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Diagnosis and Choice of Treatment Tactics for Payre's Syndrome in Children

Rakhmatullaev Akmal Abadbekovich, Terebaev Bilim Aldamuratovich, Majidov Temur Xamidovich

Tashkent Pediatric Medical Institute, Tashkent, Uzbekistan

Abstract **Background:** Payr's syndrome is a rare but clinically significant condition associated with abnormal fixation and elongation of the transverse colon, leading to chronic abdominal pain and colostasis in children. Due to the non-specific symptoms, timely diagnosis and appropriate surgical tactics remain a challenge in pediatric practice. **Materials and Methods:** This study analyzed 83 pediatric patients (52 girls, 31 boys) aged 4–18 years with diagnosed Payr's syndrome treated at the Tashkent Pediatric Medical Institute between 2018 and 2024. Diagnostic methods included abdominal Doppler ultrasound, irrigography, virtual colonoscopy, and colonoscopy. Colon elongation was quantified using segmental length coefficients (L1 in contrast-filled and L2 in contrast-evacuated colon). Treatment tactics included conservative therapy (41 patients), laparoscopic intervention (34), and open resection with end-to-end anastomosis (8). Patient complaints, colon anatomy, and function were thoroughly evaluated. **Results:** Constipation alone was observed in 39.8% of cases, pain with constipation in 43.4%, and isolated abdominal pain in 16.9%. Segmental analysis revealed significant elongation of the transverse colon ($P<0.01$). Based on elongation coefficients, laparoscopic correction was performed for moderate elongation ($L = 0.8–1.0$), while open surgery was indicated for severe elongation ($L < 0.8$). Postoperative outcomes assessed with a custom scoring scale were good or satisfactory in 88.1% of cases. **Conclusion:** A standardized diagnostic protocol and use of colon elongation coefficients improve the selection of optimal surgical tactics in children with Payr's syndrome. The introduced outcome assessment scale provides an objective tool for evaluating postoperative results and guiding further care.

Keywords Payr's syndrome, Children, Colon elongation, Chronic constipation, Surgical treatment

1. Introduction

Currently, one of the pressing issues in gastroenterology and pediatric surgery is the diagnosis and treatment of chronic colostasis and abdominal pain syndrome of the large intestine. According to the authors, chronic abdominal pain occurs in 10–17% of children under the age of 15. In addition, up to 10–40% of children with gastrointestinal diseases suffer from constipation. The prevalence of these pathologies represents a significant medical and social problem in the population.

Payr's disease, resulting from abnormal fixation of the colon, leads to traction, ischemia, and the development of pathological connective tissues [1,4,9,10,13,15].

According to the literature on Payr's syndrome, 45–65% of patients suffer from abdominal pain, and colostasis is observed in 40% of cases. The main diagnostic methods for detecting Payr's syndrome are contrast-enhanced irrigography, CT, and MRI. One of the characteristic radiological signs in irrigography is a high position of the splenic flexure of the transverse colon and the appearance of "Payr's double-barrel colon" together with the descending segment [2,3,7,11,16].

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Various approaches to the surgical treatment of Payr's syndrome are described in the literature. Among them is the dissection of the phrenocolic and splenocolic ligaments to correct the high position and sharp angle of the splenic flexure. Other scientific reports indicate that the pain syndrome becomes more severe with age. Therefore, early surgical intervention is recommended to prevent excessive dilation of the ascending and transverse colon and the development of reflux ileitis [5,6,8,12,14].

Thus, the development of a unified approach to the diagnosis and treatment of Payr's syndrome is considered relevant.

Objective: To improve the diagnosis and treatment outcomes of Payr's syndrome in children.

2. Materials and Methods

Between 2018 and 2024, a total of 83 patients aged 4 to 18 years diagnosed with Payr's syndrome were treated at the clinic of the Tashkent Pediatric Medical Institute. Among these, 52 (62.7%) were female, and 31 (37.3%) were male. The majority of the patients—45 individuals (54.2%)—were between 13 and 18 years old. In 41 cases (49.4%), the patients were diagnosed with the compensated stage of Payr's syndrome. These patients underwent conservative treatment methods based on the standardized "Guidelines for the Diagnosis and

Treatment of Payr's Syndrome." Of the remaining 42 patients, 34 underwent laparoscopic correction of the acute splenic flexure of the colon, addressing the abnormal intestinal positioning through minimally invasive surgical intervention. In the other 8 patients, a traditional laparotomy was performed to shorten the length of the transverse colon, followed by an "end-to-end" anastomosis to restore intestinal continuity (see Table 1).

3. Analysis of Clinical Presentation and Diagnostic Methods

An analysis of the reasons for patients' initial visits to the clinic revealed that 33 patients (39.8%) primarily complained of constipation. In 36 patients (43.4%), both abdominal pain and constipation were simultaneously observed. The remaining 14 patients (16.9%) reported abdominal pain as the sole symptom. These findings are presented in Table 2.

To conduct differential diagnosis of the clinical symptoms observed in patients, several specialized diagnostic methods were employed. Doppler ultrasonography was used to evaluate the engorgement of mesenteric veins in the transverse colon, the velocity of blood flow, and vascular resistance. Irrigography enabled assessment of colonic architecture via radiographic contrast imaging, with a focus on measuring the length variations of the colon when filled and emptied with contrast, the acuteness of the splenic flexure, and the positioning of the colon in both horizontal and vertical orientations. Virtual colonoscopy was used to analyze the anatomic and topographic features of the large intestine. Traditional colonoscopy assessed inflammation of the colonic mucosa and the angular degree of the splenic flexure, also evaluating the degree of sharp angulation by observing the passage of the tube through the area.

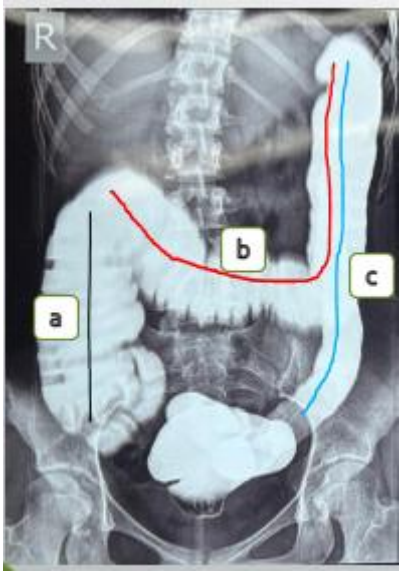
To determine the surgical approach for patients with Payr's syndrome, coefficients evaluating the evacuatory function of the colon were analyzed. Using irrigography, the lengths of different segments of the colon in its contrast-filled state were measured: the ascending part (a), transverse part (b), and descending part (c). Their sum (d) represented the total length of the colon. Furthermore, the relative length coefficient for each section was individually calculated:

L1 (ascending segment) = a/d

L2 (transverse segment) = b/d

L3 (descending segment) = c/d

These coefficients play a critical role in assessing the colon's evacuatory capability and determining the optimal surgical approach (see Figure 1).



- **a** – Length of the ascending colon segment (Asc. Col. Length)
- **b** – Length of the transverse colon segment (Transv. Col. Length)
- **c** – Length of the descending colon segment (Desc. Col. Length)
- **d** – Total length of the colon
- **L1 (ascending colon)** = a/d
- **L2 (transverse colon)** = b/d
- **L3 (descending colon)** = c/d

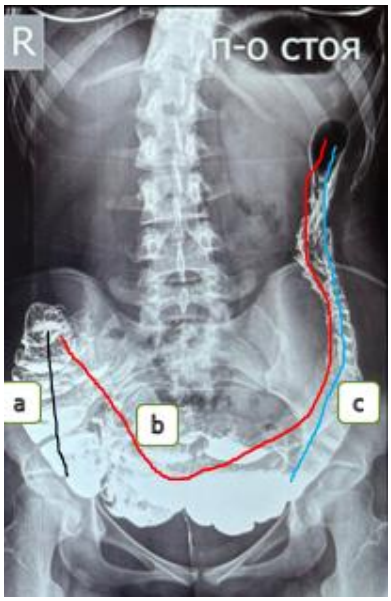
Figure 1. Relative length coefficients of the colon segments in a contrast-filled state

Table 1. Distribution of patients by age, gender, and type of treatment received

№	Treatment Method	Patient Age				Gender		Total
		0-3	4-7	8-12	13 -18	Male	Female	
1.	Conservative	-	8	15	18	17	24	41
2.	Laparoscopic	-	2	11	21	11	23	34
3	Laparotomy with transverse colon resection		-	2	6	3	5	8
Total			10	28	45	31	52	83

Table 2. Reasons for Primary Hospital Admission Among Patients

	Total Patients	Symptoms		
		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%)



- **a** – Length of the ascending colon segment (Asc. Col. Length)
- **b** – Length of the transverse colon segment (Transv. Col. Length)
- **c** – Length of the descending colon segment (Desc. Col. Length)
- **d** – Total length of the colon
- **L1 (ascending colon)** = a/d
- **L2 (transverse colon)** = b/d
- **L3 (descending colon)** = c/d

Figure 2. Relative length coefficients of the colon segments after contrast evacuation

After the colon was emptied of contrast, measurements were repeated using the same parameters. Specifically, the lengths of the different segments of the colon were re-evaluated: the ascending segment (a), the transverse segment (b), and the descending segment (c). The sum of these three lengths (d) represented the total length of the colon. Subsequently, the relative length coefficients of each segment were recalculated as follows:

L2 (ascending colon length) = a/d
L2 (transverse colon length) = b/d
L2 (descending colon length) = c/d

These coefficients play a crucial role in assessing the evacuatory function of the colon and in determining the appropriate surgical method based on this analysis (see Figure 2).

4. Results

By dividing the average L1 values obtained while the colon was filled with contrast by the average L2 values recorded after the colon was emptied, we determined the colon elongation coefficient. This analysis enabled us to assess the evacuatory function of the colon, the degree of elongation of the transverse colon, and the prominence of the "double-layer sign" characteristic of Payr's syndrome. Using these calculated coefficients, we evaluated critical parameters for determining the colon's functional status and choosing the optimal surgical method, as well as identified internal anatomical alterations of the colon and their clinical significance. These analyses play a vital role in understanding the structure of the colon, identifying influencing factors, and setting precise criteria for surgical planning (see Table 3).

Table 3. Irrigographic indicators of colonic segment length coefficients in patients with Payr's syndrome

Indicator	Colon Segment	Result	
		Normal Values	Patient Values
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 Ratio	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 .)

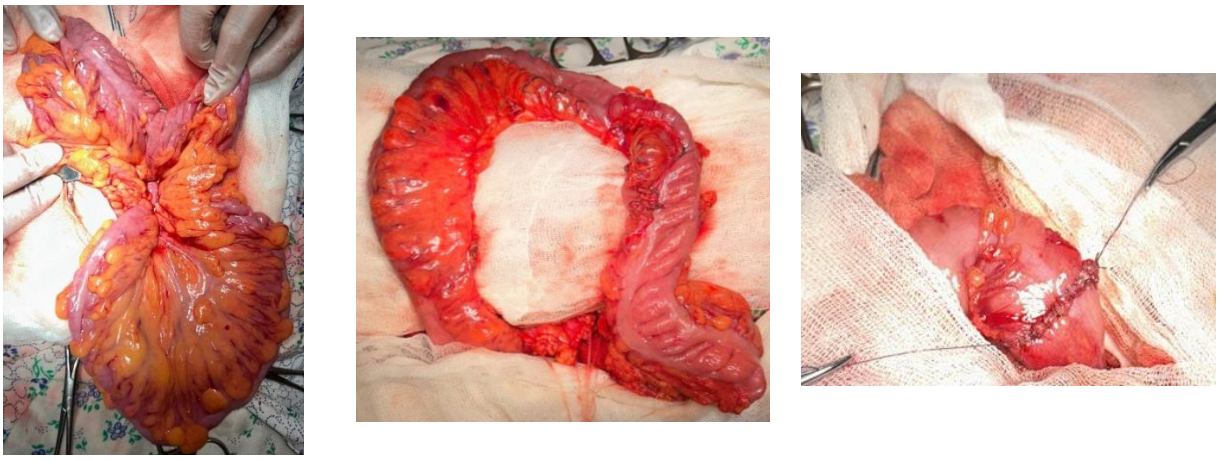


Figure 3. Resection of the transverse colon and application of an "end-to-end" anastomosis

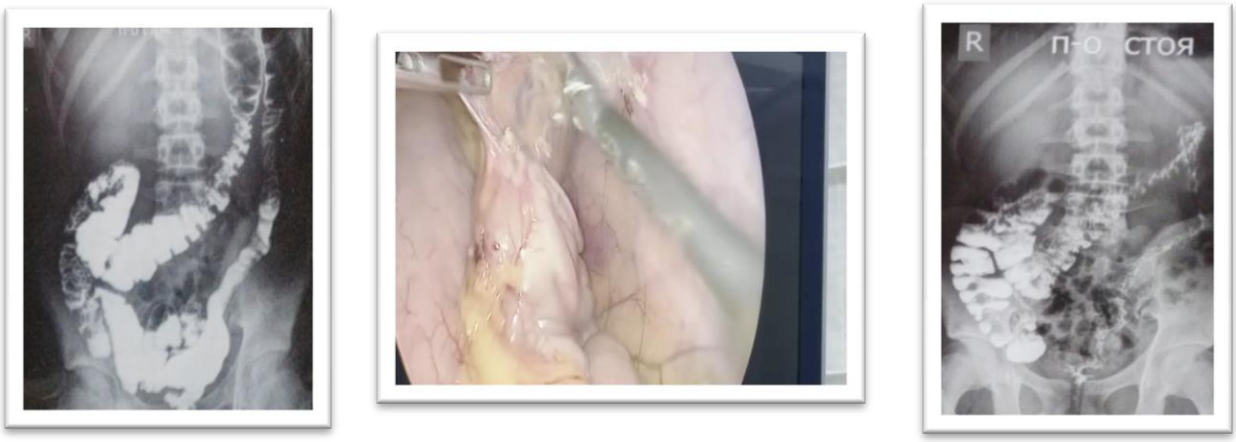


Figure 4. Laparoscopic separation of the splenic flexure from pathological adhesions and fibrous bands. Preoperative and postoperative irrigograms

Table 4. Scale for Analyzing Surgical Outcomes in Children with Payr's Syndrome

Factors		Results					
		Favorable	Points	Satisfactory	Points	Unsatisfactory	Points
Stool Form According to the Bristol Stool Scale	**Stool Type 1** (hard pellets) 	-	**3**	-	**2**	+	**1**
	Stool Type 2 (lumpy sausage) 	-	**3**	+	**2**	+	**1**
	Stool Type 3 (cracked sausage) 	++	**3**	+	**2**	-	**1**
	Stool Type 4 (smooth sausage) 	++	**3**	+	**2**	-	**1**
Abdominal pain		-	**3**	+	**2**	++	**1**
Colon contrast clearance (Irrigography)		>80%	**3**	60-75%	**2**	<50%	**1**
Bowel movement frequency		Daily	**3**	Once every 2 days	**2**	Once every 4–5 days	**1**

The calculation of colonic length coefficients provided a basis for determining the surgical treatment strategy in patients with Payr's syndrome. When the length ratio of the transverse colon was found to be below "0.8," it served as a clear indication for resection of the transverse colon followed by an "end-to-end" anastomosis (see Figure 3). Conversely, if the coefficient ranged between "0.8 and 1.0," the indication was for minimally invasive laparoscopic separation of the splenic flexure from adhesions and pathological fibrous bands (see Figure 4).

The short- and long-term outcomes of patients were evaluated using the "Scale for Analyzing Surgical Outcomes in Children with Payr's Syndrome," developed by our team. This scale is based on the official document DGU 22738 dated 02.03.2023, issued by the Social Medical Academy of the Republic of Uzbekistan. The following factors were considered in the analysis: stool form based on the Bristol Stool Scale (Type 1 – hard pellets, Type 2 – sausage-shaped but lumpy, Type 3 – like a sausage with cracks, Type 4 – smooth, soft sausage), intensity of abdominal pain, percentage of contrast clearance in the colon based on radiographic contrast studies (irrigography), and bowel movement frequency. According to the presence of these factors, outcomes were rated as "favorable," "satisfactory," or "unsatisfactory." In the scale, "-" indicates the absence of a factor, "+" indicates moderate occurrence, and "++" indicates persistent presence. Outcome scores were categorized as follows:

- 15–21 points: good outcome
- 8–14 points: satisfactory outcome
- 1–7 points: unsatisfactory outcome

This scale was used to accurately and objectively assess postoperative outcomes in patients with Payr's syndrome, enabling comprehensive evaluation of their functional status. The results, interpreted according to this scale, help determine appropriate treatment strategies and additional rehabilitation measures for patients.

An analysis of the short- and long-term outcomes in 42 patients who underwent surgical intervention showed that favorable and satisfactory results were observed in 37 patients (88.1%), while unsatisfactory outcomes were identified in 5 patients (11.9%). In these patients with unsatisfactory results, constipation and, in some cases, abdominal pain persisted. It was determined that these outcomes were due to the presence of concomitant dolichosigma (elongated sigmoid colon). As a treatment approach, resection of the sigmoid colon was performed through minilaparotomy. Following rehabilitation measures, satisfactory outcomes were achieved in these patients.

5. Conclusions

Thus, the primary specialized diagnostic methods for detecting Payr's syndrome in children include ultrasonography of the mesenteric veins of the colon, irrigography, virtual colonoscopy, and traditional colonoscopy. When selecting the appropriate treatment method, determining the colon length coefficient via irrigographic imaging holds critical importance. Additionally, the developed Scale for Analyzing Surgical Outcomes in Payr's Syndrome provides an accurate and objective means of evaluating postoperative results in patients, ensuring a comprehensive assessment of their functional recovery.

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