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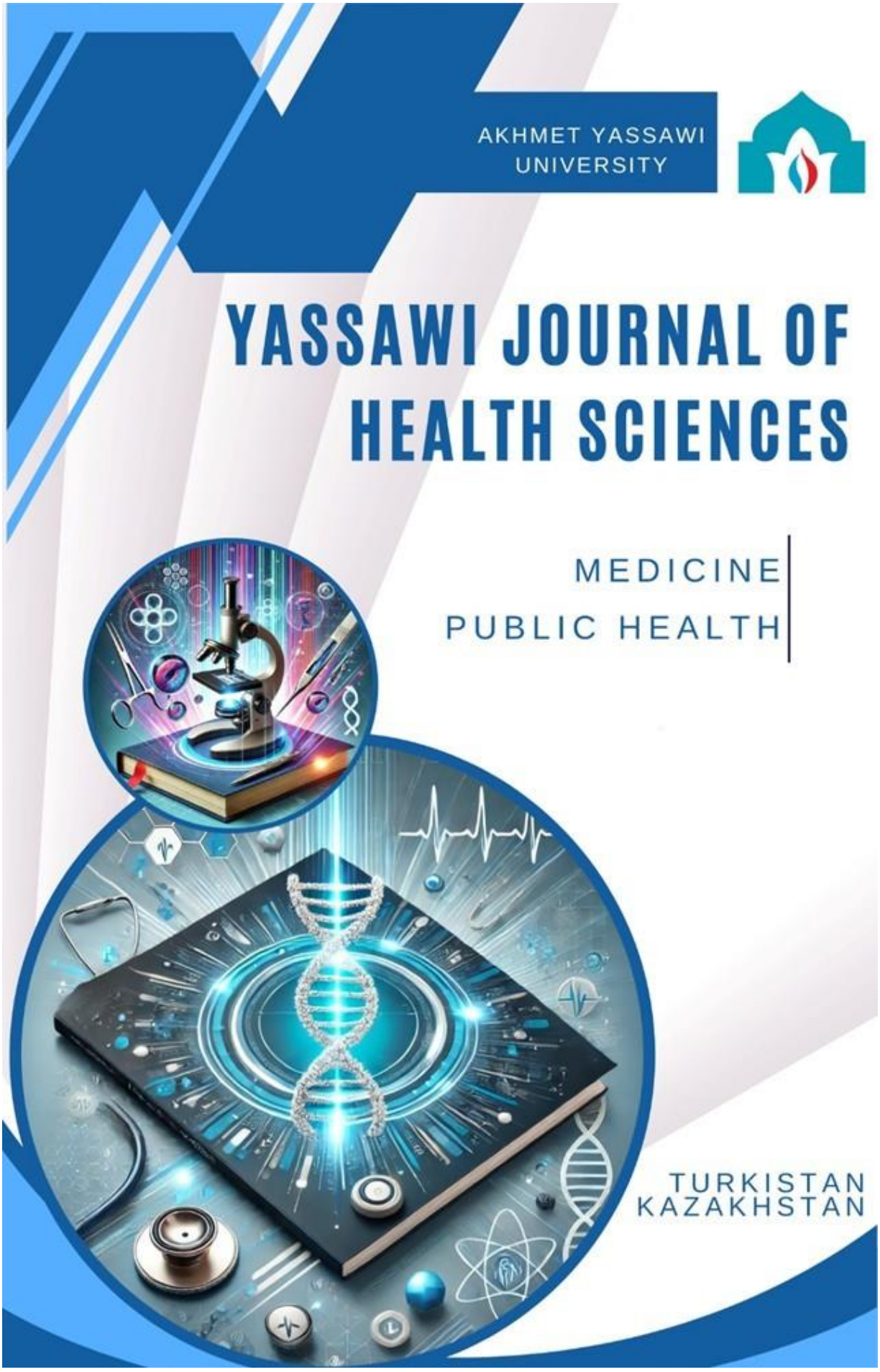

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АТЫНДАҒЫ ХАЛЫҚАРАЛЫҚ
ҚАЗАҚ-ТҮРІК УНИВЕРСИТЕТІ

KHOJA AKHMED YASSAWI
INTERNATIONAL KAZAKH-
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CHOOSING A TREATMENT METHOD FOR PAYRE'S SYNDROME IN CHILDREN

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Abstract. Payr syndrome is characterized by elongation of the transverse colon and a high position of the splenic flexure forming an acute angle, known as the “double-barrel Payr phenomenon,” which leads to chronic constipation and abdominal pain. To improve the outcomes of treatment of Payr syndrome in children. The results of treatment of 83 patients aged 4 to 18 years with Payr syndrome who were treated at the clinic of the Tashkent Pediatric Medical Institute during 2018–2024 were analyzed. Among them, 52 were girls and 31 were boys. When analyzing the early and long-term outcomes of 42 surgically treated patients, good and satisfactory results were observed in 37 cases (88.1%), while unsatisfactory results were noted in 5 cases (11.9%). Therefore, sigmoid colon resection via mini-laparotomy was performed. After rehabilitation measures, satisfactory results were achieved. Indications for surgical treatment in children with Payr syndrome include failure of conservative therapy, increased frequency of abdominal pain, and the development of reflux ileitis. In cases where elongation of the transverse colon is not pronounced, laparoscopic descent (mobilization) of the splenic flexure is considered the preferred surgical approach.

Keywords: Payr syndrome, diagnosis, treatment, children, laparoskopiya, reflyuks.

БАЛАЛАРДАҒЫ ПАЙР СИНДРОМЫН ЕМДЕУ ӘДІСІН ТАҢДАУ

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Аңдатпа. Пайр синдромы көлденең тоқ ішектің ұзаруымен және көкбауыр иінінің жоғары орналасып, өткір бұрыш түзуімен сипатталады. Бұл жағдай «Пайрдың қос діңгекті феномені» деп аталады және созылмалы іш қату мен абдоминальды ауырсыну синдромының дамуына әкеледі. Балалардағы Пайр синдромын емдеу нәтижелерін жақсарту. 2018–2024 жылдар аралығында Ташкент педиатриялық медицина институтының клиникасында Пайр синдромымен емделген 4–18 жас аралығындағы 83 науқастың ем нәтижелері талданды. Зерттелген балалардың ішінде 52 қыз және 31 ұл болды.

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Хирургиялық ем қабылдаған 42 науқастың жақын және ұзақ мерзімді нәтижелерін талдау барысында 37 жағдайда (88,1%) жақсы және қанағаттанарлық нәтижелер анықталды, ал 5 жағдайда (11,9%) қанағаттанарлықсыз нәтижелер тіркелді. Қанағаттанарлықсыз нәтижелері бар науқастарда тұрақты іш қату мен мерзімді іштің ауыруы сақталды. Реабилитациялық шаралар жүргізілгеннен кейін емнің қанағаттанарлық нәтижелеріне қол жеткізілді. Балалардағы Пайр синдромын хирургиялық емдеуге көрсеткіштерге консервативті терапияның тиімсіздігі, абдоминальды ауырсыну синдромының жиілеуі және рефлюкстік илеиттің дамуы жатады. Көлденең тоқ ішектің ұзаруы айқын болмаған жағдайларда хирургиялық емдеудің басым әдісі ретінде көкбауыр иінін лапароскопиялық төмендету (мобилизациялау) ұсынылады.

Түйін сөздер. Пайр синдромы, диагностика, емдеу, балалар, лапароскопия, рефлюкс.

ВЫБОР МЕТОДА ЛЕЧЕНИЯ СИНДРОМА ПАЙРА У ДЕТЕЙ

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Аннотация. Синдром Пайра характеризуется удлинением поперечной ободочной кишки и высоким расположением селезёночного изгиба с образованием острого угла, известного как «двуствольный феномен Пайра», что приводит к развитию хронических запоров и абдоминального болевого синдрома. Улучшить результаты лечения синдрома Пайра у детей. Проанализированы результаты лечения 83 пациентов в возрасте от 4 до 18 лет с синдромом Пайра, находившихся на лечении в клинике Ташкентского педиатрического медицинского института в период с 2018 по 2024 годы. Среди обследованных было 52 девочки и 31 мальчик. При анализе ближайших и отдалённых результатов лечения 42 пациентов, перенёсших хирургическое вмешательство, хорошие и удовлетворительные результаты были отмечены в 37 случаях (88,1%), неудовлетворительные - в 5 случаях (11,9%). У пациентов с неудовлетворительными результатами сохранялись стойкие запоры и периодические боли в животе. После проведения реабилитационных мероприятий были достигнуты удовлетворительные результаты лечения. Показаниями к хирургическому лечению синдрома Пайра у детей являются неэффективность консервативной терапии, учащение абдоминального болевого синдрома и развитие рефлюкс-илеита. В случаях, когда удлинение поперечной ободочной кишки выражено незначительно, предпочтительным методом хирургического лечения является лапароскопическое низведение (мобилизация) селезёночного изгиба ободочной кишки.

Ключевые слова. синдром Пайра, диагностика, лечение, дети, лапароскопия, рефлюкс.

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Introduction. Payr syndrome is characterized by elongation of the transverse colon and a high position of the splenic flexure forming an acute angle, known as the "double-barrel Payr phenomenon," which leads to chronic constipation and abdominal pain. This is a congenital condition associated with shortening of the phrenicocolic ligament, formation of pathological adhesions, and high positioning of the splenic flexure, resulting in impaired colonic dynamics. The disease was first described by I. Payr in 1910 [1,3,4,5,7,8,11].

The literature presents various approaches to the surgical treatment of Payr syndrome. Tsumann V.G. (2015) proposed transection of the phrenicocolic and splenocolic ligaments to eliminate the high position and acute angulation of the splenic flexure. According to the Guidelines of the European Society of Coloproctology (2022), conservative treatment is primarily recommended, while surgical treatment with lowering of the splenic flexure is advised in cases of persistent constipation and pain unresponsive to conservative therapy. Beilin N.I. (2018) reported that pain intensity increases with age in patients with Payr syndrome and recommended timely surgical intervention before the development of significant colonic dilatation and reflux ileitis [2,6,9,10,12,13].

Thus, in children with Payr syndrome, shortening of the left phrenicocolic ligament leads to the formation of an acute angle in this region of the colon. When the colon is filled, it pulls the diaphragm downward, causing pain in the left hypochondrium. Data on Payr syndrome in children are scarce in the literature, indicating the need for further research in this field.

Objective. To improve the treatment outcomes of Payr syndrome in children.

Materials and Methods. The treatment outcomes of 83 patients aged 4–18 years with Payr syndrome who were treated at the clinic of TashPMI between 2018 and 2024 were analyzed. Of these patients, 52 were girls and 31 were boys. The main cohort consisted of adolescents aged 13–18 years, comprising 45 patients. In 41 patients (49.4%), the disease was identified at the compensated stage, and conservative treatment was carried out in accordance with the *Guidelines for the Diagnosis and Treatment of Payr Syndrome*. The remaining 42 patients (50.6%) underwent surgical treatment: 34 patients had laparoscopic correction of the acute splenic flexure of the colon, while in 8 patients laparotomy was performed with shortening (resection) of the transverse colon and creation of an end-to-end anastomosis (Table 1).

Table 1. Distribution of patients according to age, sex, and type of treatment performed

№	Treatment method	to age				sex		Total
		0-3	4-7	8-12	13 -18	boys	girls	
1.	Conservative	-	8	15	18	17	24	41
2.	Laparoscopic surgery	-	2	11	21	11	23	34
3	Laparotomy with transverse colon resection	-	-	2	6	3	5	8
Total		-	10	28	45	31	52	83

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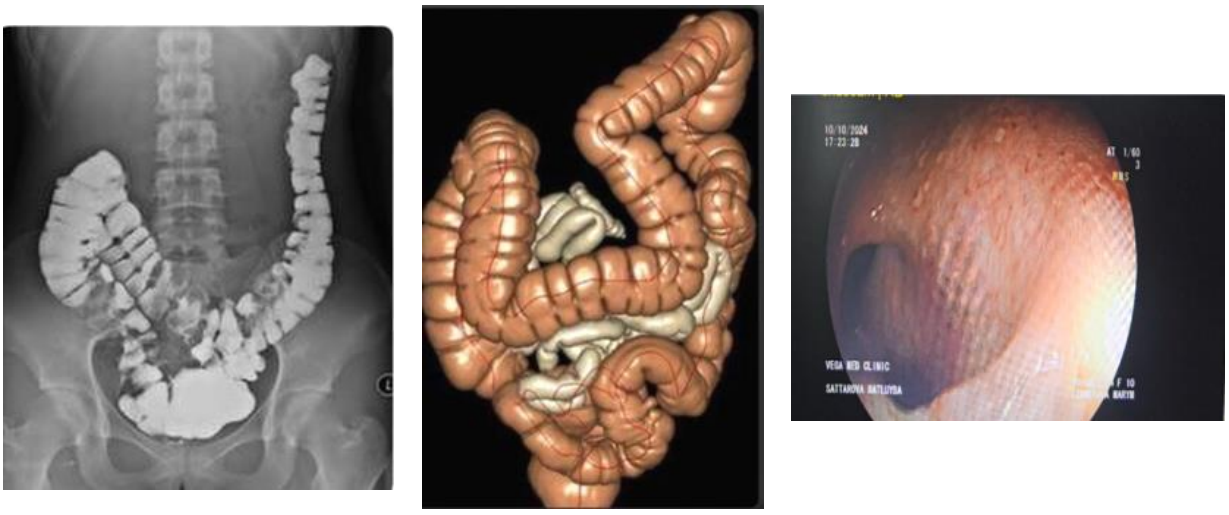
Analysis of the reasons for patients' visits to the clinic showed that 33 patients (39.8%) had constipation as the main complaint, 36 patients (43.4%) presented with a combination of abdominal pain and constipation, and 14 patients (16.9%) complained only of abdominal pain ().

Table 2. Reasons for patients' initial hospital visit

Age	Number of patients	Complaint		
		Constipation	Constipation + pain	Abdominal pain
0-3	-	-	-	-
4-7	10	4	4	2
8-12	28	14	8	6
13-18	45	15	24	6
Total	83 (100%)	33 (39,8%)	36 (43,4%)	14 (16,9%)

"In order to perform a differential diagnosis of the clinical signs observed in the patients, special diagnostic methods were applied. Doppler ultrasonography was used primarily to assess the presence or absence of venous congestion in the mesenteric veins of the transverse colon, as well as to evaluate parameters such as blood flow velocity and vascular resistance. Irrigography, as a contrast-enhanced radiographic examination, focused on the architectonics of the large intestine, the coefficient of length change before and after contrast evacuation, the acuteness of the splenic flexure angle, and changes in the position of the colon in horizontal and vertical body positions. Virtual colonoscopy was performed to assess the anatomical and topographic features of the large intestine. Colonoscopy was used to evaluate the degree of inflammatory changes in the colonic mucosa and, additionally, to assess the sharpness of the splenic flexure angle based on the passage of the endoscope tip through this region (Figure 1).



A B C

Figure 2. Imaging findings: (A) irrigography, (B) virtual colonoscopy, (C) colonoscopy

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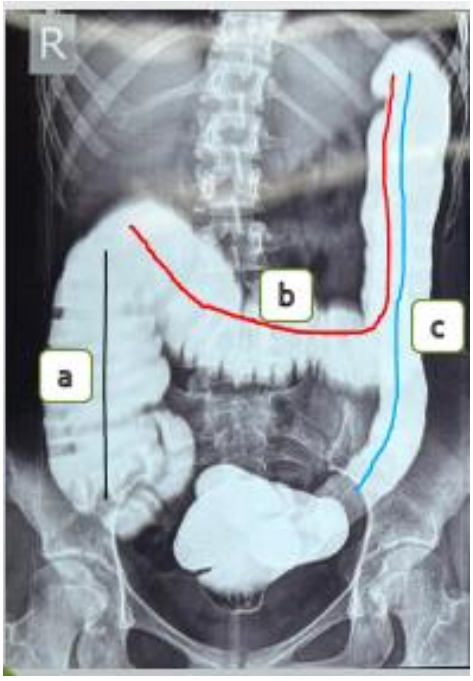
In order to determine the surgical approach, coefficients assessing the evacuatory function of the colon in Payr syndrome were analyzed. Specifically, during irrigographic examination with the colon filled with contrast medium, the length of the ascending colon (a), the transverse colon (b), and the descending colon (c) were measured. The sum of these three lengths (d) represented the total length of the colon. Subsequently, the relative length coefficients of all three segments of the colon were calculated separately (L1 [ascending colon] = a/d; L1 [transverse colon] = b/d; L1 [descending colon] = c/d) (Figure 2).



a – length of the ascending colon (Asc. col. length)
b – length of the transverse colon (Transv. col. length)
c – length of the descending colon (Desc. col. length)
d – total length of the colon
L1 (ascending colon) = a/d
L1 (transverse colon) = b/d
L1 (descending colon) = c/d

Figure 2. Relative length coefficient of the colon with contrast-filled large intestine

Using the same parameters, measurements were also performed after evacuation of the contrast medium from the large intestine. Specifically, the length of the ascending colon (a), the transverse colon (b), and the descending colon (c) were measured. The sum of these three lengths (d) represented the total length of the colon. Subsequently, the relative length coefficients of all three segments of the colon were determined separately (L2 [ascending colon] = a/d; L2 [transverse colon] = b/d; L2 [descending colon] = c/d) (Figure 3).

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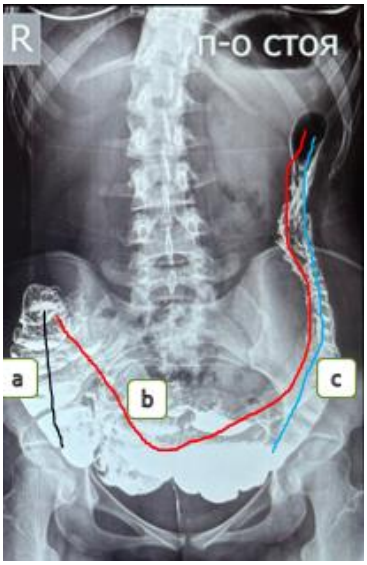

a – length of the ascending colon (Asc. col. length)
b – length of the transverse colon (Transv. col. length)
c – length of the descending colon (Desc. col. length)
d – total length of the colon
L2 (ascending colon) = a/d
L2 (transverse colon) = b/d
L2 (descending colon) = c/d

Figure 3. Relative length coefficient of the colon after evacuation of the contrast medium from the large intestine

By dividing the mean L1 value obtained with the large intestine filled with contrast medium by the mean L2 value measured after contrast evacuation, the coefficient of colonic length increase was determined. This approach allowed us to assess the evacuatory function of the large intestine, the degree of elongation of the transverse colon, and the extent of manifestation of the 'double Payr fold' (Table 3).

Table 3. Indices of the transverse colon length coefficient on irrigography in Payr syndrome

Indicator	Segments of the large intestine	Result	
		Normal value	Patients
L1 (contrast-filled state)	Ascending segment **	0,21±0,03	0,22±0,04
	Transverse segment *	0,41±0,04	0,48±0,02
	Descending segment *	0,37±0,02	0,35±0,06
L2 (after contrast evacuation)	Ascending segment **	0,21±0,04	0,21±0,24
	Transverse segment *	0,43±0,05	0,57±0,04
	Descending segment *	0,35±0,04	0,26±0,05
Length coefficient	Ascending segment **	1,11±0,29	1,29±0,32
	Transverse segment *	1,04±0,11	0,88±0,12
	Descending segment *	1,11±0,10	1,59±0,40

(*-P<0,01 ; ** - P>0,01)

"Determination of the colon length coefficient made it possible to select the appropriate surgical treatment strategy for patients with Payr syndrome. When the length coefficient was less than 0.8, particularly in the transverse colon, this was considered an indication for direct transverse colon resection with end-to-end anastomosis. Conversely, when this parameter ranged between 0.8 and 1.0, a minimally invasive laparoscopic procedure involving division of the splenic flexure ligament and pathological adhesions was indicated.

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In 34 patients, taking into account the high position of the splenic flexure of the colon, impaired passage at this level, and the resulting dilation of the proximal segments of the colon with associated reflux ileitis, laparoscopic division of the splenic flexure of the colon from ligamentous structures and pathological adhesions was performed (Figure 4).

Figure 4. Laparoscopic division of the splenic flexure of the colon from ligamentous structures and pathological adhesions in Payr syndrome

In turn, in 8 patients with Payr syndrome presenting with excessive elongation of the transverse colon, normalization of the colonic arch was achieved by resection of the transverse colon followed by creation of an end-to-end anastomosis (Figure 5).

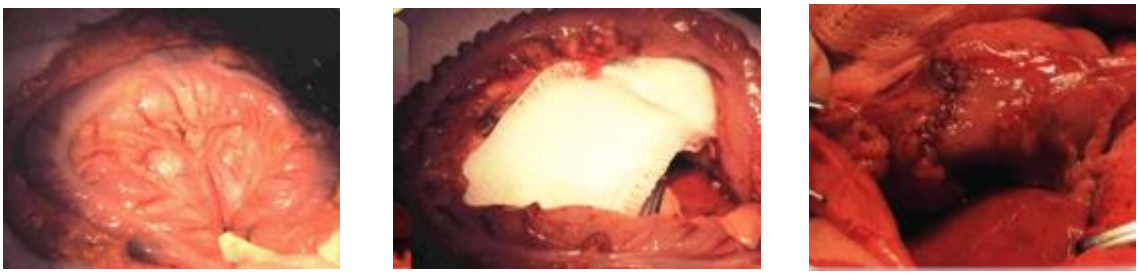

Figure 5. Resection of the transverse colon with end-to-end anastomosis in Payr syndrome

The short-term and long-term outcomes of the patients were analyzed using the ‘Scale for Analysis of Surgical Outcomes in Children with Payr Syndrome’ developed by our team (UzR IMA DGU No. 22738, dated 02.03.2023). The following factors were taken into account: stool characteristics according to the Bristol Stool Scale—type 1 (hard pellet-like stools), type 2 (hard sausage-shaped stools), type 3 (sausage-shaped elastic stools), and type 4 (smooth, soft sausage-shaped stools); intensity of abdominal pain; the percentage of contrast evacuation from the intestine on irrigographic examination; and bowel movement frequency. Based on the presence of these factors, outcomes were classified as good, satisfactory, or unsatisfactory. The symbol ‘–’ indicated the absence of a factor, ‘+’ indicated moderate frequency of the factor, and ‘++’ indicated constant presence. According to this scale, based on the total score of the evaluated factors, 15–21 points indicated a good outcome, 8–14 points a satisfactory outcome, and 1–7 points an unsatisfactory outcome (Table 4).

Table 4. Scale for Analysis of Surgical Outcomes in Children with Payr Syndrome

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Factors		Results					
		good	Point	Satisfactory	Point	Unsatisfactory	Point
Stool form according to the Bristol Stool Scale.	type 1 	-	**3**	-	**2**	+	**1**
	type2 	-	**3**	+	**2**	+	**1**
	type 3 	++	**3**	+	**2**	-	**1**
	type 4 	++	**3**	+	**2**	-	**1**
Abdominal pain		-	**3**	+	**2**	++	**1**
Contrast evacuation of the intestine on irrigography		More than 80%	**3**	60-75%	**2**	Less than 50%	**1**
Bowel movement frequency		Every day	**3**	Once every 2 days	**2**	Once every 4–5 days	**1**
total		21		14		7	

Analysis of the short-term and long-term outcomes in 42 patients who underwent surgical treatment showed good and satisfactory results in 37 cases (88.1%) and unsatisfactory results in 5 cases (11.9%). In patients with unsatisfactory outcomes, constipation and occasional abdominal pain were observed. It was concluded that the unsatisfactory results in these 5 patients were due to the concomitant presence of dolichosigmoid, and sigmoid colon resection via minilaparotomy was performed. After the rehabilitation measures undertaken, satisfactory outcomes were achieved.

Conclusion. Indications for surgical treatment in children with Payr syndrome include failure of conservative therapy, increased frequency of abdominal pain, and the development of reflux ileitis. In cases where elongation of the transverse colon is not pronounced, laparoscopic descent (mobilization) of the splenic flexure is considered the preferred surgical approach. However, in cases of excessive elongation of the transverse colon accompanied by venous congestion in the mesenteric veins, transverse colon resection via laparotomy with end-to-end anastomosis is deemed appropriate.

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SELECTION OF TACTICS AND METHODS OF SURGICAL TREATMENT OF COMBINED PULMONARY AND HEPATIC ECHINOCOCCOSIS IN CHILDREN

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Abstract. Echinococcosis is one of the most severe and dangerous parasitic diseases in many regions of the world. It is characterized by extensive organ involvement and a prolonged chronic course, leading to the development of serious functional disorders of the affected organs. To develop a treatment strategy and select the optimal surgical method for combined pulmonary and hepatic echinococcosis in children. The treatment outcomes of 346 children aged 3 to 14 years with various forms of echinococcosis were analyzed. Combined pulmonary and hepatic echinococcosis was identified in 39 cases (11,3%). A comparative assessment of the effectiveness of surgical interventions for combined pulmonary and hepatic echinococcosis in children showed that comprehensive preoperative preparation, selection of a rational surgical approach and an optimal operative technique, as well as active postoperative management, are the main components contributing to successful and favorable treatment outcomes. When determining surgical tactics, staging, and sequence of operations, it is necessary to consider the presence of echinococcal cysts that pose the greatest risk in terms of complication development. The effectiveness of surgical treatment of combined pulmonary and hepatic echinococcosis in children depends on the localization of cysts and the presence of complications. It is reasonable to perform echinococcectomy first on cysts that are most dangerous in terms of potential complications. All other factors being equal, the staged surgical approach should preferably begin with the pulmonary localization.

Keywords: children, echinococcosis, pulmonary and hepatic echinococcectomy.

БАЛАЛАРДАҒЫ ӨКПЕ МЕН БАУЫРДЫҢ ҚОСАРЛАНҒАН ЭХИНОКОККОЗЫН ХИРУРГИЯЛЫҚ ЕМДЕУДІҢ ТАКТИКАСЫ МЕН ӘДІСІН ТАҢДАУ

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Аңдатпа. Эхинококкоз - әлемнің көптеген аймақтарында кең таралған, ең ауыр әрі қауіпті паразиттік аурулардың бірі. Аурудың негізгі ерекшеліктеріне зақымданудың кең

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көлемде болуы, ұзаққа созылатын созылмалы ағымы және зақымданған ағзалардың қызметінің елеулі бұзылыстарына әкелуі жатады. Балалардағы өкпе мен бауырдың қосарланған эхинококкозын хирургиялық емдеудің тактикасын әзірлеу және оңтайлы әдісін таңдау. Әртүрлі эхинококкоз түрлерімен ауырған 3 жастан 14 жасқа дейінгі 346 баланың ем нәтижелері талданды. Оның ішінде 39 жағдайда (11,3%) өкпе мен бауырдың қосарланған эхинококкозы анықталды. Балалардағы өкпе мен бауырдың қосарланған эхинококкозына жасалған хирургиялық араласулардың тиімділігін салыстырмалы бағалау кешенді операция алдындағы дайындық, ұтымды хирургиялық қолжетімділікті және операциялық араласудың оңтайлы әдісін таңдау, сондай-ақ операциядан кейінгі белсенді жүргізу емнің сәтті әрі қолайлы нәтижесіне қол жеткізудің негізгі құрамдас бөліктері екенін көрсетті. Операцияның тактикасын, кезеңділігін және орындалу ретін анықтауда асқынулардың даму қаупі жоғары эхинококкалық кисталардың болуын ескеру қажет. Балалардағы өкпе мен бауырдың қосарланған эхинококкозын хирургиялық емдеудің тиімділігі кисталардың орналасуына және асқынулардың болуына байланысты. Эхинококкэктомияны асқыну қаупі жоғары кисталардан бастаған жөн. Басқа жағдайлар тең болғанда, хирургиялық емдеудің кезеңділігін өкпелік локализациядан бастау орынды.

Түйінді сөздер: балалар, эхинококкоз, өкпе мен бауырдың эхинококкэктомиясы.

ВЫБОР ТАКТИКИ И СПОСОБА ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ СОЧЕТАННОГО ЭХИНОКОККОЗА ЛЁГКИХ И ПЕЧЕНИ У ДЕТЕЙ

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Аннотация. Эхинококкоз является одним из наиболее тяжёлых и опасных паразитарных заболеваний во многих регионах мира, которое характеризуется обширностью поражения, длительным хроническим течением, вызывающим развитие серьёзных нарушений функций поражённых органов. Разработка стратегии и выбор способа хирургического лечения сочетанного эхинококкоза лёгких и печени у детей. Проанализированы результаты лечения 346 детей в возрасте от 3-х до 14 лет с различными формами эхинококкоза, из которых в 39 (11,3%) случаях выявлен сочетанный эхинококкоз лёгких и печени. Сравнительная оценка эффективности выполненных оперативных вмешательств сочетанного эхинококкоза лёгких и печени у детей показало, что комплексная предоперационная подготовка, выбор рационального хирургического доступа и оптимального метода оперативного вмешательства, активное послеоперационное ведение больных являются основными составляющими в успешном и благоприятном исходе лечения. При определении тактики, этапности и последовательности операций необходимо учитывать наличие эхинококковых кист, которые представляют наибольшую опасность в плане развития осложнений. Эффективность хирургического лечения сочетанного эхинококкоза лёгких и печени у детей зависит от локализации кист и наличия осложнений.

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Последовательность эхинококкэктомии логично проводить на кистах наиболее опасных развитием осложнений. При других равных обстоятельствах этапность оперативного вмешательства целесообразно начинать с легочной локализации.

Ключевые слова: дети, эхинококкоз, эхинококкэктомия лёгких и печени.

Introduction. Echinococcosis is one of the most severe and dangerous parasitic diseases in many regions of the world. It is characterized by extensive organ involvement and a prolonged chronic course, leading to the development of serious functional disorders of the affected organs [2, 7, 9]. According to WHO data, echinococcosis continues to occupy a leading position in terms of prevalence; in endemic areas, the incidence in humans reaches up to 50 cases per 100,000 population per year [5, 10, 11, 12]. In a number of countries where hydatid echinococcosis is an endemic pathology, its elimination has been elevated to the level of a national priority, and special national programs for disease control and prevention are being developed. Owing to the implementation of such programs, the disease has been practically eradicated in several countries that were previously unfavorable with respect to echinococcosis [13].

Analysis of the literature data and our own observations indicates that the proportion of echinococcal disease in the structure of surgical morbidity has increased over recent decades from 4–8% to 20%; simultaneous involvement of two or more organs has risen from 4% to 26.7%. At the same time, mortality associated with surgical treatment ranges from 2 to 7%. The frequency of purulent complications has increased to 17.9–28.5%; postoperative recurrence of echinococcosis amounts to 5–12%, and the formation and suppuration of a residual cavity after echinococcectomy is observed in 7–20% of cases [1, 3, 6, 8]. In recent years, there has been an increase in simultaneous involvement of multiple organs, as well as in the formation of centrally located cysts causing deformation of the anatomical structures of the organ and severe impairment of their function. The severity and peculiarities of the clinical course, difficulties of early diagnosis, and the variety of surgical treatment methods make this pathology one of the most challenging problems of modern medicine.

At present, the treatment of echinococcal disease presents certain difficulties. Despite the fact that numerous treatment options for this parasitic disease have been proposed worldwide, debates regarding the effectiveness of one method or another continue to be discussed at many international forums and conferences. Long-term comprehensive studies of the problem of echinococcosis have led to the conclusion that complex surgical treatment is the only effective method, regardless of the degree of radicality. This applies equally to uncomplicated and complicated, multiple, polyorgan, and combined forms of the disease.

The presented data demonstrate the relevance of early diagnosis and timely surgical treatment of various forms of echinococcosis in children, which served as the basis for conducting the present study.

Aim of the study. To develop a strategy and determine the optimal method of surgical treatment for combined echinococcosis of the lungs and liver in children.

Materials and methods. The present study is based on the results of examination and treatment of 346 children aged 3 to 14 years with various forms of echinococcosis. Among them,

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combined echinococcosis of the lungs and liver was identified in 39 cases (11.3%). Echinococcosis of the right lung and liver was detected in 18 cases (5.1%), of the left lung and liver in 14 cases (4.1%), and involvement of both lungs and the liver in 7 patients (2.1%) (Figure 1).
All patients admitted to the clinic with echinococcosis underwent clinical, laboratory, and instrumental examinations. The main diagnostic methods included plain chest radiography, ultrasound examination of the lungs and liver, and multislice computed tomography.

Results and discussion. The success of surgical treatment of echinococcosis was determined by the stage of the disease, the anatomical and topographic localization of the parasite, the size of the cysts, the presence of complicated forms, the patient's age, the state of immunobiological defense mechanisms, and the presence of concomitant diseases. These factors significantly influenced the choice of tactics and the rational sequence of surgical interventions in combined echinococcosis of the lungs and liver in children, thereby determining the operative risk. In our observations, in all 39 cases of combined echinococcosis of the lungs and liver, tactical decisions were based on the principles of organ-preserving surgery. Patients were operated on after appropriate preoperative preparation aimed at improving the general condition, reducing intoxication and allergic background, enhancing immunological parameters, and normalizing the main functional indices of vital organs.

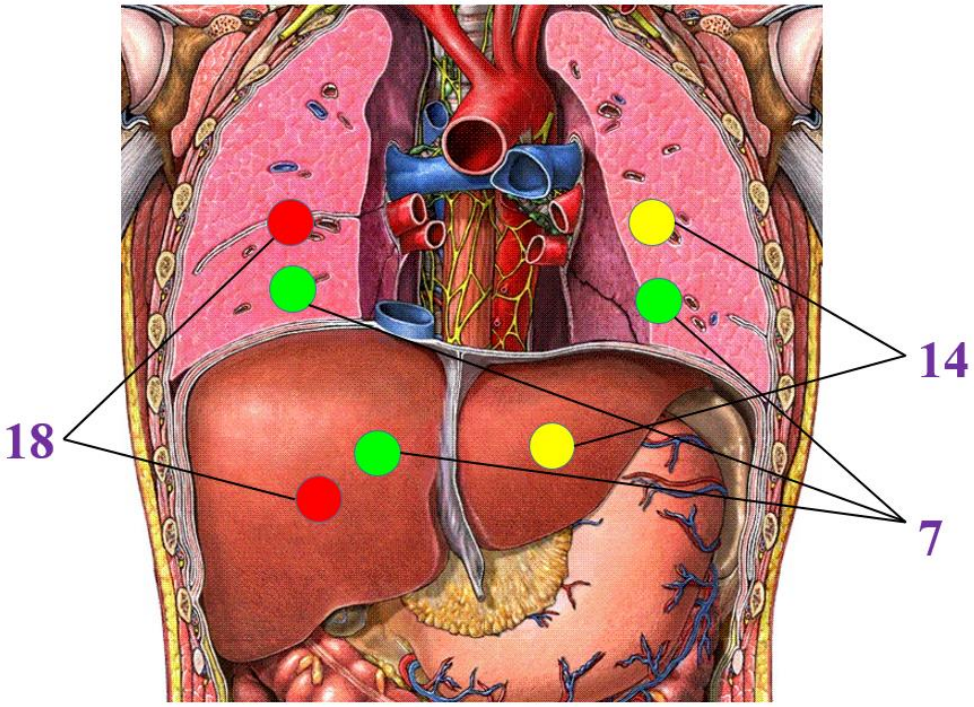

Figure 1. Organ localization of combined echinococcosis of the lungs and liver

In cases of combined involvement of the right lung and liver, one-stage echinococcectomy was performed in 14 patients (35.9%); in combined involvement of the left lung and the left lobe of the liver, in 5 patients (12.8%). The rationale for one-stage interventions was the localization of cysts in the middle and lower lobes of the right lung and in segments VII–VIII of the liver, as well

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as cyst localization in the lower lobe of the left lung and in segments I–II of the liver. In these cases, the surgical approach was a lateral or posterolateral thoracotomy in the seventh–eighth intercostal space with simultaneous transdiaphragmatic echinococcectomy of the liver. In the remaining 20 patients (51.3%) with combined lung and liver involvement, two- and three-stage echinococcectomy was performed, since cyst localization did not allow for their simultaneous removal; the interval between surgical stages did not exceed 2 months. We believe that one-stage echinococcectomy of the lungs and liver is possible only in the absence of significant technical difficulties in mobilizing both organs, when both procedures can be performed through a single incision. In such situations, this approach is justified, as it eliminates the need for repeat surgical intervention.

The sequence of removal of echinococcal cysts was determined by their size and the presence of complications, which facilitated subsequent stages of surgery from a technical standpoint. Priority was given to the removal of larger cysts to prevent their intraoperative rupture in case of accidental iatrogenic injury. Subsequently, echinococcal cysts that did not interfere with free manipulation within the operative field were removed, thereby creating favorable conditions for completion of the procedure without complications.

Determining the sequence of echinococcectomy was particularly challenging in 7 patients with bilateral pulmonary echinococcosis combined with liver involvement. In 2 patients with large and complicated liver cysts, the first stage of surgical intervention was performed on the liver, followed by surgery on the lungs (Figure 2).

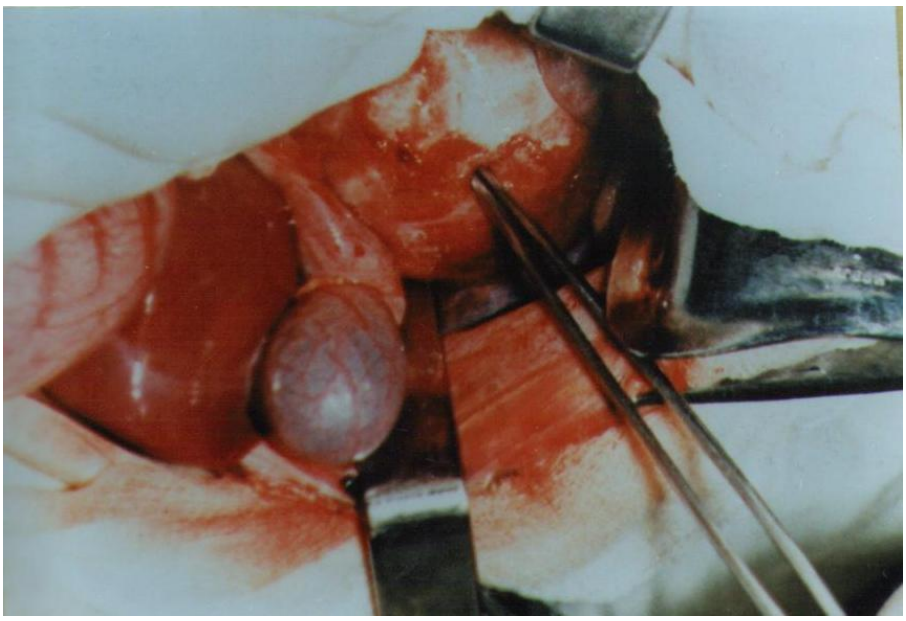

Figure 2. Echinococcal cyst occupying the entire left lobe of the liver.

In cases of single-cyst involvement of both lungs and the liver (3 observations), the cysts were approximately equal in size and showed no signs of complications. In these patients, multistage surgical treatment was performed with an interval of 2–3 months, with the sequence of

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operations beginning with the pulmonary localization. In the presence of multiple bilateral echinococcosis of the lungs and liver (2 patients), the staging of surgical interventions was determined by the greater number of cysts in the affected organ.

A mandatory condition for the successful performance of surgical interventions in echinococcosis is strict adherence to measures aimed at preventing contamination of surrounding organs and tissues with parasite elements. An essential requirement for achieving ablasty during pulmonary echinococcectomy, in our opinion, is preliminary short-term occlusion of the lobar bronchus of the affected segment during evacuation and sanitation of the cyst cavity. This approach allowed us to significantly reduce intraoperative and postoperative complications (Figure 3).

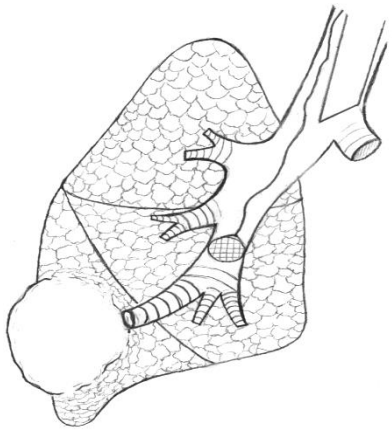

Figure 3. Schematic illustration of short-term occlusion of the lobar bronchus

This technique is considered appropriate and is used by us during echinococcectomy of medium-sized, large, and complicated cysts, when the risk of endobronchial leakage of echinococcal fluid is particularly high. Prior to tracheal intubation, obturation of the lobar bronchus supplying the segment containing the echinococcal cyst is performed. We consider this stage of echinococcectomy to be fundamental both in terms of ensuring the ablasty of the operation and in preventing bronchopulmonary complications resulting from the entry of contact chemical germicidal agents into the bronchi.

The technical steps of echinococcectomy were conventional: isolation of the cyst with gauze pads soaked in a contact-acting germicidal solution; puncture of the cyst and evacuation of its contents; cystotomy; removal of the chitinous membrane; treatment of the cyst bed with a betadine–alcohol solution; electrocoagulation of the entire inner surface of the fibrous capsule; closure of bronchial and biliary fistulas; and complete obliteration of the residual cavity by capitonnage. In our clinic, a modified capitonnage technique using figure-of-eight layered sutures (cross-layer sutures) has been introduced and successfully applied for obliteration of the cyst cavity (Figure 4).

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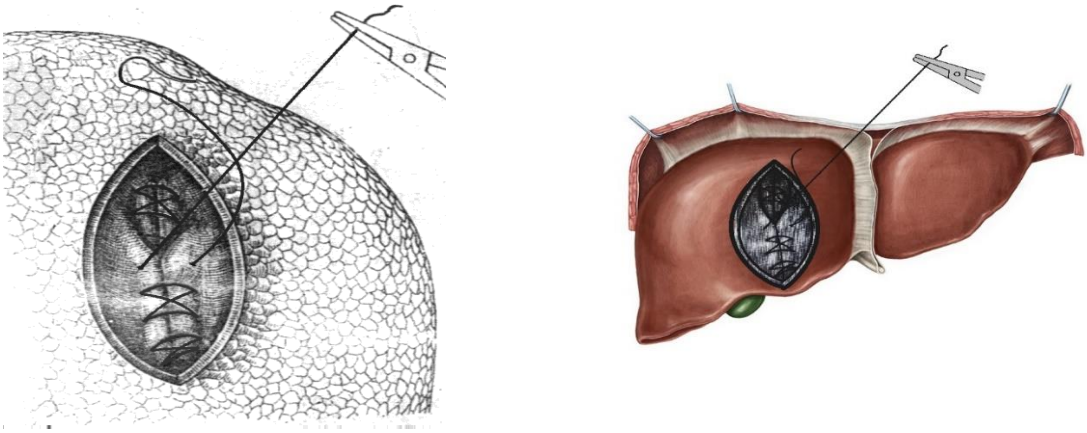

Figure 4. Schematic illustration of capitonnage performed using figure-of-eight layered sutures

When performing capitonnage with figure-of-eight layered sutures, we strictly adhere to the rules of suture placement: from the depth toward the surface, parallel to vessels, bronchi, and bile ducts, in order to avoid their injury and deformation. At the same time, we always strive to achieve complete apposition of the opposing walls of the fibrous capsule, which ensures their reliable fusion even in the presence of small bronchial and biliary fistulas. The advantages of this method of obliterating the residual cavity include significant time savings, hermetic sealing, creation of favorable conditions for healing of the lung and liver due to the alignment of corresponding tissue surfaces, as well as a reduction in ischemic zones.

The use of electrocoagulation during echinococcectomy was based on several practical considerations. First of all, coagulation of small bleeding vessels, bronchial and biliary fistulas was performed to prevent postoperative complications such as accumulation of blood, mucus, and bile in the residual cavity. In turn, electrocoagulation of the entire inner surface of the fibrous capsule led to the formation of a delicate coagulation eschar that functioned as a biological barrier; at the same time, the fibrous capsule itself became denser, contracted, and its surface area decreased. In addition, electrocoagulation of the inner surface of the fibrous capsule exerted a pronounced antimicrobial and anti-scolicidal effect as a result of thermal impact on protoscolices located both within the fibrous capsule itself and pericystically at a depth of up to 1 cm. This was confirmed by our histological and electron microscopic studies (Figure 5).

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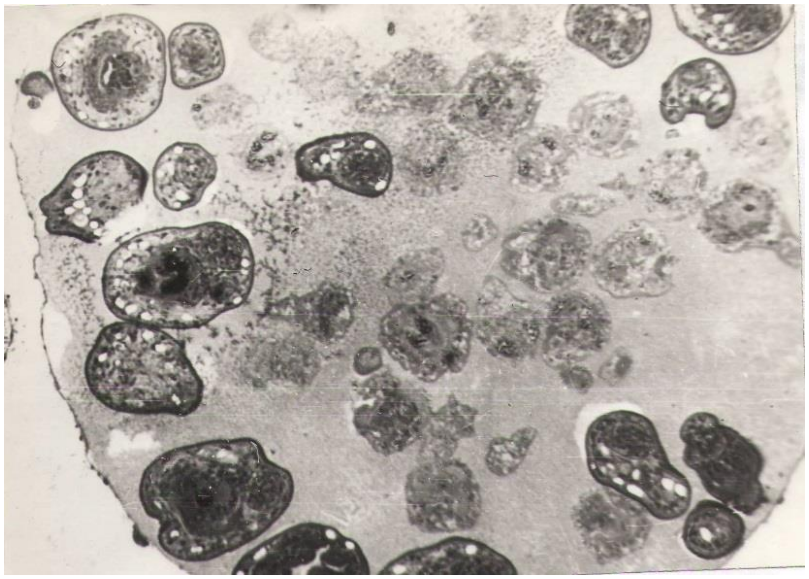

Figure 5**.** Alteration and destruction of protoscolices (treatment with betadine and electrocoagulation).

Despite strict adherence to all principles of ablasty during surgery and the introduction of various chemical and physical methods of action against the parasite, the recurrence rate of the disease remains high, reaching 12–33% [4]. In this regard, chemotherapy was administered in the preoperative and postoperative periods in order to sanitize the child's body from echinococcosis and to prevent disease recurrence. For this purpose, chemotherapy was carried out using the anthelmintic drug **Zentel**, which has demonstrated high efficacy and a broad spectrum of activity. Zentel was prescribed to all patients as a mandatory component of treatment; the daily dose was 10 mg/kg, administered in two divided doses for 14 days, followed by a repeated course after 2 months. Studies have shown that the anthelmintic drug Zentel causes irreversible disturbances in glucose utilization by the helminth and inhibits ATP synthesis. It exerts a destructive effect on the germinal elements of echinococcus by disrupting the function of the cellular microtubular apparatus and damaging tubulin protein. As a result, biochemical disorders develop within the cell, including inhibition of glucose transport and fumarate reductase activity, which underlies suppression of cell division at the metaphase stage. This mechanism is responsible for the inhibition of oviposition and larval development of helminths.

The results of the study demonstrated that the criteria for assessing the immediate and long-term outcomes of the effectiveness of surgical treatment of combined echinococcosis of the lungs and liver were the presence or absence of complications and disease recurrence. Our data indicated satisfactory function of the operated lungs and liver, and no recurrences of the disease were observed in our series. We believe that the combination of surgical intervention and chemotherapy constitutes the main criterion for preventing disease recurrence and achieving complete recovery of patients with echinococcosis.

Thus, comprehensive preoperative preparation, selection of a rational surgical approach and the optimal method of surgical intervention, as well as active postoperative management, are

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the main components of a successful and favorable treatment outcome. Surgical tactics in combined echinococcosis of the lungs and liver in children are rather complex, which is explained by the staged nature and sequence of echinococcectomy depending on cyst localization and the presence of complications. When determining the sequence of operations and the choice of surgical access, it is logical to perform echinococcectomy first in those areas where cysts pose the greatest risk of complications. Under otherwise equal conditions, it is advisable to begin staged surgical intervention with the pulmonary localization.

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EFFECTIVENESS OF PROGNOSTIC SCALES IN BREAST CANCER WITHIN THE ONCOLOGY SERVICE OF KAZAKHSTAN

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Abstract. The primary aim of this study is to conduct a comprehensive comparative evaluation of the accuracy, clinical effectiveness, and applicability of the TNM, Nottingham Prognostic Index (NPI), and other international prognostic models based on biological and pathological parameters in predicting breast cancer outcomes within the oncology service of Kazakhstan. This retrospective study was conducted using data from the national cancer registry and medical records of regional oncology centers for the period 2015–2025. Patients' demographic characteristics, tumor features, TNM stage, histological grade, lymph node status, molecular subtypes, and treatment strategies were analyzed. Statistical analysis was performed using SPSS and R software. The expected findings may indicate that relying solely on the TNM scale as an anatomical classifier is insufficient for prognostic assessment of breast cancer in Kazakhstan. Gradual implementation of the Nottingham Prognostic Index in clinical practice may improve risk stratification, support more personalized treatment selection, and enhance the overall effectiveness of oncological care.

Keywords: breast cancer, TNM, Nottingham Prognostic Index, prognosis, Kazakhstan.

ҚАЗАҚСТАННЫҢ ОНКОЛОГИЯЛЫҚ ҚЫЗМЕТІНДЕ СҮТ БЕЗІ ҚАТЕРЛІ ІСІГІНДЕГІ БОЛЖАМДЫҚ ШКАЛАЛАРЫНЫҢ ТИІМДІЛІГІ ҚАЗАҚСТАННЫҢ ОНКОЛОГИЯЛЫҚ ҚЫЗМЕТІНДЕ СҮТ БЕЗІ ҚАТЕРЛІ ІСІГІНДЕГІ БОЛЖАМДЫҚ ШКАЛАЛАРЫНЫҢ ТИІМДІЛІГІ

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Аңдатпа. Қазақстанның онкологиялық қызметінде сүт безі қатерлі ісігінің (СБҚІ) болжамын анықтауда қолданылатын TNM, NPI және биологиялық-патологиялық көрсеткіштерге негізделген басқа да халықаралық болжамдық модельдердің дәлдігін,

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клиникалық тиімділігін және қолдану мүмкіндіктерін жан-жақты салыстырмалы бағалау. Бұл ретроспективті зерттеу 2015–2025 жылдар аралығындағы республикалық онкологиялық регистр мен өңірлік онкологиялық орталықтардың медициналық құжаттары негізінде жүргізілді. Пациенттердің демографиялық деректері, ісік сипаттамалары, TNM сатысы, гистологиялық градация, лимфа түйіндерінің жағдайы, молекулалық подтиптері және ем тактикасы талданады. Статистикалық өңдеу SPSS және R бағдарламалары арқылы жүргізілді. Күтілетін нәтижелер Қазақстан жағдайында сүт безі қатерлі ісігіне болжам жасауда TNM шкаласын тек анатомиялық классификатор ретінде қолдану жеткіліксіз болуы мүмкін екенін көрсетеді. NPI шкаласын клиникалық тәжірибеге кезең-кезеңімен енгізу пациенттердің қауіп деңгейін дәлірек стратификациялауға, ем тактикасын жекелендіруге және онкологиялық көмектің тиімділігін арттыруға мүмкіндік беруі ықтимал.

Түйін сөздер: сүт безі обыры, TNM, Nottingham Prognostic Index, болжам, Қазақстан.

ЭФФЕКТИВНОСТЬ ПРОГНОСТИЧЕСКИХ ШКАЛ ПРИ РАКЕ МОЛОЧНОЙ ЖЕЛЕЗЫ В ОНКОЛОГИЧЕСКОЙ СЛУЖБЕ КАЗАХСТАНА (ОБЗОР ЛИТЕРАТУРЫ)

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Аннотация. Проведение всестороннюю сравнительную оценку точности, клинической эффективности и возможностей применения систем TNM, Nottingham Prognostic Index (NPI) и других международных прогностических моделей, основанных на биолого-патологических показателях, при определении прогноза рака молочной железы в онкологической службе Казахстана. Данное ретроспективное исследование проведено на основе данных республиканского онкологического регистра и медицинской документации региональных онкологических центров за период 2015–2025 гг. Анализировались демографические характеристики пациентов, особенности опухоли, стадия TNM, гистологическая градация, состояние лимфатических узлов, молекулярные подтипы и лечебная тактика. Статистическая обработка выполнена с использованием программ SPSS и R. Ожидаемые результаты могут показать, что использование только шкалы TNM в качестве анатомического классификатора недостаточно для прогностической оценки рака молочной железы в Казахстане. Поэтапное внедрение шкалы Nottingham Prognostic Index в клиническую практику может способствовать более точной стратификации риска, персонализации лечебной тактики и повышению эффективности онкологической помощи.

Ключевые слова: рак молочной железы, TNM, Nottingham Prognostic Index, прогноз, Казахстан.

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Introduction. Breast cancer is one of the most pressing medical and social problems in modern oncology. Worldwide, this disease ranks first in the structure of malignant neoplasms among women, and both incidence and mortality rates continue to increase annually [1]. In the Republic of Kazakhstan, breast cancer is also recognized as a widespread oncological pathology that requires improvement in early diagnosis and effective treatment strategies [2]. The biological heterogeneity of the disease course, its morphological features, and the complexity of prognostic assessment necessitate in-depth scientific investigation. Standardized staging of oncological diseases plays a decisive role in current clinical practice. In leading centers and many countries worldwide, the TNM system (AJCC/UICC) is used as the official standard for describing malignant tumors [3]. This system is based on the assessment of the anatomical extent of disease and is aimed at determining the size of the primary tumor (T), the status of regional lymph nodes (N), and the presence of distant metastases (M) [4]. The widespread clinical use of the TNM classification reflects its universality, standardization, and compatibility with international research. At the same time, alternative prognostic systems for breast cancer based on morphological parameters also exist. Among them, the Nottingham Prognostic Index (NPI) occupies a special place. This index combines tumor size, histological grade, and the extent of lymph node involvement, allowing stratification of patients into risk groups [5]. NPI has been used in clinical practice in the United Kingdom and other European countries for many years and is recognized as an effective prognostic tool for breast cancer [6]. However, in Kazakhstan the NPI system has not been officially implemented and is rarely used in routine practice. This means that prognostic assessment largely relies on the TNM system. Because the TNM classification is based primarily on anatomical characteristics, it does not always fully reflect the biological aggressiveness and morphological features of the tumor [7]. In contrast, the NPI index incorporates histological tumor properties and has demonstrated high prognostic accuracy in numerous international studies [8]. Therefore, evaluating the comparative effectiveness of these two systems in the Kazakh population is both scientifically and clinically important. The relevance of this study is explained by several aspects. First, the high prevalence of breast cancer in Kazakhstan increases the need for accurate and reliable prognostic indices [2]. Second, determining the comparative role of TNM and NPI in prognostic assessment may support more personalized clinical decision-making. Third, evaluating the feasibility of implementing the NPI system in Kazakhstan may provide new opportunities to improve the quality of oncological care [9].

Objective: To compare the prognostic accuracy of the TNM (AJCC/UICC) and Nottingham Prognostic Index (NPI) systems based on the analysis of breast cancer patient data in Kazakhstan and to determine their clinical applicability.

Materials and methods. This retrospective study was conducted using data from the national cancer registry and medical records of regional oncology centers for the period 2015–2025. Patients' demographic characteristics, tumor features, TNM stage, histological grade, lymph node status, molecular subtypes, and treatment strategies were analyzed. Statistical analysis was performed using SPSS and R software. Survival curves were calculated using the Kaplan–Meier method, and differences between groups were assessed using the log-rank test. Prognostic

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accuracy was evaluated using the AUC and Harrell's C-index. All data were stored in a confidential, coded format.

Results and Discussion.

Integration of NPI into Contemporary Treatment Decision-Making**.** Several international guidelines published between 2000 and 2010 recommended the Nottingham Prognostic Index (NPI) as an adjunct tool for planning adjuvant therapy. Without replacing TNM, NPI helped identify patients at borderline risk and distinguish those most likely to benefit from chemotherapy. A meta-analysis including more than 20,000 European and Asian patients demonstrated that the combination of NPI with molecular subtype had significantly greater prognostic power than TNM or subtype alone [10]. NPI has also been applied in clinical trials. For example, in HER2-targeted neoadjuvant therapy trials, risk stratification using NPI proved effective in selecting candidates with a higher likelihood of achieving pathological complete response [11]. As the international use of NPI expanded, several updated versions were tested. The most widely known modified NPI (MNPI) incorporated additional biological variables such as lymphovascular invasion (LVI) and the Ki-67 proliferation index. Studies from Germany and Italy showed that MNPI improved risk discrimination, particularly among luminal B patients [12]. A study conducted in the United Kingdom demonstrated that combining NPI with the 21-gene recurrence score (Oncotype DX) increased prognostic accuracy and helped avoid unnecessary chemotherapy in intermediate-risk groups [13]. Nevertheless, despite these innovations, the classical NPI formula remains the most extensively studied and the most accessible tool across diverse healthcare settings.

Limitations of TNM and Rationale for Complementary Tools. Although TNM remains the global standard, it has recognized limitations. Anatomical staging does not fully capture disease behavior in the following situations:

- biologically aggressive small tumors (e.g., T1 triple-negative or HER2-positive tumors);
- indolent large tumors, particularly low-grade luminal A cancers;
- node-negative but biologically high-risk tumors;
- patients with discordant imaging and histological findings.

A large European analysis showed that in stage II breast cancer, 10-year survival differed by up to twofold depending on biological subtype despite identical TNM stage [14]. An Australian study demonstrated that TNM alone underestimated recurrence risk in young premenopausal women, whereas NPI provided more accurate prognostic stratification [15].

Comparative Survival Prediction: TNM vs NPI. Direct comparisons help clarify the global significance of NPI. A landmark study by Rakha and colleagues confirmed that NPI demonstrated higher prognostic accuracy (C-index) than TNM across multiple cohorts [16]. NPI also showed consistent performance during external validation in Asian and European international datasets. Another comparative analysis from Italy reported that inclusion of histological grade (a core component of NPI) improved survival prediction across all TNM stages, including stage III disease [17]. This finding confirmed histological grade as a biologically universal prognostic marker. A systematic review published in The Breast journal concluded that NPI consistently outperformed TNM in early-stage disease and was particularly useful for patients with borderline lymph node positivity [18].

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Epidemiology and Registry Challenges in CIS Countries. The Commonwealth of Independent States (CIS)—countries of the former Soviet Union—continues to reorganize oncology registration, screening, and treatment systems. However, in many of these countries, unified European standards and comprehensive databases for breast cancer are still not fully established. According to the study "Comparison of breast cancer and cervical cancer stage distributions in ten newly independent states of the former Soviet Union," a large proportion of breast cancer cases in CIS countries (Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Ukraine, Uzbekistan, etc.) were registered at stages I–II between 2008 and 2017. In the 2013–2017 period, more than 50% of cases across the CIS—and over 75% in Belarus, Kazakhstan, and Ukraine—were diagnosed at stages I–II [19]. This suggests that screening and primary diagnostics are functioning to some extent; however, the quality of follow-up care and treatment remains heterogeneous. Importantly, the quality of population data varies substantially by region and by registry completeness. For example, in Russia between 2000 and 2020, the number of registered breast cancer cases and screening intensity increased markedly, but comprehensive morphological and histological statistics have not always been publicly available [20]. Demographic variability also plays a role. Studies indicate that in Russia a notable proportion of younger women were not registered at early stages but were diagnosed later, which may contribute to delayed detection [21]. Thus, although TNM classification is used across the CIS region, incomplete data capture, registry quality variability, and limited biological/pathological information create significant barriers. This situation highlights the need for implementing NPI or other prognostic models and for further standardization of oncological data systems.

CIS Comparative Data. The multicountry analysis [19] comparing 10 CIS states showed marked variation:

- Belarus, Kazakhstan, and Ukraine - more than 75% of patients diagnosed at stages I–II;
- other countries - more than 50% diagnosed at stages I–II.

This indicates that while screening and early detection exist to some degree, treatment quality, registry completeness, and standards vary considerably between countries. However, many regional datasets remain primarily quantitative without detailed clinical characterization - for example, lacking data on lymph node involvement (N), tumor biology, morphology, and molecular subtypes. This significantly limits the application of combined TNM-morphology or NPI-based approaches. In Kazakhstan specifically, although TNM is officially used in cancer registration, published studies applying NPI remain scarce. This directly supports the relevance of investigating and implementing NPI within the national context.

Conclusion: Need for TNM–NPI Complementarity in CIS Countries. Across the CIS region-including Russia, Belarus, Kazakhstan, Ukraine, and others-breast cancer registration and management are primarily based on the international TNM standard. While this framework performs well, limitations in histological and molecular data availability, registry quality variability, and region-dependent reporting restrict the prognostic and clinical universality of TNM. Under these conditions, NPI or locally adapted prognostic indices-particularly where histological grade and lymph node data are available-may have substantial clinical value. The use of NPI could:

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- improve stratification of early and intermediate-stage patients;
- reduce overtreatment and undertreatment;
- provide prognostic insight where molecular testing is unavailable;
- support more effective clinical decision-making (chemotherapy, adjuvant therapy).

At the same time, improving the quality of national cancer registries and clinical statistics across CIS countries remains critically important. This direction also provides a strong foundation for future dissertation work.

Epidemiology and Screening in Kazakhstan. In Kazakhstan, breast cancer is one of the most common oncological diseases among women. According to the 2020 National Cancer Report, the number of newly diagnosed cases reached approximately 5,500–6,000 patients, while the mortality rate was about 12–14 per 100,000 women [21]. Screening programs have been implemented since 2008. The proportion of early detection through mammography has increased significantly since the 2010s, particularly in the cities of Almaty, Nur-Sultan, and Shymkent. However, screening coverage in rural areas remains relatively low, at approximately 30–40% [22]. Use of TNM in Kazakhstan and Clinical Practice. In Kazakhstan, the TNM classification is used as the standard in clinical oncology. The most commonly registered stages are:

- I–II - 65–70%
- III - 20–25%
- IV - 5–10% [61].

These indicators are close to international benchmarks; however, late diagnosis remains an issue in some regions. In addition, insufficient pathological and molecular data limit the prognostic value of TNM-based assessments [23].

Potential and Applicability of NPI. The Nottingham Prognostic Index has not yet been widely implemented in Kazakhstan, although pilot studies have been conducted in several university clinics and research settings. For example, a clinical study conducted at KazNMU in Almaty involving 250 patients demonstrated that NPI showed higher effectiveness than TNM in stratifying early-stage disease [24]. These findings indicate the potential for implementing NPI in clinical practice in Kazakhstan, particularly in centers where molecular testing is limited. Diagnostic performance varies across regions of Kazakhstan:

- Almaty, Astana - early detection: 60–70%
- Northern and Eastern regions - 40–50% [25].

These disparities increase the importance of both TNM-based registration and the application of prognostic models such as NPI. Implementation of NPI may improve accurate stratification of early- and intermediate-stage patients, thereby supporting more appropriate use of adjuvant therapy [26].

Molecular and Histological Parameters. Studies from Kazakhstan indicate that ER, PR, HER2 status and histological grading of breast cancer have significant prognostic value alongside TNM staging. One retrospective study of 300 patients showed that when NPI was applied, 5-year overall survival was predicted more accurately than with TNM alone [27]. This supports the

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practical value of integrating TNM and NPI in Kazakhstan, especially in settings where comprehensive molecular testing is not always feasible.

Recommendations and Future Directions. Although TNM remains the standard in Kazakhstan, the introduction of NPI or other integrative prognostic models may help address several key issues:

1. Stratification of patients detected at early stages;
2. Reduction of overtreatment and undertreatment;
3. More efficient allocation of healthcare resources;
4. Enhancement of national cancer registry data quality [28], [29], [30], [31], [32].

Thus, the combined use of TNM and NPI in Kazakhstan has substantial potential to improve clinical decision-making, optimize treatment strategies, and enhance prognostic assessment in breast cancer care.

Conclusion: Preliminary analyses suggest that breast cancer in Kazakhstan may frequently be diagnosed at stages II–III, which could potentially affect the performance of prognostic models. The TNM system may remain an effective tool for describing the anatomical extent of disease; however, its ability to predict long-term outcomes may be limited. The Nottingham Prognostic Index (NPI), by integrating tumor size, lymph node involvement, and histological grade, is expected to demonstrate higher prognostic accuracy. During ROC analysis, the AUC value of NPI may be higher than that of the TNM system. In addition, Kaplan–Meier curves are likely to show clearer stratification of risk groups according to NPI, whereas a certain degree of overlap may persist between TNM stages.

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RESTLESS LEGS SYNDROME IN PREGNANCY: PREVALENCE, SYMPTOM SEVERITY AND TREATMENT EFFECTIVENESS

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Introduction. The aim of this study was to assess the prevalence, clinical features, risk factors, and treatment effectiveness of restless legs syndrome (RLS) in pregnant women. A prospective observation was conducted on 56 pregnant women with clinically verified RLS. It was found that symptom onset predominantly occurs during the second and third trimesters and is associated with iron deficiency, sleep disturbances, and increased anxiety. Moderate therapeutic response was observed with iron supplementation and non-pharmacological intervention. To analyze the clinical and functional features of RLS in pregnant women and assess the effectiveness of combined therapy in the observed cohort. The study included 56 pregnant women aged 19–38 years presenting with nighttime discomfort in the legs, meeting the diagnostic criteria of the International Restless Legs Syndrome Study Group (IRLSSG). Each participant underwent clinical assessment using the IRLS severity scale, Pittsburgh Sleep Quality Index (PSQI), and Hospital Anxiety and Depression Scale – Anxiety subscale (HADS-A). Laboratory tests included hemoglobin, ferritin, and serum iron levels. RLS symptoms appeared predominantly in the second (41.1%) and third (50.0%) trimesters, while only 8.9% of patients reported onset in the first trimester. Eighty-two percent reported significant sleep disturbances, including difficulty falling asleep, frequent awakenings, and light sleep. Sixty-four percent experienced increased daytime sleepiness and reduced performance. Seventy-one percent of patients had pain, tingling, or itching in the extremities, aggravated by sitting or lying down. Ferritin deficiency (<30 ng/mL) was detected in 73% of women, with 32% presenting with anemia (Hb <110 g/L). Mean ferritin before therapy was 19.4 ± 8.7 ng/mL. Patients without iron deficiency had milder disease: mean IRLS scores were 5–6 points lower, and PSQI sleep quality scores were 3–4 points better ($p < 0.05$). Early diagnosis and timely iron supplementation are essential components of pregnancy management and contribute to improved maternal and perinatal outcomes.

Keywords: restless legs syndrome, pregnancy, iron deficiency, sleep disturbance, perinatal neurology.

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ЖҮКТІЛІК КЕЗІНДЕГІ МАЗАСЫЗ АЯҚТАР СИНДРОМЫ (RLS): ТАРАЛУЫ, СИМПТОМДАР АУЫРЛЫҒЫ ЖӘНЕ ЕМ ТИІМДІЛІГІ

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Аңдатпа. Зерттеудің мақсаты – жүкті әйелдердегі тынышсыз аяқ синдромының (RLS) таралуын, клиникалық ерекшеліктерін, қауіп факторларын және емнің тиімділігін бағалау. Клиникалық расталған RLS бар 56 жүкті әйелге проспективті бақылау жүргізілді. Симптомдардың көбіне екінші және үшінші триместрлерде пайда болатыны, темір тапшылығымен, ұйқы бұзылыстарымен және мазасыздықтың жоғарылауымен байланысты екені анықталды. Темір препараттарын қабылдау мен дәрілік емес шараларды қолдану аясында орташа терапиялық жауап байқалды. Жүкті әйелдердегі RLS-тің клиникалық және функционалдық ерекшеліктерін талдау және бақылаудағы топта кешенді емнің тиімділігін бағалау. Зерттеуге 19–38 жас аралығындағы, аяқтарында түнгі дискомфортқа шағымданған және Халықаралық тынышсыз аяқ синдромын зерттеу тобының (IRLSSG) диагностикалық критерийлеріне сәйкес келетін 56 жүкті әйел енгізілді. Әрбір қатысушы IRLS ауырлық шкаласы, Питтсбург ұйқы сапасы индексі (PSQI) және Госпитальдық мазасыздық пен депрессия шкаласының мазасыздық субшкаласы (HADS-A) бойынша клиникалық бағалаудан өтті. Зертханалық тексерулерге гемоглобин, ферритин және сарысулық темір деңгейлері кірді. RLS симптомдары негізінен екінші (41,1%) және үшінші (50,0%) триместрлерде байқалды, ал тек 8,9% пациентте симптомдардың басталуы бірінші триместрде тіркелді. Пациенттердің 82%-ы ұйқының айқын бұзылыстарын, соның ішінде ұйықтап кетудің қиындауын, жиі оянуды және үстірт ұйқыны атап өтті. 64%-ында күндізгі ұйқышылдықтың артуы мен еңбекке қабілеттіліктің төмендеуі байқалды. 71% пациентте аяқ-қолдарда ауырсыну, шаншу немесе қышу сезімі тіркеліп, ол отыру немесе жату кезінде күшейген. Ферритин тапшылығы (<30 нг/мл) әйелдердің 73%-ында анықталды, оның ішінде 32%-ында анемия (Hb <110 г/л) байқалды. Емге дейінгі орташа ферритин деңгейі 19,4 ± 8,7 нг/мл болды. Темір тапшылығы жоқ пациенттерде ауру жеңілірек өтті: IRLS шкаласы бойынша орташа көрсеткіштер 5–6 баллға төмен, ал PSQI бойынша ұйқы сапасының көрсеткіштері 3–4 баллға жақсы болды ($p < 0,05$). Ерте диагностика және темір препараттарын дер кезінде тағайындау жүктілікті жүргізудің маңызды компоненттері болып табылады және ана мен перинаталдық нәтижелердің жақсаруына ықпал етеді.

Кілт сөздер: мазасыз аяқтар синдромы, жүктілік, темір тапшылығы, ұйқы бұзылысы, перинаталдық неврология.

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СИНДРОМ БЕСПОКОЙНЫХ НОГ ПРИ БЕРЕМЕННОСТИ: ЧАСТОТА, ТЯЖЕСТЬ СИМПТОМОВ И ЭФФЕКТИВНОСТЬ ТЕРАПИИ

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Аннотация. Целью данного исследования была оценка распространённости, клинических особенностей, факторов риска и эффективности лечения синдрома беспокойных ног (СБН) у беременных женщин. Проведено проспективное наблюдение за 56 беременными с клинически подтверждённым СБН. Установлено, что начало симптомов преимущественно приходится на второй и третий триместры и связано с дефицитом железа, нарушениями сна и повышенной тревожностью. Отмечен умеренный терапевтический эффект при применении препаратов железа и немедикаментозных вмешательств. Проанализировать клинико-функциональные особенности СБН у беременных женщин и оценить эффективность комбинированной терапии в наблюдаемой когорте. В исследование были включены 56 беременных женщин в возрасте 19–38 лет с ночным дискомфортом в ногах, соответствующим диагностическим критериям Международной группы по изучению синдрома беспокойных ног (IRLSSG). Каждая участница прошла клиническую оценку с использованием шкалы тяжести IRLS, Питтсбургского индекса качества сна (PSQI) и подшкалы тревоги Госпитальной шкалы тревоги и депрессии (HADS-A). Лабораторные исследования включали определение уровня гемоглобина, ферритина и сывороточного железа. Симптомы СБН преимущественно появлялись во втором (41,1%) и третьем (50,0%) триместрах, тогда как только у 8,9% пациенток отмечалось начало в первом триместре. У 82% наблюдались выраженные нарушения сна, включая трудности засыпания, частые пробуждения и поверхностный сон. У 64% отмечалась повышенная дневная сонливость и снижение работоспособности. У 71% пациенток наблюдались боль, покалывание или зуд в конечностях, усиливающиеся в положении сидя или лёжа. Дефицит ферритина (<30 нг/мл) выявлен у 73% женщин, при этом у 32% диагностирована анемия (Hb <110 г/л). Средний уровень ферритина до начала терапии составил 19,4 ± 8,7 нг/мл. У пациенток без дефицита железа заболевание протекало легче: средние показатели по шкале IRLS были на 5–6 баллов ниже, а показатели качества сна по шкале PSQI - на 3–4 балла лучше ($p < 0,05$). Ранняя диагностика и своевременная коррекция дефицита железа являются важными компонентами ведения беременности и способствуют улучшению материнских и перинатальных исходов.

Ключевые слова: синдром беспокойных ног, беременность, дефицит железа, нарушения сна, перинатальная неврология.

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Introduction. Restless legs syndrome (RLS), or Willis–Ekbom disease, is a common neurological sensorimotor disorder characterized by an irresistible urge to move the legs, often accompanied by unpleasant sensations in the lower extremities, such as itching, tingling, or a pulling or burning pain. Symptoms are exacerbated at rest, especially in the evening and at night, leading to sleep disturbances, daytime sleepiness, decreased physical activity, and impaired emotional well-being. The prevalence of RLS in the general population is 2–10%; however, among pregnant women, it is significantly higher, ranging from 10% to 30%, depending on diagnostic methods and trimester. Symptoms most commonly appear during the second and third trimesters, associated with physiological changes, including increased blood volume, higher iron requirements, hormonal fluctuations, and increased cardiovascular and nervous system load. The pathogenesis of RLS in pregnancy is multifactorial. Iron and ferritin deficiency is considered a key factor, affecting dopamine synthesis in the central nervous system and the function of dopaminergic pathways. Impaired dopaminergic transmission contributes to sensorimotor symptoms and sleep disturbances. Hormonal changes during pregnancy, including elevated estrogen and progesterone levels, can increase peripheral nerve sensitivity and symptom severity. Other significant factors include stress, chronic fatigue, sleep disorders, and hereditary predisposition, all of which can exacerbate the clinical picture. RLS during pregnancy is associated with a significant reduction in quality of life, increased fatigue, higher anxiety levels, and decreased cognitive and physical functioning. Symptoms often remain undiagnosed or are perceived as temporary manifestations of pregnancy, resulting in delayed therapy and worsening of the patient's condition.

Despite the high prevalence of RLS in pregnancy, data on clinical features, symptom severity, laboratory markers, and treatment effectiveness remain limited. In particular, the relationship between symptom severity and ferritin levels, the influence of pregnancy trimester on RLS manifestations, and the effectiveness of combined therapy using non-pharmacological interventions and iron supplementation remain insufficiently studied. Thus, the relevance of this study is determined by the need for a systematic investigation of clinical and laboratory characteristics of RLS in pregnant women, assessment of risk factors, symptom dynamics, and treatment effectiveness. The aim of this study was to investigate the features of RLS in pregnant women, assess the influence of iron deficiency and pregnancy trimester on symptom severity, and evaluate the effectiveness of a combined treatment approach in a cohort of 56 patients.

Objective. To analyze the clinical and functional features of RLS in pregnant women and assess the effectiveness of combined therapy in the observed cohort.

Materials and Methods. The study included 56 pregnant women aged 19–38 years presenting with nighttime discomfort in the legs, meeting the diagnostic criteria of the International Restless Legs Syndrome Study Group (IRLSSG). Each participant underwent clinical assessment using the IRLS severity scale, Pittsburgh Sleep Quality Index (PSQI), and Hospital Anxiety and Depression Scale – Anxiety subscale (HADS-A). Laboratory tests included hemoglobin, ferritin, and serum iron levels. Ferritin levels below 30 ng/mL were considered indicative of iron deficiency. Patients were followed prospectively, with visits every four weeks, including reassessment of all scales and laboratory parameters. Treatment followed current guidelines: non-pharmacological interventions were recommended, and oral iron supplementation was provided

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for laboratory-confirmed deficiency. Dopaminergic drugs were not used. Treatment effectiveness was assessed based on IRLS score reduction, sleep improvement, and laboratory dynamics.

Results. The study included 56 pregnant women aged 19–38 years (mean age 28.6 ± 4.2 years). Primiparas accounted for 53.6% of the cohort, and multiparas 46.4%. RLS symptoms appeared predominantly in the second (41.1%) and third (50.0%) trimesters, while only 8.9% of patients reported onset in the first trimester. All participants reported an irresistible urge to move the legs at rest, most pronounced in the evening and at night. Eighty-two percent reported significant sleep disturbances, including difficulty falling asleep, frequent awakenings, and light sleep. Sixty-four percent experienced increased daytime sleepiness and reduced performance. Seventy-one percent of patients had pain, tingling, or itching in the extremities, aggravated by sitting or lying down. Ferritin deficiency (<30 ng/mL) was detected in 73% of women, with 32% presenting with anemia (Hb <110 g/L). Mean ferritin before therapy was 19.4 ± 8.7 ng/mL. Patients without iron deficiency had milder disease: mean IRLS scores were 5–6 points lower, and PSQI sleep quality scores were 3–4 points better ($p < 0.05$).

Table 1. Characteristics of pregnant women with RLS

Parameter	Value
Mean age, years	28.6 ± 4.2
Primiparas, %	53.6
Symptom onset in 1st trimester, %	8.9
Symptom onset in 2nd trimester, %	41.1
Symptom onset in 3rd trimester, %	50.0
Mean IRLS score (pre-treatment)	21.3 ± 5.4
Ferritin deficiency (<30 ng/mL), %	73
Anemia (Hb <110 g/L), %	32
Sleep disturbance (PSQI >5), %	82
Anxiety (HADS-A >7), %	64

After eight weeks of combined therapy, including non-pharmacological interventions and iron supplementation, mean IRLS scores decreased from 21.3 ± 5.4 to 12.4 ± 4.1 ($p < 0.01$), indicating significant improvement. Sleep quality improved in 67% of patients, and mean HADS-A anxiety scores decreased by 19%. In the ferritin-deficient subgroup, 78% of women showed a positive response.

Table 2.Effectiveness of RLS therapy in pregnant women

Parameter	Before Treatment	After Treatment	Change
IRLS score	21.3 ± 5.4	12.4 ± 4.1	–8.9 ($p < 0.01$)
Ferritin, ng/mL	19.4 ± 8.7	42.8 ± 11.2	+23.4
Patients with improved sleep, %	-	67	+67

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Anxiety reduction (HADS-A), %	-	19	-19
Complete symptom regression postpartum, %	-	82	-

Symptom severity according to IRLS was higher in the second and third trimesters compared to the first (mean score 21.8 ± 4.9 and 22.1 ± 5.1 vs. 17.2 ± 3.8, $p < 0.05$). Women with ferritin below 30 ng/mL had more severe disease (mean IRLS 23.1 ± 4.7 vs. 15.6 ± 3.9 in patients with normal iron levels).

Table 3. RLS severity by trimester and ferritin level

Group	Mean IRLS Score	N	ferritin deficiency (%)
1st trimester	17.2 ± 3.8	5	40
2nd trimester	21.8 ± 4.9	23	74
3rd trimester	22.1 ± 5.1	28	75
Ferritin ≥30 ng/mL	15.6 ± 3.9	15	-
Ferritin <30 ng/mL	23.1 ± 4.7	41	100

Sleep disturbances were observed in 82% of patients before therapy, decreasing to 27% after treatment (PSQI >5). Anxiety (HADS-A >7) decreased from 64% pre-treatment to 45% post-treatment.

Table 4. Sleep quality and anxiety before and after therapy

Parameter	Before Treatment	After Treatment	Change
PSQI >5, %	82	27	–55
HADS-A >7, %	64	45	–19

Preterm birth occurred in 3.6% of patients; newborn weight was within normal limits. In 28% of women, RLS symptoms completely resolved within two weeks postpartum, and in 54% within the first two months. Complete symptom regression occurred in 82% of women postpartum; 18% had mild residual symptoms up to three months.

Discussion. Our study confirms that RLS is a relatively common disorder in pregnant women, predominantly occurring in the second and third trimesters. This aligns with previously published epidemiological studies reporting a prevalence of 10–30% in pregnancy. The most pronounced symptoms were observed in women with iron deficiency, confirming the key role of this micronutrient in RLS pathogenesis. Ferritin deficiency may impair dopaminergic transmission in the CNS, explaining the severity of sensorimotor symptoms. Symptom severity increased with pregnancy progression, related to rising physiological demands and increased nervous system load. Sleep disturbances, identified in 82% of patients, represent an important clinical aspect, as

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fragmented and insufficient sleep can exacerbate daytime sleepiness, anxiety, and emotional impairment. Iron supplementation combined with non-pharmacological interventions (leg exercises, massage, sleep hygiene) reduced mean IRLS scores by 8.9 points and improved sleep in 67% of patients. These results confirm the effectiveness of non-pharmacological and iron therapy during pregnancy and are consistent with current recommendations limiting dopaminergic drug use in this population. Postpartum symptom dynamics showed complete regression in 82% of women within the first two months, consistent with literature indicating the temporary nature of pregnancy-related RLS and recovery after hormonal balance and iron status normalization. Our study highlights the importance of early RLS diagnosis and detection of iron deficiency as a key risk factor. Timely therapy not only improves sleep and reduces anxiety but may also lower pregnancy complications associated with chronic fatigue and sleep disturbances. Limitations include the relatively small sample size (n=56) and lack of long-term follow-up beyond three months postpartum. Further large prospective studies using objective sleep assessments and evaluating RLS impact on labor and child development are warranted.

Conclusion. RLS is a common disorder in pregnant women, primarily occurring in the second and third trimesters. Iron deficiency is the main risk factor and correlates with symptom severity. RLS significantly impairs sleep quality, increases daytime sleepiness, and raises anxiety, reducing overall quality of life. Combined therapy with iron supplementation and non-pharmacological interventions effectively reduces symptom severity and improves sleep quality. Postpartum, most women experience symptom regression within the first two months, although a small portion may retain mild symptoms up to three months. Early diagnosis and timely iron supplementation are essential components of pregnancy management and contribute to improved maternal and perinatal outcomes.

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ANXIETY STATE IN CHILDREN WITH TYPE 1 DIABETES MELLITUS

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Abstract. The aim of this study was the early identification of anxiety states in children under 18 years of age with type 1 diabetes mellitus, which would allow timely provision of medical and psychological care and contribute to the reduction of possible disorders associated with the central nervous system. To assess the level of anxiety in children and adolescents with type 1 diabetes mellitus (T1DM) depending on disease duration and to determine its clinical significance. The study included 102 patients with T1DM aged 7 to 18 years, including 48 girls (47.3%) and 54 boys (52.6%). The duration of the disease ranged from 1 to 15 years. Patients were divided into three groups: up to 3 years, 3–6 years, and more than 6 years of disease duration. Psychoemotional status was assessed using the Spielberger–Khanin Anxiety Inventory (evaluation of state and trait anxiety). A statistically significant increase in both state and trait anxiety levels was found with increasing disease duration ($p < 0.001$). In the early stages of T1DM, moderate state anxiety predominated, reflecting adaptation to the disease. In patients with a disease duration of 3–6 years, a significant increase in trait anxiety was observed, indicating the development of stable psychoemotional disturbances. The highest levels of anxiety were identified in patients with a disease duration of more than 6 years, suggesting the accumulation of the psychological burden of chronic illness. Anxiety disorders are widespread among children with T1DM and tend to progress with increasing disease duration. The obtained data highlight the need for early detection and correction of psychoemotional disturbances, as well as the integration of psychological support into the standard management of patients with T1DM.

Keywords: Anxiety, psychoemotional, diabetes mellitus, children, glycemic control, cognitive dysfunction.

БАЛАЛАР АРАСЫНДАҒЫ 1-ШІ ТИПТІ ҚАНТ ДИАБЕТІ КЕЗІНДЕГІ МАЗАСЫЗДЫҚ КҮЙІ

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Аңдатпа. Бұл зерттеудің мақсаты – 18 жасқа дейінгі 1 типті қант диабеті бар балалардағы мазасыздық жағдайларын ерте анықтау, бұл өз кезегінде дер кезінде медициналық және психологиялық көмек көрсетуге мүмкіндік беріп, орталық жүйке жүйесімен байланысты мүмкін бұзылыстардың алдын алуға ықпал етеді. 1 типті қант диабеті (СД1) бар балалар мен жасөспірімдердегі мазасыздық деңгейін аурудың ұзақтығына байланысты бағалау және оның клиникалық маңызын анықтау. Зерттеуге 7–18 жас аралығындағы 102 СД1 бар пациент енгізілді, оның ішінде 48 қыз (47,3%) және 54 ұл (52,6%). Аурудың ұзақтығы 1 жылдан 15 жылға дейін болды. Пациенттер үш топқа бөлінді: 3 жылға дейін, 3–6 жыл және 6 жылдан астам. Психоэмоционалдық жағдай Спилбергер–Ханин мазасыздық шкаласы арқылы бағаланды (ситуациялық және тұлғалық мазасыздық). Ауру ұзақтығы артқан сайын ситуациялық және тұлғалық мазасыздық деңгейінің статистикалық тұрғыдан мәнді жоғарылауы анықталды ($p < 0,001$). СД1-дің бастапқы кезеңдерінде ауруға бейімделуді көрсететін орташа деңгейдегі ситуациялық мазасыздық басым болды. Ауру ұзақтығы 3–6 жыл болған пациенттерде тұлғалық мазасыздықтың айқын жоғарылауы байқалды, бұл тұрақты психоэмоционалдық бұзылыстардың қалыптасуын көрсетеді. Ең жоғары мазасыздық деңгейі ауру ұзақтығы 6 жылдан асқан пациенттерде анықталды, бұл созылмалы аурудың психологиялық жүктемесінің жинақталуын көрсетеді. СД1 бар балалар арасында мазасыздық бұзылыстары кең таралған және ауру ұзақтығына байланысты үдеуге бейім. Алынған нәтижелер психоэмоционалдық бұзылыстарды ерте анықтау мен түзетудің, сондай-ақ СД1 бар пациенттерді жүргізу стандартына психологиялық қолдауды енгізудің қажеттілігін көрсетеді.

Түйін сөздер: Мазасыздық, психоэмоционалдық, қант диабеті, балалар, гликемиялық бақылау, когнитивті дисфункция

ТРЕВОЖНОЕ СОСТОЯНИЕ ПРИ САХАРНОМ ДИАБЕТЕ 1 ТИПА СРЕДИ ДЕТСКОГО КОНТЕНГЕНТА

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Аннотация. Целью данного исследования была раннее выявление тревожных состояний у детей до 18 лет с сахарным диабетом 1 типа, что могло бы позволить своевременно оказывать медицинскую и психологическую помощь, для снижению возможных нарушений, связанных с центральной нервной системой. Оценить уровень тревожности у детей и подростков с сахарным диабетом 1 типа (СД1) в зависимости от длительности заболевания и определить её клиническое значение. В исследование включены 102 пациента с СД1 в возрасте от 7 до 18 лет, из них 48 девочек (47,3%) и 54 мальчика (52,6%). Длительность заболевания варьировала от 1 до 15 лет. Пациенты были разделены на три группы: до 3 лет, 3–6 лет и более 6 лет заболевания. Оценка

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психоэмоционального состояния проводилась с использованием шкалы тревожности Спилбергера–Ханина (оценка ситуативной и личностной тревожности). Установлено статистически значимое увеличение уровней как ситуативной, так и личностной тревожности с увеличением длительности заболевания ($p < 0,001$). На ранних этапах СД1 преобладала умеренная ситуативная тревожность, отражающая адаптацию к заболеванию. У пациентов с длительностью заболевания 3–6 лет отмечено достоверное повышение личностной тревожности, что свидетельствует о формировании устойчивых психоэмоциональных нарушений. Наиболее выраженные показатели тревожности выявлены у пациентов с длительностью заболевания более 6 лет, что указывает на накопление психологического бремени хронического заболевания. Тревожные расстройства широко распространены среди детей с СД1 и имеют тенденцию к прогрессированию по мере увеличения длительности заболевания. Полученные данные подчеркивают необходимость раннего выявления и коррекции психоэмоциональных нарушений, а также интеграции психологической поддержки в стандарт ведения пациентов с СД1.

Ключевые слова: Тревожность, психоэмоциональные расстройства, сахарный диабет, дети, контроль уровня глюкозы в крови, когнитивные нарушения

Introduction. It is well known that diabetes mellitus (DM) is a chronic metabolic disease that develops due to an absolute deficiency of insulin in type 1 DM or its relative deficiency and insulin resistance in type 2 DM. Currently, diabetes mellitus is recognized worldwide as a so-called “non-communicable epidemic” [1]. This is due to its high prevalence across all age groups, as well as the extremely increased risk of developing complications with subsequent disability. This disease represents a serious problem, as it involves damage to multiple organs and systems, with the central nervous system being no exception.

The number of pediatric patients seeking medical care for diabetes mellitus is increasing every year. In this regard, childhood diabetes mellitus has for many years remained a pressing issue in global healthcare. The expansion of age boundaries, along with the development of fairly severe complications against the background of diabetes with possible subsequent disability, largely determine its leading position both in global and national programs aimed at timely prevention and provision of care to affected individuals [2,3,4].

As noted above, one of the main “targets” of the negative effects of hyperglycemia, even at the early stages of the disease, is the central nervous system (CNS). Various CNS-related pathologies occupy a certain priority among complications of diabetes mellitus in childhood due to the specific features of innervation, the heterogeneous nature of clinical manifestations, as well as the difficulty of diagnostic and especially therapeutic interventions. Moreover, cognitive impairments, which are the primary cerebral abnormalities in type 1 diabetes mellitus, negatively affect the achievement and maintenance of optimal glycemic control [5].

According to the literature, the initial manifestations of cognitive dysfunction in this disease may appear as early as 2–8 years after disease onset. In this regard, early assessment of quality of life and its subsequent dynamic evaluation throughout the course of the disease will

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contribute to the timely provision of medical and psychological support, which will naturally lead to a reduction in nervous system complications in patients with type 1 diabetes mellitus.

Objective. Early identification of anxiety in this group of children leads to the timely provision of medical and psychological care, which in turn results in a reduction of possible disorders associated with the central nervous system.

Materials and Methods. To achieve the stated objective, 102 children with type 1 diabetes mellitus were examined, including 48 girls (47.3%) and 54 boys (52.6%), with a disease duration ranging from 1 to 15 years. The study was conducted in the pediatric department of the Republican Specialized Scientific and Practical Medical Center of Endocrinology of the Republic of Uzbekistan. At the time of clinical data analysis, the children's ages ranged from 7 to 18 years. Clinical assessment included evaluation of complaints, neurological status, and analysis of the emotional sphere using the Spielberger–Khanin anxiety inventory.

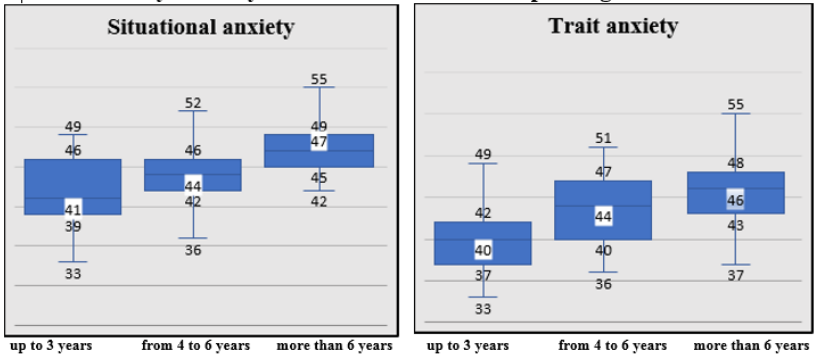
Results. The study included 102 children with type 1 diabetes (T1DM). Depending on the duration of the disease, the patients were divided into three groups: up to 3 years (Group I), 3–6 years (Group II), and more than 6 years (Group III).

Assessment of the psychoemotional state using the Spielberger–Hanin Anxiety Scale revealed a tendency toward increased anxiety levels as the duration of the disease increased. Indicators of both «State Anxiety Scale» and «Trait Anxiety Scale» differed significantly between groups ($p < 0.001$ and $p < 0.001$, respectively) **(Table 1.).**

In children of Group I (duration of illness ≤3 years), mild or moderate levels of situational anxiety were observed in most cases, which is likely associated with the stage of adaptation to the illness and the characteristics of the treatment being administered. At the same time, patients in Group II (3–6 years) showed a marked increase in the level of state anxiety, which may indicate the development of persistent emotional disturbances.

The highest levels of both situational and state anxiety were observed in patients in Group III (disease duration > 6 years). This category of patients is characterized by persistent psychoemotional stress, which is likely due to the prolonged course of the disease, the accumulation of psychological stress, as well as the fear of developing complications and the instability of glycemic control. Thus, a direct correlation has been established between the duration of T1DM and the severity of anxiety disorders. The results suggest that psychoemotional disturbances tend to progress and accumulate as the disease progresses.

Table 1. Analysis of Psychoemotional Disorders Depending on Disease Duration



* – The differences in indicators are statistically significant. ($p < 0,05$)

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Discussion

The results of this study demonstrate that anxiety disorders are widespread among children with T1D and are closely associated with disease duration. These findings are consistent with recent international studies showing that chronic metabolic diseases significantly increase the risk of psychological disorders in children. Recent data indicate that children and adolescents with T1DM have a 2- to 3-fold higher risk of anxiety and depressive disorders compared to healthy peers, which negatively impacts glycemic control and treatment adherence [6,7].

The progressive increase in anxiety levels observed in our study may be attributed to a number of factors, including the effects of chronic stress associated with long-term disease management, the need for continuous insulin therapy, regular glucose monitoring, and adherence to dietary restrictions [7]. The neurobiological consequences of chronic hyperglycemia also play a significant role, as it can alter the structure and function of the brain, particularly in areas responsible for emotional regulation, such as the hippocampus and prefrontal cortex. An additional factor is the growing fear of developing complications from the disease, which intensifies psycho-emotional stress [8].

As the duration of the disease increases, children become increasingly aware of possible complications, which contributes to increased personal anxiety. Our findings, indicating higher personal anxiety in the 3–6-year-old group, suggest a transition from reactive to chronic anxiety, which is clinically significant because personal anxiety is associated with long-term psychological maladjustment. The highest levels of anxiety among patients with a disease duration of more than 6 years indicate the need for early psychological intervention [9]. Without adequate support, anxiety can become chronic and contribute to impaired metabolic control, creating a vicious cycle between psychological and somatic health. It is important to note that recent studies emphasize that psychological disorders in T1DM.

The progressive increase in anxiety levels observed in our study may be attributed to a number of factors, including the effects of chronic stress associated with long-term disease management, the need for continuous insulin therapy, regular glucose monitoring, and adherence to dietary restrictions. The neurobiological consequences of chronic hyperglycemia also play a significant role, as it can alter the structure and function of the brain, particularly in areas responsible for emotional regulation, such as the hippocampus and prefrontal cortex. An additional factor is the growing fear of developing complications from the disease, which intensifies psycho-emotional stress are not only consequences but also predictors of worsening glycemic control and an increased risk of complications [9, 10, 11]. Thus, our results support the concept that routine psychological screening should be integrated into the management of diabetes in children, particularly in patients with longer disease duration.

Conclusion

Children with type 1 diabetes show a significant increase in anxiety levels as the duration of the disease increases. In the early stages of the disease, situational emotional reactions predominate, whereas more persistent anxiety states develop with long-term disease progression. The findings underscore the need for early detection of psychoemotional disorders, the inclusion of psychological support in standard treatment protocols, and the use of an interdisciplinary approach to patient management.

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CLINICAL AND NEUROLOGICAL ANALYSIS OF SPEECH DISORDERS IN CHILDREN WITH VARIOUS FORMS OF ORGANIC CENTRAL NERVOUS SYSTEM PATHOLOGY

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Abstract. Speech disorders in children with organic central nervous system pathology remain a significant issue in pediatric neurology due to their high prevalence and impact on cognitive development. A comprehensive clinical and neurological assessment, including evaluation of higher cortical functions and neurophysiological data, is a key approach for the accurate diagnosis and differentiation of these disorders.

Objective. To perform a comparative clinical and neurological analysis of the structure, frequency, and pathogenetic mechanisms of speech disorders in children with cerebral palsy, epilepsy, and autism spectrum disorders, and to identify key neurological factors influencing speech development and their clinical significance.

Materials and Methods. The study included 150 children aged 3–10 years: 40 patients with cerebral palsy, 38 with epilepsy, 42 with autism spectrum disorders and 30 children with developmental language disorder. All participants underwent a comprehensive neurological examination, including assessment of motor status, higher cortical functions, electroencephalographic data, and neuroimaging findings.

Results. Speech disorders were identified in 95% of children with cerebral palsy, 65.8% with epilepsy, and 92.9% with autism spectrum disorders. In cerebral palsy, dysarthric disorders predominated and were associated with lesions of the corticobulbar pathways and subcortical structures. In epilepsy, speech disturbances were mainly cognitive-dysphasic and often transient, demonstrating correlation with seizure frequency and disease duration. In autism spectrum disorders, impairments were primarily neurocognitive and related to social communication, occurring in the absence of significant motor deficits.

Conclusions. Speech disorders in children with organic central nervous system pathology differ significantly in their clinical presentation and pathogenetic mechanisms depending on the underlying nosological form. These findings emphasize the importance of a differentiated neurological approach to diagnosis, prognosis, and the selection of comprehensive therapeutic and rehabilitation strategies. The absence of unified clinical and neurological assessment algorithms complicates timely diagnosis and management, highlighting the need for their development and implementation.

Keywords: cerebral palsy, epilepsy, autism spectrum disorders, neurocognitive disorders, dysarthria.

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ОРТАЛЫҚ ЖҮЙКЕ ЖҮЙЕСІНІҢ ОРГАНИКАЛЫҚ ПАТОЛОГИЯСЫНЫҢ ӘРТҮРЛІ ТҮРЛЕРІ БАР БАЛАЛАРДАҒЫ СӨЙЛЕУ БҰЗЫЛЫСТАРЫН КЛИНИКАЛЫҚ ЖӘНЕ НЕВРОЛОГИЯЛЫҚ ТАЛДАУ

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Аңдатпа. Бас миының органикалық зақымдануы бар балаларда сөйлеу бұзылыстары жиі кездеседі және олар баланың ойлау мен когнитивтік дамуына кері әсер етеді. Сондықтан бұл мәселе балалар неврологиясында маңызды клиникалық проблема болып саналады. Жоғары қыртыстық функцияларды және нейрофизиологиялық деректерді талдауды қамтитын кешенді клинико-неврологиялық бағалау осы бұзылыстарды дәл диагностикалау мен дифференциациялаудың негізгі тәсілі болып табылады.

Зерттеу мақсаты. Бас миының органикалық патологиясының әртүрлі нозологиялық формаларында балалардағы сөйлеу бұзылыстарын клинико-неврологиялық тұрғыдан талдау және негізгі ауруға байланысты олардың патогенетикалық механизмдеріндегі айырмашылықтарды анықтау.

Материалдар мен әдістер. Зерттеуге 3–10 жас аралығындағы 150 бала енгізілді: 40 науқас – балалар церебралды сал ауруымен, 38 – эпилепсиямен, 42 – аутизм спектрі бұзылыстарымен және 30 – сөйлеу дамуының бұзылыстары бар балалар. Барлық қатысушыларға қозғалыс жағдайын, жоғары қыртыстық функцияларды, электроэнцефалографиялық деректерді және нейровизуализация нәтижелерін қамтитын кешенді неврологиялық тексеру жүргізілді.

Нәтижелер. Сөйлеу бұзылыстары балалар церебралды сал ауруымен ауыратындардың 95%-ында, эпилепсиясы барлардың 65,8%-ында және аутизм спектрі бұзылыстары барлардың 92,9%-ында анықталды. Балалар церебралды сал ауруында негізінен кортико-бульбарлық жолдар мен субкортикальды құрылымдардың зақымдалуымен байланысты дизартриялық бұзылыстар басым болды. Эпилепсия кезінде сөйлеу бұзылыстары көбінесе когнитивті-дисфазиялық сипатта болып, ұстамалардың жиілігі мен ауру ұзақтығына тәуелді транзиторлы көріністермен сипатталды. Аутизм спектрі бұзылыстарында айқын қозғалыс тапшылығы болмай, нейрокогнитивтік және әлеуметтік-коммуникативтік бұзылыстар басым болды.

Қорытынды. Бас миының органикалық патологиясы бар балалардағы сөйлеу бұзылыстары клиникалық көріністері мен патогенетикалық механизмдері бойынша нозологиялық формаға байланысты айтарлықтай ерекшеленеді. Алынған нәтижелер диагностика, болжам жасау және кешенді емдік-реабилитациялық стратегияларды таңдау кезінде дифференциацияланған клинико-неврологиялық тәсілдің маңыздылығын көрсетеді. Бірыңғай клинико-неврологиялық бағалау алгоритмдерінің болмауы пациенттерді уақытылы диагностикалау мен жүргізуді қиындатады, бұл олардың әзірленуі мен енгізілу қажеттілігін айқындайды.

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Түйін сөздер: балалар церебралды сал ауруы, эпилепсия, аутизм спектрі бұзылыстары, нейрокогнитивтік бұзылыстар, дизартрия.

КЛИНИЧЕСКИЙ И НЕВРОЛОГИЧЕСКИЙ АНАЛИЗ РЕЧЕВЫХ НАРУШЕНИЙ У ДЕТЕЙ С РАЗЛИЧНЫМИ ФОРМАМИ ОРГАНИЧЕСКОЙ ПАТОЛОГИИ ЦЕНТРАЛЬНОЙ НЕРВНОЙ СИСТЕМЫ

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Аннотация. Нарушения речи у детей с органической патологией центральной нервной системы остаются значимой проблемой детской неврологии вследствие их высокой распространённости и влияния на когнитивное развитие. Комплексная клинико-неврологическая оценка, включающая анализ высших корковых функций и нейрофизиологических данных, является ключевым подходом к точной диагностике и дифференциации данных нарушений.

Цель исследования. Провести клинико-неврологический анализ нарушений речи у детей с различными формами органической патологии центральной нервной системы и выявить различия их патогенетических механизмов в зависимости от основного заболевания.

Материалы и методы. В исследование включены 150 детей в возрасте 3–10 лет: 40 пациентов с детским церебральным параличом, 38 — с эпилепсией и 42 — с расстройствами аутистического спектра и 30 - дети с расстройством развития речи. Все участники прошли комплексное неврологическое обследование, включающее оценку двигательного статуса, высших корковых функций, электроэнцефалографических данных и результатов нейровизуализации.

Результаты. Нарушения речи выявлены у 95% детей с детским церебральным параличом, у 65,8% с эпилепсией и у 92,9% с расстройствами аутистического спектра. При детском церебральном параличе преобладали дизартрические расстройства, связанные с поражением кортико-бульбарных путей и подкорковых структур. При эпилепсии речевые нарушения носили преимущественно когнитивно-дисфазический и часто транзиторный характер, с корреляцией с частотой приступов и длительностью заболевания. При расстройствах аутистического спектра преобладали нейрокогнитивные и социально-коммуникативные нарушения при отсутствии выраженного двигательного дефицита.

Выводы. Нарушения речи у детей с органической патологией центральной нервной системы существенно различаются по клиническим проявлениям и патогенетическим механизмам в зависимости от нозологической формы. Полученные данные подчёркивают необходимость дифференцированного клинико-неврологического подхода к диагностике, прогнозированию и выбору комплексных лечебно-реабилитационных стратегий. Отсутствие единых клинико-неврологических алгоритмов оценки затрудняет

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своевременную диагностику и ведение пациентов, что определяет необходимость их разработки и внедрения.

Ключевые слова: детский церебральный паралич, эпилепсия, расстройства аутистического спектра, нейрокогнитивные нарушения, дизартрия.

Introduction. Speech represents a complex integrative function of the central nervous system, ensured by the coordinated activity of cortical (frontal, temporal, parietal), subcortical, cerebellar structures, and conducting pathways [1]. In childhood, active processes of neurogenesis, synaptic plasticity, and myelination determine both the rapid development of speech and its high vulnerability to organic and functional brain disorders [2].

From the standpoint of pediatric neurology, speech disorders reflect structural or functional dysfunction of specific CNS regions. Their clinical characteristics depend on the level and timing of brain injury, the degree of nervous system immaturity, and the severity of associated cognitive impairments. Early speech delay often serves as a marker of perinatal brain injury or neurodevelopmental disorders [2,3].

Cerebral palsy (CP), epilepsy, and autism spectrum disorders (ASD) occupy a significant place in pediatric neurological pathology and are characterized by a high prevalence of speech impairments with distinct pathogenetic mechanisms [4,5]. In CP, speech disorders are mainly associated with damage to corticobulbar pathways, subcortical nuclei, and cerebellum, manifesting as dysarthria and pseudobulbar syndrome [6]. In epilepsy, speech disturbances are linked to epileptiform activity, focal cortical dysfunction (predominantly temporal-frontal), and long-term antiepileptic therapy, presenting as both transient and persistent cognitive-speech deficits [7]. In ASD, impairments are related to dysfunction of frontal-temporal neural networks responsible for social communication, resulting in predominant neurocognitive and pragmatic speech deficits without pronounced motor impairment [8,9].

Developmental language disorder (DLD) represents a functional impairment of cortico-subcortical networks involved in phonological processing and verbal memory, occurring in the absence of significant neurological deficits [10,11].

Despite numerous studies describing speech disorders in individual conditions, comparative clinical and neurological analyses focusing on pathogenetic mechanisms remain limited. Existing research is largely centered on speech therapy aspects, while neurological determinants of speech impairment are insufficiently systematized.

Thus, the research gap lies in the lack of an integrated comparative neurological framework for understanding speech disorders across different CNS pathologies.

Aim and Hypothesis: The present study aims to conduct a comparative clinical and neurological analysis of speech disorders in children with cerebral palsy, epilepsy, and autism spectrum disorders, with identification of key pathogenetic mechanisms and neurological factors influencing speech development, based on the hypothesis that speech impairments in these conditions differ significantly in their structure and underlying neurobiological mechanisms, thereby requiring a differentiated diagnostic and therapeutic approach.

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Materials and Methods

Study design and setting. A cross-sectional observational study was conducted at a pediatric neurological department and outpatient consultation center.

Participants.

The study included 150 children aged 3–10 years (mean age 6.3 ± 1.7 years); 62% were boys and 38% girls.

Group formation. Participants were divided into four clinical groups:

- 40 children (26.7%) with cerebral palsy (CP);
- 38 children (25.3%) with epilepsy;
- 42 children (28%) with autism spectrum disorders (ASD);
- 30 children (20%) with developmental language disorder (DLD).

General criteria for all groups included: age 3–10 years, confirmed clinical diagnosis, and absence of severe sensory impairments (deafness or blindness).

Additional criteria for the DLD group were: absence of structural brain abnormalities on MRI, normal hearing, intelligence quotient (IQ) ≥ 85, and absence of pronounced focal neurological deficits.

Examination procedures: All patients underwent a comprehensive assessment including:

1. clinical and neurological examination;
2. evaluation of motor function (using the Gross Motor Function Classification System in CP patients);
3. analysis of seizure type and frequency (in epilepsy);
4. electroencephalography (EEG);
5. magnetic resonance imaging (MRI) when clinically indicated;
6. assessment of higher cortical functions;
7. standardized neuropsychological testing.

Statistical analysis was performed using IBM SPSS Statistics version 25.0. Categorical variables were compared using the chi-square (χ^2) test. When appropriate, Fisher's exact test was applied. Results are presented as frequencies and percentages (n, %). A p-value of <0.05 was considered statistically significant.

Ethical considerations: The study was conducted in accordance with the principles of the Declaration of Helsinki. Informed consent was obtained from the parents or legal guardians of all participants. The study protocol was approved by the local ethics committee.

Results. A total of 150 children were examined. Speech disorders were identified with varying frequency depending on the nosological group.

In children with cerebral palsy (CP, n = 40), speech disorders were detected in 95% (n = 38) of cases. The structure was dominated by dysarthria - 34 (85%) and oromotor dysfunction – 29 (72.5%), while anarthria was observed in – 4 (10%) of patients. Pseudobulbar syndrome was identified in – 12 (30%) of cases. Delayed phrase speech formation occurred in – 18 (45%) of children. Clinical features varied by CP form: spastic dysarthria predominated in spastic forms, hyperkinetic articulation disorders in dyskinetic forms, and scanning speech in ataxic forms. The severity of speech impairment significantly correlated with motor deficit level (GMFCS III–V; $p < 0.01$) (Table 1).

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In the epilepsy group (n = 38), speech disorders were observed in 65.8% of children (n = 25). The most frequent manifestations included slowing of speech production – 17 (44.7%), decreased verbal memory - 16 (42%), and postictal aphasia - 14 (36.8%). Dysphasic disorders were identified in – 9 (23.7%) of cases. Speech impairment was more common in focal epilepsy (72%) compared to generalized forms (56%). With disease duration exceeding 5 years, the prevalence of cognitive-speech deficits increased to 72%. Polytherapy was associated with reduced psycholinguistic processing speed (47%).

Among children with autism spectrum disorders (ASD, n = 42), speech disorders were detected in 92.9% (n = 39). The predominant features included impaired intonational modulation (73.8%) and echolalia (61.9%). Absence of phrase speech was noted in 35.7%, and regression of speech skills in 16.7% of cases. Although no gross motor deficits were observed, 66.7% of children demonstrated signs of neuromotor immaturity. Epileptiform activity on EEG was recorded in 42.8% of patients.

In the developmental language disorder group (DLD, n = 30), speech impairment was present in all children (100%). Expressive speech delay (60%) and grammatical structure impairment (70%) predominated. Phonemic perception deficits were observed in 56.7% of cases. Neurological examination revealed no focal deficits; however, mild coordination disturbances (26.7%), synkineses (23.3%), and fine motor immaturity (40%) were noted. MRI findings were normal, and EEG showed no significant epileptiform activity.

Table 1. Frequency and structure of speech disorders in different nosological groups

Group	N	Speech disorders (%)	Main speech manifestations	Neurological / instrumental findings
Cerebral palsy (CP)	40	95% (n=38)	Dysarthria – 85% (n=34); oromotor dysfunction – 72.5% (n=29); anarthria – 10% (n=4); delayed phrase speech – 45% (n=18)	Pseudobulbar syndrome – 30% (n=12); motor-dependent speech impairment
Epilepsy	38	65.8% (n=25)	Slowed speech production – 44.7% (n=17); reduced verbal memory – 42% (n=16); postictal aphasia – 36.8% (n=14); dysphasia – 23.7% (n=9)	Higher frequency in focal epilepsy (72%) vs generalized (56%); ↑ with disease duration >5 years (72%); polytherapy → reduced psycholinguistic speed (47%)
Autism spectrum disorders (ASD)	42	92.9% (n=39)	Impaired intonation – 73.8%; echolalia – 61.9%; absence of phrase speech – 35.7%; speech regression – 16.7%	Neuromotor immaturity – 66.7%; EEG epileptiform activity – 42.8%; no gross motor deficits
Developmental language disorder (DLD)	30	100% (n=30)	Expressive delay – 60%; grammatical impairment – 70%; phonemic perception deficit – 56.7%	No focal neurological deficits; coordination disorders – 26.7%; synkineses – 23.3%; fine motor immaturity – 40%; MRI normal; EEG without epileptiform activity

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Comparative analysis demonstrated statistically significant intergroup differences (Table 2). The motor component of speech disorders was significantly higher in CP (85%) compared to epilepsy (34%), ASD (19%), and DLD (10%) ($p < 0.01$). Structural CNS lesions and focal neurological symptoms were most prevalent in CP and least common in DLD ($p < 0.001$).

Table 2. Intergroup comparison of key clinical parameters

Variable	CP (n=40)	Epilepsy (n=38)	ASD (n=42)	DLD (n=30)	Statistical significance
Motor component of speech disorder (%)	85%	34%	19%	10%	$p < 0.01$
Structural CNS lesions (%)	High prevalence	Moderate	Low	Minimal/none	$p < 0.001$
Focal neurological symptoms (%)	High prevalence	Moderate	Rare	Absent/minimal	$p < 0.001$

Discussion. The findings indicate that speech disorders in children with different CNS pathologies have distinct pathogenetic mechanisms.

In CP, speech impairment is primarily determined by structural damage to corticobulbar pathways and subcortical structures, resulting in predominantly motor (dysarthric) deficits.

In epilepsy, speech disturbances are associated with functional cortical instability and epileptiform activity, leading to variable and often transient cognitive-speech impairments dependent on seizure characteristics and disease duration.

In ASD, speech disorders reflect dysfunction of distributed neural networks responsible for social communication, with predominant impairment of pragmatic and intonational aspects rather than motor articulation.

In DLD, the absence of structural CNS pathology suggests a functional immaturity of cortico-subcortical networks involved in phonological processing and grammatical organization. The presence of minimal neurological signs supports the role of subtle neurodevelopmental dysfunction.

Thus, the obtained results confirm the heterogeneity of speech disorders and emphasize the necessity of a differentiated neurological approach to diagnosis and rehabilitation.

Conclusion. The present study demonstrated that speech disorders in children with cerebral palsy, epilepsy, autism spectrum disorders, and developmental language disorder differ significantly in their structure and underlying neurological mechanisms. In cerebral palsy, speech impairment is predominantly associated with structural damage to corticobulbar pathways and is closely correlated with the severity of motor deficit. In epilepsy, speech disorders are mainly functional-cortical, showing variability depending on seizure characteristics, disease duration, and treatment factors. In autism spectrum disorders, impairments are primarily related to dysfunction of neural networks responsible for social communication, with predominant involvement of pragmatic speech components. In developmental language disorder, speech deficit occurs in the absence of structural CNS damage and is associated with functional immaturity of speech-related neural systems, accompanied by minimal neurological signs. These findings confirm the

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heterogeneity of pathogenetic mechanisms underlying speech disorders and substantiate the necessity of a differentiated clinical and neurological approach to diagnosis, prognosis, and selection of individualized therapeutic strategies.

Conflict of Interest. The authors declare no conflict of interest. The authors have no financial or other relationships that could have influenced the results presented in this manuscript.

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