DOI: https://doi.org/10.17816/PTORS603050

Journal Article

Current issues in the diagnostics of hip dysplasia in newborns in the regions of the Russian Federation

Vladimir E. Baskov, Sergei V. Vissarionov, Maria S. Filippova, Vladimir M. Kenis, Pavel I. Bortulev

H. Turner National Medical Research Center for Children's Orthopedics and Trauma Surgery, Saint Petersburg, Russia

ABSTRACT

BACKGROUND: Early diagnostics of hip dysplasia in newborns are important medical and social problems because untimely treatment of these children leads to severe irreversible pathological disorders of the hip joint, dysplastic coxarthrosis, and consequently disability. Anamnesis data of patients from the Department of Hip Pathology of H. Turner National Medical Research Center for Children's Orthopedics and Trauma Surgery show that late diagnoses of the dysplastic pathology of the hip joint are not rare, which does not tend to decrease in number.

AIM: To identify and analyze the causes of the late diagnosis of dysplastic hip joint pathology in newborns in the Russian Federation.

MATERIALS AND METHODS: Statistical data from 64 regions of the Russian Federation were collected and analyzed to study the causes of untimely diagnosis of dysplastic hip joint pathology in newborns.

RESULTS: According to the information received, 3,456,207 children were born in 64 regions of the Russian Federation between 2019 and 2021. Of these children, 108,737 (3.1%) were diagnosed with hip dysplastic pathology of varying severity (acetabular dysplasia, subluxation, and dislocation), and 3,943 cases (3.6%) had untimely diagnosis.

CONCLUSIONS: Late diagnosis is primarily caused by the untimely appearance of patients for ultrasound screening and initial examination by an orthopedist. The secondary reason is the understaffing of medical organizations with specialists–orthopedists and specialists in Doppler ultrasound examination. To reduce the number of cases of late diagnosed or missed dysplastic hip pathologies and improve the quality of orthopedic care for children in the Russian Federation, strengthening health education must be recommended among parents and staff of medical organizations with orthopedic and ultrasound specialists.

Keywords: children; hip joint; dysplasia; diagnostics.

To cite this article

Baskov VE, Vissarionov SV, Filippova MS, Kenis VM, Bortulev PI. Current issues in the diagnostics of hip dysplasia in newborns in the regions of the Russian Federation. *Pediatric Traumatology, Orthopaedics and Reconstructive Surgery.* 2023;11(4):439–448. DOI: https://doi.org/10.17816/PTORS603050

Received: 04.10.2023 **Accepted:** 07.11.2023 **Published:** 20.12.2023

УДК 616.728.2-053.1-07
DOI: https://doi.org/10.17816/PTORS603050

Научная статья

Актуальные проблемы диагностики дисплазии тазобедренного сустава у детей грудного возраста в регионах Российской Федерации

В.Е. Басков, С.В. Виссарионов, М.С. Филиппова, В.М. Кенис, П.И. Бортулёв

Национальный медицинский исследовательский центр детской травматологии и ортопедии имени Г.И. Турнера, Санкт-Петербург, Россия

АННОТАЦИЯ

Обоснование. Вопросы ранней диагностики дисплазии тазобедренного сустава у детей грудного возраста — важная медико-социальная проблема, так как несвоевременное лечение этой категории детей приводит к тяжелым необратимым патологическим нарушениям со стороны тазобедренного сустава, развитию диспластического коксартроза и, как результат, инвалидизации ребенка. Данные анамнеза пациентов отделения патологии тазобедренных суставов НМИЦ детской травматологии и ортопедии им. Г.И. Турнера показывают, что случаи поздней диагностики диспластической патологии тазобедренного сустава отнюдь не редкость и тенденции к снижению их количества не наблюдается.
Цель — выявить и проанализировать причины поздней диагностики диспластической патологии тазобедренного сустава у детей грудного возраста в регионах Российской Федерации.
Материалы и методы. С целью изучения причин несвоевременной диагностики диспластической патологии тазобедренных суставов у детей грудного возраста собраны и изучены статистические данные из 64 регионов Российской Федерации.
Результаты. Согласно полученной информации в 64 регионах РФ в период с 2019 по 2021 г. родились 3 456 207 детей. Из них у 108 737 (3,1 %) диагностирована диспластическая патология тазобедренного сустава различной степени тяжести (ацетабулярная дисплазия, подвывих, вывих), причем в 3943 случаях (3,6 %) диагностика была несвоевременной.
Заключение. Основная причина поздней диагностики — несвоевременная явка пациентов на ультразвуковой скрининг и первичный осмотр ортопеда. Вторая причина — недоукомплектованность медицинских организаций специалистами — врачами-ортопедами и врачами ультразвуковой диагностики. С целью уменьшения количества случаев поздно диагностированной или невыявленной диспластической патологии тазобедренного сустава и повышения качества оказания ортопедической помощи детям России рекомендовано усилить санитарно-просветительскую работу среди родителей и доукомплектовать медицинские организации врачами-ортопедами и врачами ультразвуковой диагностики.

Ключевые слова: дети; тазобедренный сустав; дисплазия; диагностика.

Как цитировать
Басков В.Е., Виссарионов С.В., Филиппова М.С., Кенис В.М., Бортулёв П.И. Актуальные проблемы диагностики дисплазии тазобедренного сустава у детей грудного возраста в регионах Российской Федерации // Ортопедия, травматология и восстановительная хирургия детского возраста. 2023. Т. 11. № 4. С. 439–448. DOI: https://doi.org/10.17816/PTORS603050

Рукопись получена: 04.10.2023 **Рукопись одобрена:** 07.11.2023 **Опубликована:** 20.12.2023

BACKGROUND

Hip stability disorders of dysplastic genesis are detected in 0.15–4.45 cases per 1000 newborns [1–7].

The development of hip dysplasia in children is primarily determined by the initial severity and progression rates of congenital diseases. Failure to provide timely and adequate comprehensive conservative treatment for these children can lead to severe, irreversible pathological disorders of the hip joint, resulting in dysplastic coxarthrosis and ultimately disability. Early diagnosis of hip dysplasia in newborns and comprehensive conservative therapy are important medical and social issues. Numerous studies have focused on the diagnosis and treatment of pediatric patients with dysplastic hip stability disorders [8–14].

The Turner National Medical Research Center for Pediatric Traumatology and Orthopedics of the Ministry of Health of Russia has conducted long-term clinical studies demonstrating the effectiveness of functional splints in the conservative treatment of children with hip dysplasia. The average treatment period was twice the patient's age at the time of treatment. A study reported that a child's potential for hip joint predevelopment significantly decreased when they began to walk independently at approximately 1 year of age. After 1.5 years of age, conservative therapy becomes less effective, and surgery may be the only cure. Early diagnosis and comprehensive conservative treatment of dysplastic hip pathologies in newborns can lead to positive outcomes in 96%–98% of cases, although the treatment period may be longer and less effective for older children [15].

Radiological examination provides completely reliable information about the development of the hip joint. However, because of the high radiation exposure, it cannot be used as a screening method.

In 1980, Prof. R. Graf, an Austrian orthopedic surgeon, proposed a method for ultrasound screening of hip joints. Currently, ultrasound screening of hip joints is a universally recognized method because of its high informativeness and ease of use. The method has a reliability rate of >75%, with 25% of errors attributed to overdiagnosis. Therefore, it is highly unlikely that any pathology will be missed using this method. However, overdiagnosis of the disease is quite common, leading to unjustified and unnecessary treatment.

Currently, no consensus has been established on the optimal age for the ultrasound examination of newborn hips. Some proposals suggest screening in maternity hospitals. However, ultrasound screening at an early age, when approximately 20% of newborns have physiologically immature hip joints, may lead to diagnostic errors and require repeat examinations at a later age. Newborns with muscle hypertonicity may be overdiagnosed with hip pathology, leading to unnecessary treatment, increased costs, and burden on the healthcare system [16, 17].

According to Tan et al. (18), hip ultrasound examination performed before the fourth week of life is unreliable, as evidenced by the low correlation between ultrasound and radiographic data 1 year later. The authors suggest that the best results, without false-positive diagnoses, were obtained when children were examined from 5 weeks of age. Gokharman et al. found that ultrasound data at 8 weeks of age were more similar to control ultrasound data at 12 weeks of age, which was accepted as a reference test, than ultrasound data at 4 weeks of age [19].

In the Netherlands, selective ultrasound screening is performed at 3 months of age if risk factors for hip dysplasia are present or earlier if clinical hip instability is detected during the clinical examination performed at 1 week, 1 month, and 3 months of age at a pediatric outpatient clinic [20].

The authors generally advise against ultrasound screening before 6 weeks the age of, except in cases of clinical dislocation of the femoral head. This is because the physiologic hypermobility of the hip joints caused by maternal estrogen disappears only by this period [21, 22].

Therefore, no agreement has been made on the best time to perform hip ultrasound screening in newborns, and further research is needed.

The Russian Federation has established medical care standards for its population, which regulate the timing of orthopedic screening and newborn examinations. At 1 month of age, ultrasound screening of the hip joints is performed, followed by an orthopedic examination at 3 months of age. If hip joint pathology is detected during ultrasound screening, seeking orthopedic consultation as soon as possible is important. Analysis of patient history data from the Department of Hip Joint Pathology of the Turner National Medical Research Center for Pediatric Traumatology and Orthopedics revealed that late diagnoses of dysplastic changes of the hip joint are common. Unfortunately, no trend toward reducing their frequency was observed.

The aim of this study was to identify and analyze the causes of delayed diagnosis of dysplastic hip joint pathologies in infants in the Russian Federation.

MATERIALS AND METHODS

A questionnaire was designed to gather information from orthopedic doctors in the Russian Federation to investigate the reasons for the delayed diagnosis of dysplastic hip joint pathologies in infants. Statistical data from 64 regions of the Russian Federation were collected and analyzed based on the following indicators:

- Number of children born in regions of the Russian Federation for 2019–2021
- Number of identified cases of dysplastic hip joint pathologies (dysplasia, hip subluxation, and hip dislocation)

- Number of cases of delayed diagnoses of congenital hip joint pathologies in children aged 3 months to 1 year, including the reasons for the delay (such as untimely appearance, diagnostic errors, and undetected reasons)
- Number of cases of extremely delayed diagnoses of congenital hip pathologies (pathologies diagnosed at the age of 1 year and older) and the reasons for the delay (late presentation, diagnostic error, and undetected causes).

Delayed diagnoses were divided into two categories based on the effectiveness of conservative treatment depending on the age of the child:

  - **Late diagnosis:** the pathology is detected in children aged 3 months to 1 year when conservative treatment is still possible with positive results.
  - **Extremely late diagnosis:** the pathology is detected in patients aged 1 year or older, which often requires surgical treatment.
- Number of cases of late ultrasound screening of hip joints (>1 month from birth) and reasons for the delay (late arrival, absence of ultrasound machine, absence of ultrasound doctor, and undetected reasons)
- Number of cases of late initial examination by an orthopedist (>3 months from birth) and reasons for the delay (late appearance, absence of a doctor, and unknown reasons).

Cases of late diagnosis without documentation of the underlying pathology were among the undetected causes.

RESULTS

Between 2019 and 2021, 3,456,207 children were born in 64 regions of the Russian Federation. Of these, 108,737 (3.1%) children were diagnosed with dysplastic hip joint pathologies of varying degrees of severity, including acetabular dysplasia, subluxation, and dislocation, which is consistent with literature data.

Table 1 presents the number of children born and diagnosed with dysplastic hip joint pathologies in the Russian Federation.

On average, in all federal districts of the Russian Federation, the frequency of dysplastic hip joint pathologies is approximately the same, except for the North Caucasus Federal District, which is explained by the endemicity of this disease in this region.

Table 2 shows the number of cases of late and extremely late diagnoses of dysplastic hip joint pathologies in children born in the Russian Federation in 2019–2021.

The comparative analysis of the indicators for late and extremely late diagnoses of dysplastic hip joint pathologies in children across eight federal districts of Russia revealed that the Far Eastern Federal District had the highest number of cases of late diagnosis with 218 cases (8.1%) and 27 cases (1.0%) of extremely late diagnosis out of the total 2692 identified cases of hip dysplasia during the analyzed period. Identical rates of extremely late diagnosis were reported in the North Caucasus (1.1%) and Siberian (0.8%) districts. The Urals and Central districts exhibit the lowest rates of late (0.6% and 1.4%, respectively) and extremely late (0.2% and 0.2%, respectively) diagnoses of hip joint pathologies. In the remaining districts, the situation was similar, with late diagnostic rates of dysplasia ranging from 2.8% to 4.6%. Overall, late and extremely late diagnoses occurred in 3.9% of cases, with a total of 108,737 cases of dysplastic hip joint pathologies detected.

In the analysis of the reasons for the late diagnosis of dysplastic hip joint pathologies, the most common causes were delayed ultrasound screening of the hip joints (35.8%) and a consequent delay in primary orthopedic examination (34.5%). Unspecified reasons for late diagnosis of dysplastic hip joint pathologies were reported in 29.7% of the cases. The distribution of the causes of late diagnosis is shown in Figure 1.

After identifying the three main reasons for late and extremely late diagnoses of dysplastic hip joint pathologies,

Table 1. Distribution of children born and diagnosed with dysplastic hip joint pathologies in the federal districts of the Russian Federation

Federal District of the Russian Federation	Number of children born in 2019–2021	Number of children with identified dysplastic hip joint pathologies	Incidence, %
Central	999,962	22,778	2.3
Northwestern	316,899	12,160	3.8
Southern	380,701	8015	2.1
North Caucasus	270,716	33,403	12.3
Volga	488,365	16,230	3.3
Urals	378,334	7,720	2.0
Siberian	403,208	5,739	1.4
Far Eastern	218,022	2,692	1.2
Total	**3,456,207**	**108,737**	**3.1**

Table 2. Frequency of late and extremely late diagnoses of hip dysplasia in the federal districts of the Russian Federation

Federal District of the Russian Federation	Late diagnosis of hip dysplasia, *n* (%)	Extremely late diagnosis of hip dysplasia, *n* (%)
Central	316 (1.4)	42 (0.2)
Northwestern	445 (3.7)	63 (0.5)
Southern	225 (2.8)	48 (0.6)
North Caucasus	1540 (4.6)	359 (1.1)
Volga	514 (3.2)	68 (0.4)
Urals	49 (0.6)	19 (0.2)
Siberian	264 (4.6)	46 (0.8)
Far Eastern	218 (8.1)	27 (1.0)
Total	**3571 (4.0)**	**672 (0.8)**

the circumstances that led to the violation of the diagnostic protocol were analyzed.

Figure 2 presents data on the reasons for delayed ultrasound screening of hip joints (35.8%) in all analyzed patients in the Russian Federation.

In 56.7% of cases, patients attended their appointments late. In 25.4% of cases, a long waiting list for hip ultrasound screening was due to insufficient staffing of medical organizations with ultrasound physicians and/or machines. In 17.9% of cases, the reasons for the delay could not be determined.

Delayed ultrasound screening occurred for various reasons. Table 3 presents data on the reasons for delayed ultrasound screening by federal districts of the Russian Federation.

As shown in Table 3, the primary cause of delayed ultrasound screening in all federal districts of the Russian Federation is a child's untimely appearance for examination. The issue of insufficient ultrasound physicians and/or machines is particularly pronounced in the Northwestern, North Caucasus, and Urals districts compared with those in other regions. A similar, albeit less significant, problem is observed in the Siberian Federal District.

Figure 3 presents data on the reasons for the delayed initial examination by an orthopedist, which occurred in 34.5% of cases among all the analyzed patients in the Russian Federation.

In 47.2% of cases, patients missed their appointments, whereas in 29.5% of cases, no orthopedist was available in the medical organization. The reason for the delay was not identified in 23.3% of the cases.

Table 4 presents data on the reasons for the delayed examination of children by an orthopedist in the federal districts of the Russian Federation.

Based on the presented data, patients' late arrival late for appointments is the primary cause of the delayed examination of children by an orthopedist in all federal districts. This issue is particularly prevalent in the Southern, Far Eastern, Volga, and Central districts. The North Caucasus Federal District is of particular concern because of a significant shortage of orthopedists and a high incidence of hip dysplasia among patients. To compensate for the shortage of doctors, specialists from the "anchor" institution is brought in for examinations, and contracts are made with private medical centers. In addition, children receive examinations from orthopedists or surgeons who specialize in treating adults.

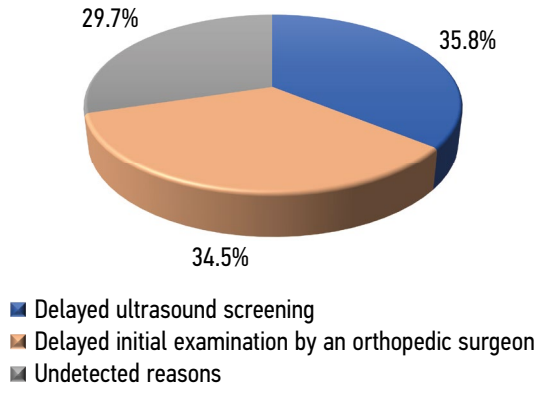

Fig. 1. Reasons for the late and extremely late diagnoses of dysplastic hip joint pathologies

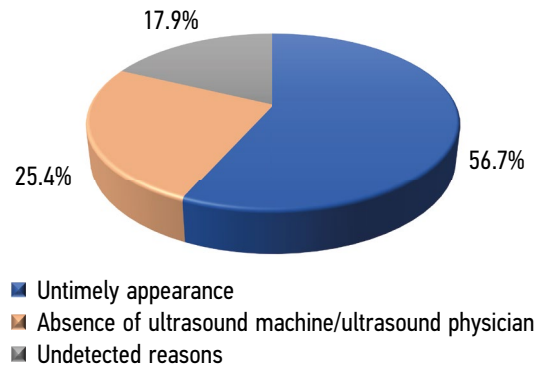

Fig. 2. Reasons for the delayed ultrasound screening of the hip joints. US, ultrasound; USG, ultrasonography

Table 3. Distribution of reasons for delayed ultrasound screening of children by federal districts of the Russian Federation

Federal District of the Russian Federation	Untimely appearance of patients, %	Absence of US machine/ USG physician, %	Undetected reasons, %
Central	82.7	15.1	2.2
Northwestern	53.8	24.9	21.3
Southern	80.2	2.3	17.5
North Caucasus	53.5	27.6	18.9
Volga	91.4	2.2	6.4
Urals	63.8	23.9	12.3
Siberian	65.6	17.8	16.6
Far Eastern	82.5	7.1	10.4

Note. US. ultrasound examination; USG. ultrasonic diagnostics.

Table 4. Distribution of the reasons for the delayed examination of children by an orthopedist in the Russian Federation

Federal District of the Russian Federation	Untimely appearance of patients, %	Absence of an orthopedist, %	Undetected reasons, %
Central	80.7	15.9	3.3
Northwestern	72.8	19.3	7.89
Southern	92.2	2.4	5.4
North Caucasus	30.9	44.1	24.9
Volga	82.3	8.3	9.3
Urals	78.9	8.7	12.3
Siberian	77.8	15.4	6.7
Far Eastern	85.8	5.7	8.5

The incidence of extremely late diagnosis made at the age of 1 year or older is low, accounting for only 0.8% of cases (n = 672 children). Figure 4 presents data on the reasons for extremely late diagnosis.

This group requires special attention because all these patients will need long-term and expensive surgical treatment in the future. Patients' untimely appearance at appointments, which accounts for 79.5% of cases, is the primary reason for delayed diagnosis. Diagnostic errors were made during the initial screening and examination in 15.8% of cases, whereas the reasons for the remaining 4.7% of cases were not identified.

DISCUSSION

In the analysis of questionnaire data collected from orthopedists in 64 regions of the Russian Federation, the prevalence of dysplastic hip pathologies is similar across all federal districts, except for the North Caucasus Federal District. The obtained indicators are consistent with literature data, which suggest that dysplastic hip joint pathologies occur on average 2.8 times more frequently in the Caucasus. No studies have provided clear scientific explanations for this endemicity; therefore, further research is necessary [23–25].

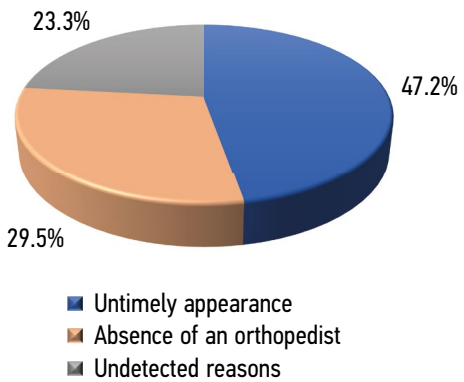

Fig. 3. Reasons for the delayed initial examination of patients by an orthopedic surgeon

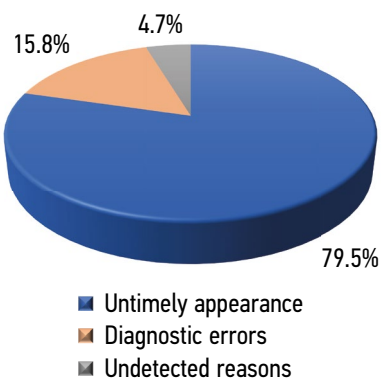

Fig. 4. Reasons for the extremely late diagnosis of hip joint pathologies in children

Delayed diagnosis of dysplastic hip joint pathologies in children in the Russian Federation is often caused by patients arriving late for ultrasound screening and initial examination by an orthopedist. This issue is particularly prevalent in the Southern, Far Eastern, Volga, and Central districts. The reasons for this delay are not yet clear. Geographical factors, such as remoteness from medical centers, may influence healthcare access in certain regions, such as the Far Eastern Federal District. However, attributing this as the sole explanation for healthcare access disparities in other regions, such as the Central or Volga districts, is not objective. When investigating the reasons for children arriving late for preventive appointments with an orthopedist, most of the reasons cited were related to household, economic, or other circumstances. Although most parents are aware of the possible serious consequences of hip dysplasia, health education among expectant mothers and young parents is insufficient.

Delayed attendance for ultrasound screening and appointments with an orthopedic surgeon can lead to a delayed diagnosis of the disease, resulting in a longer period of conservative therapy. In some cases, hip dysplasia may not be diagnosed until after the age of 1 year, which almost always requires early surgical treatment.

Early implementation of ultrasound screening in maternity hospitals during the first week of life cannot be considered a solution to this issue. International experience has shown that early ultrasound screening of hip joints in newborns may increase the false-positive rates and prescription of unnecessary treatment, increasing the burden on the healthcare system [16–21].

Late ultrasound screening and newborn examination by an orthopedist can delay the implementation of an effective conservative treatment. This can burden the healthcare system and potentially increase disability among children in the Russian Federation.

According to medical literature and analysis of indicators from regions in the Russian Federation, the optimal time for performing ultrasound examination of a child's hip joints is 4–8 weeks of age.

Late diagnosis of dysplasia in infants can be attributed to a lack of personnel and equipment, including subspecialists such as ultrasonographers (Tables 3 and 4). This issue is particularly relevant in the North Caucasus Federal District and the Northwestern, Central, and Siberian districts.

CONCLUSIONS

In the analysis of the timing of dysplastic pathology detection in infants' hip joints, late and extremely late diagnoses are quite common. The most common reason for this phenomenon is the untimely appearance of patients for appointments. In addition, a significant number of late diagnoses are due to understaffing of relevant medical organizations with orthopedists, ultrasonic diagnosticians, and ultrasound machines.

To improve the quality of orthopedic care for children in the Russian Federation and reduce the number of cases of late diagnosis or missed diagnosis of dysplastic hip pathologies, the following measures should be taken:

- Strengthening health education among expectant mothers and parents and emphasizing the importance of timely ultrasound examination of the hip joints and examination of the child by specialized doctors.
- Equipping relevant medical organizations with expert-class ultrasound machines to detect and treat musculoskeletal pathologies.
- Staffing of relevant medical organizations with specialists (radiologists and orthopedists) to detect and treat musculoskeletal pathologies.
- Regular training courses for radiologists and orthopedists on the diagnosis of congenital hip joint pathology.
- Ultrasound examination of the hip joints of children between 4 and 8 weeks of age and rational planning of examinations of children by orthopedic doctors; if any pathology is detected or suspected during the ultrasound screening, an unscheduled examination by an orthopedist is mandatory.

ADDITIONAL INFORMATION

Funding source. No funding source was available.

Conflict of interest. The authors declare no obvious or potential conflicts of interest related to this publication.

Authors' contribution. *V.E. Baskov*, concept and design of the study, material analysis, review of publications on the topic of the article, and writing the text of the article; *S.V. Vissarionov*, editing the text of the article; *M.S. Filippova*, collection and analysis of material and writing the text of the article; *V.M. Kenis*, review of publications on the topic of the article; *P.I. Bortulev*, editing the text of the article.

All authors made a significant contribution to the study and preparation of the article and read and approved the final version before publication.

REFERENCES

1. Marks VO. Diagnostika i lechenie vrozhdennogo vyvikha bedra u detei. *Orthopedics, Traumatology.* 1934;(3):3–5. (In Russ.)

2. Barta O. Vrozhdennyj vyvih bedra i ego rannee konservativnoe lechenie. Budapest: izdatel'stvo AN Vengrii; 1972. (In Russ.)

3. Mirzoeva II, Goncharova MN, Tihonenkov ES. Operativnoe lechenie vrozhdennogo vyvikha bedra u detei. Leningrad: Meditsina; 1976. (In Russ.)

4. Kucenok YaB, Rulla EA, Mel'nik VV. Vrozhdennaya displaziya tazobedrennogo sustava. Kiev: Zdorov'ya; 1992. (In Russ.)

5. Yamamuro T, Ishida K. Recent advances in the prevention, early diagnosis, and treatment of congenital dislocation of the hip in Japan. *Clin Orthop.* 1984;(184):34–40.
6. Ishida K. Prevention of the development of a typical hip dislocation. *Clin Orthop Relat Res.* 1977;(126):167–169.
7. Tredwell SJ, Davis L. A prospective study of congenital dislocation of the hip. *J Pediatr Orthop*.1989;(9):386–390.
8. Volkov MV, Ter-Egiazarov GM, Yukina GP. Vrozhdennyi vyvikh bedra. Moscow: Meditsina; 1972. (In Russ.)
9. Krasnov AI. Mnogoploskostnye deformatsii proksimal'nogo otdela bedrennoi kosti posle konservativnogo lecheniya vrozhdennogo vyvikha bedra u detei (patogenez, klinika, diagnostika, lechenie) [abstract dissertation]. Leningrad; 1990. (In Russ.)
10. Tihilov RM. Khirurgicheskoe lechenie bol'nykh s degenerativno-distroficheskimi zabolevaniyami i posledstviyami travm tazobedrennogo sustava [abstract dissertation]. Saint Petersburg; 1998. (In Russ.)
11. Kamosko MM. Transpozitsiya vertluzhnoi vpadiny pri nestabil'nosti tazobedrennogo sustava displasticheskogo geneza [abstract dissertation]. Saint Petersburg; 2007. (In Russ.)
12. Tonnis D. Surgical treatment of congenital hip dislocation. *Clin Orthop Relat Res.* 1990;(258):33–40.
13. Valdisseri L, Campagnaro J, Urso K. The treatment of congenital hip dislocation between the ages of 1 and 3. *Chir Organi Mov.* 1992;77(3):219–231.
14. Weinstein S, Mubarak S, Wenger D. Developmental hip dysplasia and dislocation: part I. *Instr Course Lect.* 2004;53(3):523–530.
15. Baskov VE. Ortopedokhirurgicheskoe lechenie detei s displasticheskim marginal'nym vyvikhom bedra [abstract dissertation]. Saint Petersburg; 2009. (In Russ.)
16. Gulati V, Eseonu K, Sayani J, et al. Developmental dysplasia of the hip in the newborn: a systematic review. *World J Orthop.* 2013;4(2):32–41. DOI: 10.5312/wjo.v4.i2.32
17. De Pellegrin M, Moharamzadeh D, Fraschini G. Early diagnosis and treatment of DDH: a sonographic approach. *Hip Int.* 2007;17(S5):15–21.
18. Tan SHS, Wu CH, Wong KL, et al. Correlations between ultrasonographic and subsequent radiographic findings of developmental dysplasia of the hips. *Ultrasonography.* 2019;38(4):43–51. DOI: 10.14366/usg.18064
19. Gokharman FD, Aydin S, Fatihoglu E, et al. Optimizing the time for developmental dysplasia of the hip screening: earlier or later? *Ultrasound Q.* 2019;35(2):130–135. DOI: 10.1097/RUQ.0000000000000348
20. Federation of Medical Specialists [Internet]. DDH (dysplastic hoypontvikkeling) in childhood at the end of June 2020 [cited 2023 Nov 8]. Available from: https://richtlijnendatabase.nl/richtlijn/ddh_dysplastische_heupontwikkeling_bij_kinderen_onder_n_jaar/startpagina_-_ddh.html
21. American Institute of Ultrasound in Medicine; American College of Radiology. AIUM practice guideline for the performance of an ultrasound examination for detection and assessment of developmental dysplasia of the hip. *J Ultrasound Med.* 2009;28(1):114–119. DOI: 10.7863/jum.2009.28.1.114
22. Vukasinovic Z, Bascarevic Z. Diseases of the infant hip. Special orthopaedics. Belgrade: Banjica; 2004.
23. Abakarov AA, Abakarov AA. Long-term treatment results of congenital hip disease in adolescents. *Pediatric Traumatology, Orthopaedics and Reconstructive Surgery*. 2019;7(4):87–96. (In Russ.) DOI: 10.17816/PTORS7487-96
24. Tikhilov RM, Mazurenko AV, Shubnyakov II. Results of hip arthroplasty using Paavillainen technique in patients with congenitally dislocated hip. *Traumatology and Orthopedics of Russia*. 2014;(1):5–15. (In Russ.) DOI: 10.21823/2311-2905-2014-0-1-5-15
25. Tikhilov RM, Shubnyakov II, Kovalenko AN, et al. Data of hip arthroplasty registry of Vreden Institute for the period 2007–2012 years. *Traumatology and Orthopedics of Russia*. 2013;19(3):167–190. (In Russ.) DOI: 10.21823/2311-2905-2013--3-167-190

СПИСОК ЛИТЕРАТУРЫ

1. Маркс В.О. Диагностика и лечение врожденного вывиха бедра у детей // Ортопедия, травматология. 1934. № 3. С. 3–5.
2. Барта О. Врожденный вывих бедра и его раннее консервативное лечение. Будапешт: издательство АН Венгрии, 1972. 215 с.
3. Мирзоева И.И., Гончарова М.Н., Тихоненков Е.С. Оперативное лечение врожденного вывиха бедра у детей. Ленинград: Медицина, 1976. 232 с.
4. Куценок Я.Б., Рулла Э.А., Мельник В.В. Врожденная дисплазия тазобедренного сустава. Врожденный подвывих и вывих бедра. Киев: Здоров'я, 1992. 182 с.
5. Yamamuro T., Ishida K. Recent advances in the prevention, early diagnosis, and treatment of congenital dislocation of the hip in Japan // Clin. Orthop. 1984. No. 184. P. 34–40.
6. Ishida K. Prevention of the development of the typical dislocation of the hip // Clin. Orthop. Relat. Res. 1977. No. 126. P. 67–69.
7. Tredwell S.J., Davis L. Prospective study of congenital dislocation of the hip // J. Pediatr. Orthop.1989. Vol. 9. No. 4. P. 386–390.
8. Волков М.В., Тер-Егиазаров Г.М., Юкина Г.П. Врожденный вывих бедра. Москва: Медицина, 1972. 159 с.
9. Краснов А.И. Многоплоскостные деформации проксимального отдела бедренной кости после консервативного лечения врожденного вывиха бедра у детей (патогенез, клиника, диагностика, лечение): автореф. дис. ... канд. мед. наук. Ленинград, 1990.
10. Тихилов Р.М. Хирургическое лечение больных с дегенеративно-дистрофическими заболеваниями и последствиями травм тазобедренного сустава: автореф. дис. ... д-ра мед. наук. Санкт-Петербург, 1998.
11. Камоско М.М. Транспозиция вертлужной впадины при нестабильности тазобедренного сустава диспластического генеза: дис. ... д-ра мед. наук. Санкт-Петербург, 2007.
12. Tönnis D. Surgical treatment of congenital dislocation of the hip // Clin. Orthop. Relat. Res. 1990. No. 258. P. 33–40.
13. Valdisseri L., Campagnaro J., Urso K. The treatment of congenital hip dislocation between the ages of 1 and 3 // Chir. Organi. Mov. 1992. Vol. 77. No. 3. P. 219–231.
14. Weinstein S., Mubarak S., Wenger D. Developmental hip dysplasia and dislocation: Part I // Instr. Course. Lect. 2004. Vol. 53. No. 3. P. 523–530.

15. Басков В.Е. Ортопедохирургическое лечение детей с диспластическим маргинальным вывихом бедра: дис. … канд. мед. наук. Санкт-Петербург, 2009.
16. Gulati V., Eseonu K., Sayani J., et al. Developmental dysplasia of the hip in the newborn: a systematic review // World J. Orthop. 2013. Vol. 4. No. 2. P. 32–41. DOI: 10.5312/wjo.v4.i2.32
17. De Pellegrin M., Moharamzadeh D., Fraschini G. Early diagnosis and treatment of DDH: a sonographic approach // Hip. Int. 2007. Vol. 17. No. S5. P. 15–21.
18. Tan S.H.S., Wu C.H., Wong K.L., et al. Correlations between ultrasonographic and subsequent radiographic findings of developmental dysplasia of the hips // Ultrasonography. 2019. Vol. 38. No. 4. P. 43–51. DOI: 10.14366/usg.18064
19. Gokharman F.D., Aydin S., Fatihoglu E., et al. Optimizing the time for developmental dysplasia of the hip screening: earlier or later? // Ultrasound Q. 2019. Vol. 35. No. 2. P. 130–135. DOI: 10.1097/RUQ.0000000000000348
20. Federatie Medisch Specialisten [Internet]. DDH (dysplastische heupontwikkeling) bij kinderen onder één jaar. 2020 [дата обращения 08.11.2023]. Доступ по ссылке: https://richtlijnendatabase.nl/richtlijn/ddh_dysplastische_heupontwikkeling_bij_kinderen_onder_n_jaar/startpagina_-_ddh.html
21. American Institute of Ultrasound in Medicine; American College of Radiology. AIUM practice guideline for the performance of an ultrasound examination for detection and assessment of developmental dysplasia of the hip // J. Ultrasound. Med. 2009. Vol. 28. No. 1. P. 114–119. DOI: 10.7863/jum.2009.28.1.114
22. Vukasinovic Z., Bascarevic Z. Diseases of the infant hip. Special orthopaedics. Belgrade: Banjica, 2004.
23. Абакаров А.А., Абакаров А.А. Отдаленные результаты лечения врожденного вывиха бедра у подростков // Ортопедия, травматология и восстановительная хирургия детского возраста. 2019. Т. 7. № 4. С. 87–96. DOI: 10.17816/PTORS7487-96
24. Тихилов Р.М., Мазуренко А.В., Шубняков И.И. Результаты эндопротезирования тазобедренного сустава с укорачивающей остеотомией по методике T. Paavillainen при полном вывихе бедра // Травматология и ортопедия России. 2014. Т. 20. № 1. С. 5–15. DOI: 10.21823/2311-2905-2014-0-1-5-15
25. Тихилов Р.М., Шубняков И.И., Коваленко А.Н., и др. Данные регистра эндопротезирования тазобедренного сустава РНИИТО им. Р.Р. Вредена за 2007–2012 годы // Травматология и ортопедия России. 2013. Т. 19. № 3. С. 167–190. DOI: 10.21823/2311-2905-2013--3-167-190

AUTHOR INFORMATION

*** Vladimir E. Baskov**, MD, PhD, Cand. Sci. (Med.);
address: 64-68 Parkovaya str., Pushkin, Saint Petersburg, 196603, Russia;
ORCID: 0000-0003-0647-412X;
eLibrary SPIN: 1071-4570;
e-mail: dr.baskov@mail.ru

Sergei V. Vissarionov, MD, PhD, Dr. Sci. (Med.), Professor, Corresponding Member of RAS;
ORCID: 0000-0003-4235-5048;
eLibrary SPIN: 7125-4930;
e-mail: vissarionovs@gmail.com

Maria S. Filippova, MD;
ORCID: 0009-0003-0298-973X;
e-mail: kalininams@bk.ru

ОБ АВТОРАХ

*** Владимир Евгеньевич Басков**, канд. мед. наук;
адрес: Россия, 196603, Санкт-Петербург, Пушкин, ул. Парковая, д. 64–68;
ORCID: 0000-0003-0647-412X;
eLibrary SPIN: 1071-4570;
e-mail: dr.baskov@mail.ru

Сергей Валентинович Виссарионов, д-р мед. наук, профессор, чл.-корр. РАН;
ORCID: 0000-0003-4235-5048;
eLibrary SPIN: 7125-4930;
e-mail: vissarionovs@gmail.com

Мария Сергеевна Филиппова;
ORCID: 0009-0003-0298-973X;
e-mail: kalininams@bk.ru

* Corresponding author / Автор, ответственный за переписку

AUTHOR INFORMATION

Vladimir M. Kenis, MD, PhD, Dr. Sci. (Med.), Professor;
ORCID: 0000-0002-7651-8485;
eLibrary SPIN: 5597-8832;
e-mail: kenis@mail.ru

Pavel I. Bortulev, MD, PhD, Cand. Sci. (Med.);
ORCID: 0000-0003-4931-2817;
eLibrary SPIN: 9903-6861;
e-mail: pavel.bortulev@yandex.ru

ОБ АВТОРАХ

Владимир Маркович Кенис, д-р мед. наук, профессор;
ORCID: 0000-0002-7651-8485;
eLibrary SPIN: 5597-8832;
e-mail: kenis@mail.ru

Павел Игоревич Бортулёв, канд. мед. наук;
ORCID: 0000-0003-4931-2817;
eLibrary SPIN: 9903-6861;
e-mail: pavel.bortulev@yandex.ru