrowing of the pelvis was revealed in 3 women, and only in one woman external examination revealed all abnormal values. Pelvis configuration, determined by external examination coincided with MR data in 32,5% of cases.

Bone pelvis diameters, measured by the means of MRI were in normal range in 14 (35%) of women (I grade narrowing or normal). These women were allowed to perform natural childbirth, however in 5 women urgent cesarean section was performed because of labor weakness and/or fetus hypoxia. In 12 (30%) of women with grade II narrowing and/or big fetus (>4000 gr.) and without any other contraindications natural childbirth was prescribed, but 6 of them underwent cesarean section because of labor weakness and/or fetus hypoxia. Basing on MR pelvimetry data (large fetus with discrepancy risk, II grade bone pelvis narrowing together with uterine scar, uterine scar thinning, breech presentation, III grade bone pelvis narrowing) prearranged cesarean section was performed in 12 (85,7%) women. Average bone pelvis diameters were noted to be larger in women with natural childbirth, than in women, who underwent cesarean section. Biparietal distance and fetus weight were bigger in the second group. Shoulder distocia risk was revealed in 4 (10%) of women with large and

giant fetus: high risk in 2 women, possible risk also in 2 women; all of them underwent cesarean section. Low frequency of subclinical bone pelvis narrowing revelation by means a external examination may lead to late intranatal diagnostics of this pathology. MR pelvimetry revealed subclinical bone pelvis narrowing and determined the grade of it in 100% of cases. Having additional fetometric data helps to evaluate shoulder distocia risk before the delivery.

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E.Kurzina¹, O.Gidkova², D.Ivanov¹, Y.Petrenko¹ CORRELATION BETWEEN SEVERITY OF FORMER DISEASES IN NEONATAL PERIOD AND LONG-TERM MORBIDITY.

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SUMMARY

КОРРЕЛЯЦИОННАЯ ЗАВИСИМОСТЬ ТЯЖЕСТИ ЗАБОЛЕВАНИЯ В НЕОНАТАЛЬНОМ ПЕРИОДЕ И ЗАБОЛЕВАЕМОСТЬ НОВОРОЖДЕННЫХ НА FOLLOW-UP

Цель: выявить корреляции между тяжестью патологии неонатального периода и особенностями заболеваемости в школьном возрасте.

Методы: обследованы 136 детей в возрасте 8-11 лет, лечившихся в отделении реанимации и интенсивной терапии ДГБ№1 Санкт-Петербурга. Исследование ретроспективное со сплошной выборкой. Гестационный возраст новорожденных составил 28-42 недели. Тяжесть перенесенной неонатальной патологии была ретроспективно оценена в соответствии со шкалой тяжести состояния для новорожденных - NTISS. Данные антропометрии, наличие аномалий развития, острые и хронические заболевания в возрасте 8-11 лет оценивались на основании клинического осмотра, анализа медицинской документации и функциональных тестов.

Результаты: на основании суммы посуточных оценок по шкале NTISS за весь период наблюдения в ОПИТН дети были разделены на пять групп. Диагноз и срок гестации не учитывался при разделении на 5 групп: 1 группа — оцен-