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DIAGNOSIS AND SURGICAL TREATMENT OF POSTOPERATIVE ANAL INCONTINENCE IN ANORECTAL MALFORMATIONS IN CHILDREN

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Abstract. ATo date, there is no single final point of view on determining the main causes of development and the role of various etiopathogenetic factors leading to postoperative anal incontinence, as well as the choice of a standard method of treatment and ways to prevent this complication, this problem remains unsolved. The study is based on the results of examination and treatment of 234 children with postoperative anal incontinence due to anorectal malformations. In order to determine the degree of anal incontinence and conduct a comparative analysis, our patients were divided into two groups: the main 134 (57.3%) patients and the control 100 (42.7%) patients, who underwent instrumental, endoscopic and functional research methods. Remote results of postoperative anal incontinence in children due to anorectal malformation were studied in 65 of 79 operated patients in the period from 6 months to 5 years. Good and satisfactory results were noted in 86.1% of cases and a negative outcome in 13.9% of cases. In order to obtain positive results in operated patients, they must be under dispensary observation until complete recovery, conservative and rehabilitation measures must be carried out on time and correctly. Only in this case can good and satisfactory results be guaranteed.

Key words: anorectal malformation, anal incontinence, puborectal muscle, proctoplasty, children.

Балалардағы аноректальды ақаулардағы операциядан кейінгі анальды ұстамауды диагностикалау және хирургиялық емдеу

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Аңдатпа. Бүгінгі күнге дейін операциядан кейінгі анальды инконтиненцияға әкелетін әртүрлі этиопатогенетикалық факторлардың дамуының негізгі себептерін және рөлін анықтауға, сондай-ақ емдеудің стандартты әдісін және осы асқынудың алдын алу жолдарын таңдауға бірыңғай түпкілікті көзқарас жоқ, бұл мәселе толық шешілмеген күйінде қалып отыр. Зерттеу аноректальды ақаулар үшін операциядан кейінгі анальды инконтиненциясы бар 234 баланы тексеру және емдеу нәтижелеріне негізделген. Анальды инконтиненция дәрежесін анықтау және салыстырмалы талдау жүргізу мақсатында біздің науқастарымыз екі топқа бөлінді: негізгі 134 (57,3%) науқастар және аспаптық, эндоскопиялық және функционалдық зерттеу әдістері жүргізілген 100 (42,7%) науқастарды бақылау. Аноректальды ақауға байланысты балалардағы операциядан кейінгі анальды инконтиненцияның ұзақ мерзімді нәтижелері 6 айдан бастап операция жасалған 79 науқастың 65-изуч зерттелді. 5 балаға дейін. Бақылаулардың 86,1% - Хорошие жақсы және қанағаттанарлық нәтижелер және 13,9% жағдайда теріс нәтиже байқалды. Операция жасалған науқастардан оң нәтиже алу үшін олар толық сауығып кеткенге дейін диспансерлік

бақылауда болуы керек, консервативті және оңалту шаралары уақытында және дұрыс жүргізілуі керек. Тек осы жағдайда жақсы және қанағаттанарлық нәтижелерге кепілдік беруге болады.

Түйін сөздер: аноректальды ақау, анальды инконтиненция, пуборектальды бұлшықет, проктопластика, балалар.

Диагностика и хирургическое лечение послеоперационного анального недержания при аноректальных инконтиненции развития у детей

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Аннотация. До сегодняшнего дня нет единой окончательной точки зрения на определение основных причин развития и роли различных этиопатогенетических факторов, приводящих к послеоперационной анальной инконтиненции, а также выбора стандартного метода лечения и путей профилактики этого осложнения, данная проблема остаются до конца не решённой. Исследование основано на результатах обследования и лечения 234 детей с послеоперационной анальной инконтиненцией по поводу аноректальных мальформаций. С целью определения степени анальной инконтиненции и проведения сравнительного анализа наши больные были разделены на две группы: основную 134 (57,3%) больных и контрольную 100 (42,7%) больных, которым проведены инструментальные, эндоскопические и функциональные методы исследования. Отдаленные результаты послеоперационной анальной инконтиненции у детей по поводу аноректальной мальформации изучена у 65 из 79 оперированных больных в периоде от 6 мес. до 5 дет. Хорошие и удовлетворительные результаты отмечены у 86,1% наблюдениях и отрицательный исход у 13,9% случаях. Что бы получить положительные результаты у оперированных больных, они должны находится в диспансерном наблюдение до полного выздоровления, консервативные и реабилитационные мероприятие должны проводится во время и правильно. Только в таком случае можно гарантировать хорошие и удовлетворительные результаты.

Ключевые слова: аноректальная мальформация, анальная инконтиненция, пуборектальная мышца, проктопластика, дети.

Introduction. The problem of comprehensive diagnostics and selection of optimal treatment tactics for postoperative anal incontinence in children with anorectal malformations (ARM) are constantly in the center of attention of researchers studying this problem. Improving diagnostic methods and, based on this, determining the choice of optimal comprehensive treatment tactics for postoperative anal incontinence in children with anorectal malformations is a pressing problem in pediatric proctology [2, 3, 8, 11, 13, 15, 16].

Literature data indicate that there is still no single final point of view on determining the main causes of development and the role of various etiopathogenetic factors leading to postoperative anal incontinence , as well as the choice of a standard method of treatment and ways to prevent this complication, this problem remains unresolved. Many researchers believe that the correct determination of the causes and nature of postoperative anal incontinence can only be based on the results of a set of diagnostic measures, the main objectives of which are: establishing the true causes and factors of fecal incontinence, as well as assessing the degree of anal incontinence [1, 5, 6, 7, 9, 10, 12, 14].

Thus, the question arises about developing a rational diagnostic protocol that allows for the selection of optimal treatment tactics, determining the most effective method and technique of reconstructive intervention depending on the type of damage and deformation of the anatomical structures of the locking apparatus of the rectum in children with postoperative anal incontinence. **The aim of the study**. Improving methods of surgical treatment of postoperative anal incontinence in anorectal malformations in children.

Materials and methods. The study is based on the results of examination and treatment of 234 children with postoperative anal incontinence due to anorectal malformations. All these children, aged from 6 months to 16 years, were undergoing inpatient examination and treatment at the clinics of the Tashkent Pediatric Medical Institute for the period from 2018 to 2024. The distribution of patients by gender and age at the time of hospitalization is presented in Table 1.

Table 1.

Distribution of patients by gender and ageMaterials and methods.

Floor	Age				Total	%
	< 3 years	3-7 years	7-11 years	> 1 1 years		
Boys	36	47	22	3	**108**	**46.2**
Girls	49	43	23	11	**126**	**53.8**
Total	**85**	**90**	**45**	**14**	**234**	**100%**

Retrospective and prospective analysis of the disease showed that out of the total number of admitted patients with postoperative anal incontinence , high form of anorectal malformation was diagnosed at birth in 126 (53.8%) cases, and low form in 108 (46.2%) cases. At the same time, in 67 (28.6%) cases, children with high supralevator form of rectal atresia underwent palliative intervention at the place of residence after birth - colostomy , and in 59 (25.2%) cases, primary radical correction of the malformation was performed. In 108 (46.2%) patients with low forms of anorectal malformations, perineal proctoplasties were performed at various times after birth . In 105 (44.9%) patients, severe combined concomitant congenital defects and developmental anomalies of the cardiovascular and genitourinary systems, as well as developmental defects of the sacrococcygeal segment were detected.

In the course of this study, new directions in the diagnosis and treatment tactics of postoperative anal incontinence were developed and implemented , in connection with which this period was divided into 2 segments (2018-2020 and from 2021 to 2024), and 2 comparison groups were formed (main and control). In order to determine the degree of anal incontinence and conduct a comparative analysis, our patients were divided into two groups: the main 134 (57.3%) patients and the control 100 (42.7%) patients who underwent instrumental, endoscopic and functional research methods. Based on generally accepted classifications of fecal incontinence in children, as well as in accordance with the principles of stratification randomization of the study, we divided the patients into three degrees of postoperative anal incontinence . This distribution allowed us to determine not only the severity of the clinical course of the disease, but also to determine the severity of the manifestation of postoperative anal incontinence , which contributed to the choice of one or another method and method of its correction (Table 2).

Table 2.

Distribution of patients into comparison groups depending on the degree of postoperative anal incontinence and the primary form of ARM

Degree of AI	Main group		Control group		Total number of patients
	low form ARM	high form ARM	low form ARM	high form ARM	
1st degree	38	17	30	13	98 (41.9%)
II degree	14	52	20	33	119 (50.8%)
III degree	4	9	2	2	17 (7.3%)
Total	**5 6**	**78**	**52**	**48**	**234 (100%)**
	134 (57.3%)		**100 (42.7%)**		

Sphincterometry indices were studied in 72 patients, including 55 patients in the main group and 17 patients in the control group. Comparative characteristics in both groups were carried out depending on the patient's age, since when studying depending on the degree of anal incontinence , the indices of average deviations varied at high numbers, this circumstance is considered unacceptable in comparison groups. The obtained results of anal sphincterometry indicated that in the main group of patients, depending on age, the average resting pressure varied from 24.0±2.0 mm Hg to 32.6±1.0 mm Hg , the maximum contraction pressure varied from 44.6±2.9 mm Hg to 71.6±0.65 mm Hg . At the same time, in patients of the control group, these indices corresponded to the following results: the average resting pressure was from 17.8±2.1 mm Hg . up to 28.8±0.98 mmHg ; maximum contraction pressure varied from 42.5±1.06 mmHg to 67.5±2.8 mmHg (Table 3).

Table 3.

Comparative evaluation of sphincterometry parameters depending on the patient's age

Indicators	4-7 years		8-12 years		12-15 years	
	Mean resting pressure (mmHg)	Maximum contraction pressure (mmHg)	Mean resting pressure (mmHg)	Maximum contraction pressure (mmHg)	Mean resting pressure (mmHg)	Maximum contraction pressure (mmHg)
Main group	24.0±2.0	44.6±2.9	24.5±2.3	65.3±2.7	32.6±1.0	71.6±0.65
Control group	17.8±2.1	42.5±1.06	22.1±0.11	62.6±0.26	28.8±0.98	67.5±2.8

Sphincterometry conducted in our studies showed a significant decrease in the inhibitory reflex and threshold sensitivity of the internal anal sphincter, compared to children without

functional and organic disorders of the anorectal zone. This fact once again proves that the internal anal sphincter is not controlled consciously and therefore is in a relaxed or contracted state.

Results and discussion. As noted above, 234 patients with postoperative anal incontinence were treated in our clinic , which, depending on the causes and form of anorectal malformation (high and low forms), we conditionally divided into two compared groups, 134 patients in the main group and 100 patients in the control group. Of the 134 patients in the main group, in 58 (43.3%) cases with low forms of anorectal malformations, the following primary corrective surgeries were performed: in 23 (39.7%) cases, perineal proctoplasty was performed in a modification of the clinic, in 12 (20.7%) cases, anterior-sagittal anorectoplasty (PSARP), in 11 (18.9%) patients perineal proctoplasty according to Stone-Benson and in 12 (20.7%) cases perineal proctoplasty according to Solomon. At the same time, in 76 (56.7%) patients with high forms of anorectal malformations, abdominoperineal proctoplasty according to Romualdi was performed .

In the control group of patients (100 patients), in 52 cases (52%) a low form of anorectal malformations was diagnosed, these children underwent the following surgical interventions: perineal proctoplasty in the modification of the clinic - 13 (25.0%) patients, perineal proctoplasty according to Stone-Benson in 24 (46.2%) patients and in 15 (28.8%) observations perineal proctoplasty according to Solomon was performed. In 48 (48%) cases in children with a high form of anorectal malformations, abdominoperineal proctoplasty according to Romualdi was performed.

As noted above, primary abdominoperineal and perineal proctoplasties performed in 79 (58.9%) patients with anorectal malformations were the main causes of postoperative anal incontinence , which required repeated reconstructive plastic surgeries, which are presented in Table 4.

Table 4.

Distribution of patients with grade II-III postoperative anal incontinence depending on repeated reconstructive and corrective surgical interventions in children of the main group (n=79)

No.	Repeated reconstructive interventions in children with PAI	Number of operations	Initially performed operations	
			Perineal proctoplasty	Abdominoperineal proctoplasty
1.	PSARP with sphincter restoration.	11	1	10
2.	ZSARP with sphincter restoration.	6	2	4
3.	Perineal proctoplasty with excision of cicatricial stenosis.	9	3	6
4.	Excision of the protruding mucosa.	15	4	11
5.	Creation of an internal neosphincter.	1 3	3	10
6.	Gel plastic surgery of the anal canal.	19	8	11
7.	Prosthetics of the puborectal loop with the artificial graft "Urosling-1".	6	-	6
Total		**79**	**21**	**58**

The data presented in Table 4 indicate that 79 patients underwent repeat corrective interventions, with 19 (24.1%) cases undergoing anal canal plastic surgery by introducing Noltrex polyacrylamide gel (Fig. 1), 11 (13.9%) children underwent PSARP with restoration of the anterior portion of the external anal sphincter with preliminary ostomy of the colon, 6 (7.5%) patients underwent ZSARP with restoration of the posterior portion of the anal sphincters and puborectalis muscle, 15 (18.9%) patients with protrusion of the rectal mucosa underwent its excision, 13 (16.5%) patients underwent the formation of an artificial internal sphincter (Fig. 2), and in 9 (11.4%) cases perineal proctoplasty with excision of cicatricial stenosis of the anal opening was performed (Fig. 3). We also used a minimally invasive method of reconstructing the puborectal loop by means of its prosthetics using the artificial transplant “Urosling-1” (Fig. 4). This method of surgical correction was performed in 6 (7.5%) patients with complete loss of function of the anorectal closure apparatus, after primary surgical intervention in children with anorectal malformations.

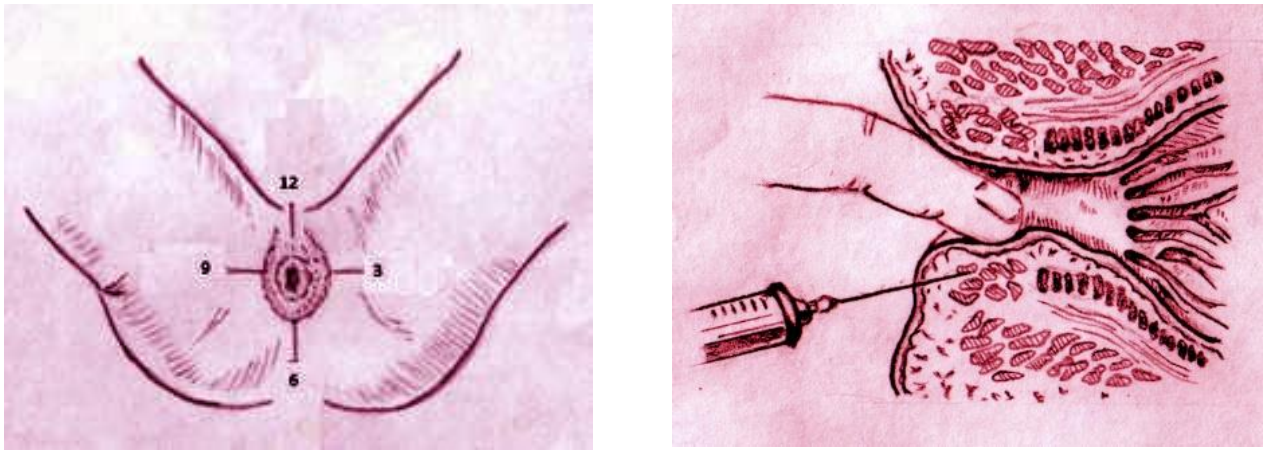

Fig. 1. Injection area for the introduction of the volume-forming drug polyacrylamide gel " Noltrex ". Technique for introducing the drug into the submucosal layer of the anal canal.

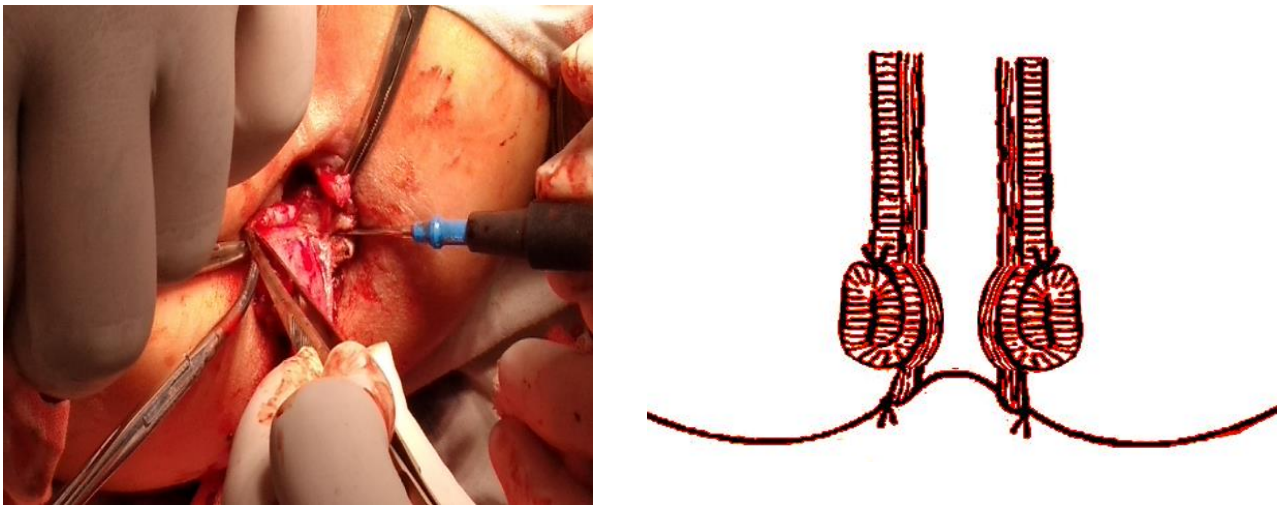

Fig. 2. Circular separation of the muscular layer of the intestinal wall from the mucosa and submucosal layer. Schematic representation of the stage of the operation being performed.

Fig. 3. The anal end of the skin flap is sutured with interrupted sutures on the rectal mucosa on both sides in the area of damage. Application of interrupted sutures to the skin flaps.

Fig. 4. (a). Fixation of the prolene graft "Urosling-1" on the lower arch of the pubic bone on the right and its passage through the tunnel. (b). Passage of the graft to the left side of the wound.

It is necessary to remember that one of the causes of postoperative anal incontinence is - reduced or completely absent tone of the sphincters of the rectum, which is caused by impaired innervation of the corresponding nerve centers. In this regard, we believe that the priority in carrying out reconstructive intervention is the restoration of the sphincter apparatus of the rectum, in particular the internal anal sphincter, since the external anal sphincter has the same innervation as the skeletal muscles, so its contraction is controlled consciously. Based on the conclusion made, we modified the proposed method for creating an artificial internal sphincter - "Leiomyoplasty Sitkovsky -Kaplan method " from the muscular membrane of the descending intestine by turning it back by 180 0 [4]. A distinctive feature of the method we proposed is not turning back, but forming by external screwing of the serous-muscular cylinder in the oral direction by 360 0 , which forms a sphincter -like duplication of the serous-muscular layer of the intestine in the form of a cuff, which helps to narrow the anal canal and retain feces, thereby reducing the intensity and frequency of separation of colonic contents (a patent of the Republic of Uzbekistan , FAP 01745, dated 12/30/2021 "Method for creating a smooth muscle sphincter of the rectum" was received for this method). This method of plastic surgery helps to correct anal sphincter insufficiency, since a smooth muscle internal sphincter is formed. This type of plastic surgery has also shown undoubted advantages in relation to various types of interventions, since this type of plastic surgery is physiological in many respects, and is also easy to perform technically, while completely eliminating the risk of damage to the innervation and blood supply of the pelvic organs.

The leading criterion of the effectiveness of surgical treatment of postoperative anal incontinence in children with anorectal malformations is undoubtedly the study of remote results. For this purpose, the effectiveness of remote results was studied by us in 65 (82.2%) patients out of 79 operated children of the main group in the period from 6 months to 5 years. In our opinion, such a long-term follow-up allows us to fairly objectively judge the remote effectiveness and radicality of the reconstructive interventions performed, the likelihood of incontinence in a milder degree or

its recurrence. In the remote observation period, the operated patients were examined mostly on an outpatient basis and underwent clinical and laboratory studies, X-ray, ultrasound and functional examination, as well as questionnaires.

In our observations, 9 (13.4%) patients showed an unsatisfactory result; unfortunately, the surgical intervention only worsened the process, transferring the condition to severe fecal incontinence. The explanation for the unsatisfactory results is primarily that these patients had deformations of the anorectal region, combined damage to various complexes of muscle structures of the anorectal zone retaining apparatus, and in some cases, their complete and rough scarring, which accordingly did not technically allow for the restoration of local tissues of the same name. We believe that this group of patients does not require any additional reconstructive surgical interventions, since they are practically doomed to an unsatisfactory outcome. The only option that can correct and reduce the manifestations of incontinence is the introduction of bulk-forming drugs.

At the same time, in 26 (32.9%) patients with postoperative anal incontinence , in whom the above changes in the rectoanal area were less pronounced, we performed surgical interventions in several stages with the imposition of a preventive colostomy or ileostomy . We consider the imposition of a stoma in this contingent of patients to be an important point, the purpose of which was to prevent infection of the anorectal zone during reconstructive interventions, as well as to reduce the risk of possible septic complications in the postoperative period. At the same time, normal blood supply to the pelvic organs is maintained and the integrity of the large intestine is not violated. Closure of the imposed stoma in order to restore the natural direction of fecal passage was performed 1.5-2 months after the reconstructive intervention.

In 13 (16.5%) cases reconstructive surgery helped transform grade III anal incontinence into grade I. In these patients, the result obtained in the long-term observation period was assessed as satisfactory; the reconstructive interventions performed in most cases led to the development of pliable stenosis due to cicatricially altered muscle fibers after primary interventions, which did not allow their full functioning, despite the measures taken for maximum reconstruction of the same tissues. Realizing that these patients will not have normal bowel movements as a result of the operations performed, but cleansing enemas will allow these children to remain clean for a long time, we consider this indicator to be relatively favorable, since it improves their social adaptation in society. This fact allowed us to form our opinion that " pliable stenosis with fecal smearing or mild constipation are better indicators than anal incontinence!"

We assessed the long-term treatment results according to the criteria of good, satisfactory and unsatisfactory (Table 5).

Clinical cure was considered a good indicator in children who developed physically normally and practically did not present any complaints related to fecal and gas incontinence.

Table 5

Remote results of repeated corrective surgical interventions in children of the main group (n=65)

No.	Types of interventions	Number of operations	Upcoming results		
			Good	Satisfactory	Unsatisfactory
1.	PSARP with sphincter restoration	9	6 (9.2%)	2 (3.1%)	1 (1.5%)
2.	ZSARP with sphincter restoration	5	3 (4.6%)	2 (3.1%)	-
3.	Perineal proctoplasty with excision of cicatricial stenosis	7	3 (4.6%)	3 (4.6%)	1 (1.5%)
4.	Excision of the protruding mucosa	12	7 (10.8%)	3 (4.6%)	2 (3.1%)
5.	Creation of an internal neosphincter	11	8 (12.3%)	2 (3.1%)	1 (1.5%)
6.	Gel plastic surgery of the anal canal	15	7 (10.8%)	5 (7.6%)	3 (4.6%)

7.	Prosthetics of the puborectal loop with the artificial transplant “Urosling-1”.	6	4 (6.2%)	1 (2.5%)	1 (1.5%)
Total		**65 (100%)**	**38 (58.5%)**	**18 (27.6%)**	**9 (13.8%)**

At the same time, the functional indicators showed that the multicomponent function of the rectal locking apparatus corresponds to socially acceptable indicators, characterized by the presence of urges to defecate. Also, to assess the results of surgical treatment and the anatomical and functional completeness of the puborectal muscle, MRI and MSCT studies of the small pelvis were performed, while the state of the rectal locking muscles was assessed.

Conclusion. Thus, summarizing the analysis of our studies of surgical treatment of postoperative anal incontinence in the follow-up, good and satisfactory long-term results were obtained in 56 (86.2%) patients, unsatisfactory - in 9 (13.8%) of 65 operated patients. Unsatisfactory treatment results in the form of recurrent incontinence are clearly the causes of social vulnerability of these children, which leads to emotional problems manifested in low self-esteem of their condition, which does not allow them to feel complete when communicating with their peers. In this regard, we believe that timely clinical examination of patients after reconstructive interventions with appropriate conservative therapy and rehabilitation allows us to obtain good and satisfactory treatment results.

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