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DIAGNOSIS AND TREATMENT OF OBSTRUCTIVE UROPATHY IN CHILDREN

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Conflict of interest
The authors declare that they have no conflicts of interest

Keywords
children, obstructive uropathy, endoscopic treatment

Abstract

Material and methods. *The study is based on the results of diagnosis and treatment of 444 children with congenital obstructive diseases of the urinary tract. They were in the urology department of NRCMCH since August 2007. To differentiate organic and functional obstructive uropathy were conducted high-tech, informative and noninvasive imaging diagnostic methods. On the basis of which were provided a differentiated treatment.*

Results.*Children with functional hydronephrosis and vesico-dependent version of urodynamic disorders in obstructive megauretera received conservative treatment. In ureteral type of the functional form of obstructive megauretera and 2-3 stage of vesicoureteral reflux were provided mini invasive endoscopic treatment. Effectiveness of endoscopic treatment of obstructive megauretera was - 85%, while the vesicoureteral reflux of 2nd stage - 100%, grade 3 - 80%. The use of mini lumbotomy front-side access for hydronephrosis, allowed towork locally in the area of ureteropelvic segment, to avoid injury of the kidneys and paranephritis.*

Conclusion. *Thus, the use of an integrated approach to diagnosis using minimally invasive, highly informative methods made it possible to pathogenetically substantiate the choice of tactics for the treatment of obstructive uropathy in children and significantly improve the results of this complex category of patients.*

Диагностика и лечения обструктивных уропатий у детей

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Конфликт интересов
Авторы заявляют об отсутствии конфликта интересов

Ключевые слова
дети, обструктивные уропатии, эндоскопическое лечение

Аннотация

Материал и методы. *В основу работы положены результаты обследования и лечения 444 детей с врожденными обструктивными заболеваниями мочевых путей, находившихся в отделении урологии АО «ННЦМД» с августа 2007 года. Для дифференциации органической и функциональной обструктивной уропатий проводились высокотехнологичные, информативные и малоинвазивные визуализирующие методы диагностики, на основании которых проводилось дифференцированное лечение.*

Результаты. *Дети с функционально обусловленным гидронефрозом и пузырно-зависимым вариантом нарушения уродинамики при обструктивном мегауретере получали консервативное лечение. При мочеточниковом варианте функциональной формы обструктивного мегауретера и ПМР 2-3 ст. проведены миниинвазивные эндоскопические методы лечения. Эффективность эндоскопического лечения обструктивного мегауретера составила - 85%, при ПМР 2 ст.- 100%, 3 степени – 80%. Применение мини люмботомного передне-бокового доступа при гидронефрозе позволило локально работать в зоне ЛМС, без излишнего травмирования почки и паранефрия.*

Заключение. *Таким образом, использование комплексного подхода к диагностике с использованием миниинвазивных, высокоинформативных методов позволило патогенетически обосновать выбор тактики лечения обструктивныхуропатии у детей и значительно улучшить результаты этой сложной категории пациентов.*

Балалардағы обструктивтік уропатияның диагностикасы және емі

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Аңдатпа

Материал және әдістер. *Жұмыс 2007 жылғы тамыз айынан бері «ҰҒАБО» АҚ урология бөлімшесінде жатқан зәр шығару жолдарының туа біткен обструктивті аурулары бар 444 баланы қарап-тексеру және емдеу нәтижелеріне негізделген. Органикалық және функционалды обструктивті уропатияны саралау үшін жоғары технологиялық, ақпараттық және миниинвазивті бейнелеу диагностикалық әдістері жүргізілді, оның негізінде сараланған емдеу жүзеге асырылды.*

Нәтижелер. *Функционалды түрде анықталған гидронефроз және обструктивті мегауретердегі уродинамикалық бұзылулардың қуыққа тәуелді нұсқасы бар балалар консервативті ем алды. Обструктивті мегауретер және ҚНР 2-3 с. функционалдық түрінің несепағар нұсқасы мен емдеудің миниинвазивті эндоскопиялық әдістері орындалды. Обструктивті мегауреттерді эндоскопиялық емдеудің тиімділігі – 85%, 2 дәрежелі ҚНР кезінде - 100%, 3 дәреже кезінде 80%-ды құрады. Гидронефрозға арналған мини-люмботомиялық алдыңғы-бүйірлік тәсілді қолдану бүйрек пен паранефрияның шамадан тыс зақымдануынсыз ШНС аймағында жергілікті түрде жұмыс істеуге мүмкіндік берді.*

Қорытынды. *Осылайша, миниинвазивті, жоғары ақпараттық әдістерді қолдана отырып, диагностикаға кешенді тәсілді қолдану балалардағы обструктивті уропатияны емдеу тактикасын таңдауды патогенетикалық тұрғыдан негіздеуге және осы күрделі санаттағы науқастардың нәтижелерін айтарлықтай жақсартуға мүмкіндік берді.*

Мүдделер қақтығысы
Авторлар мүдделер қақтығысының жоқтығын мәлімдейді

Түйін сөздер
балалар, обструктивтік уропатия, эндоскопиялық ем

Introduction

The term “Obstructive uropathy” (OU) combines a complex of structural and functional changes in the renal parenchyma, predominantly of the tubulointerstitial type, which develop as a result offunctional or organic origin disorders of the urine passage at the level of the pyelocaliceal, pelvic-ureteral, vesicoureteral segments or a consequence of infravesical obstruction [1,2]. Obstructive uropathy in children most often includes hydronephrosis, vesicoureteral reflux, and obstructive megaureter. Obstructive uropathy without timely diagnosis and adequate treatment, can cause functional developmental delay of the kidneys, and when secondary changes are added, a complete loss of kidney function. Therefore, the assessment of the degree of preservation of renal function determines both, the choice of treatment for obstructive uropathy and the prognosis of the disease. At the same time, the degree of preservation of renal function directly depends on the state of renal hemodynamics [3,4].

Currently, the assessment of the upper urinary tract condition with obstructive uropathy is- complex and unthinkable, without the using of new technologies. This research is devoted to study these issues, as well as the search for new ways to correct the detected changes.

Material and methods

The study is based on the results of examination and treatment of 444 children with congenital obstructive diseases of the urinary tract, who were in the department of urology of the NRCMCH since August 2007, of all children 202 (45.5%) consist- hydronephrosis, 79 (17, 8%)-had megaureter and 163 (36.7%) were with vesicoureteral reflux (VUR) (Table 1).

Table 1.
Distribution of children with obstructive uropathy depending on nosology, sex and age

Diagnosis	under 3years		4-7years		8-11years		12-15years		Total
	boys	girls	boys	girls	boys	girls	boys	girls	
Hydronephrosis	69	28	38	9	24	10	12	12	202 (45,5%)
Megaureter	36	19	4	10	3	4	2	1	79 (17,8%)
VUR	38	22	6	39	11	24	9	14	163 (36,7%)
Total:	143	69	48	58	38	38	23	27	**444 (100%)**
	212 (47,7%)		**106 (23,9%)**		**76 (17,1%)**		**50 (11,3%)**		

As can be seen from the table above, children under 3 years of age predominated - 212 (47.7%). This unequivocally indicates an earlier diagnosis of Congenital Malformation of Urinary System . This positive trend is primarily due to the widespread introduction of prenatal ultrasound of the fetus into the protocol for examining pregnant women.

Attention is drawn to the distinct dynamics of the decrease in the frequency of OU with age, which correlates with the age-related regression of neurogenic urinary disorders in children. In this regard, we can assume a close relationship of the existing detrusor hyperreflexia with the development of OU.

All patients with obstructive uropathy during their stay in the hospital were examined according to the accepted plan, including the study of anamnesis, clinical laboratory, radiological (CT angiography, MRI - urography), ultrasound, urodynamic and endoscopic methods of research. To differentiate organic and functional obstruction, an ultrasound study was performed with a pharm test (lasix) - diuretic ultrasound (DUS), Dopplerography of the kidney vessels andureterovesical ejection of urine.

Results and discussion

In functional obstruction of pelvic-ureteral segment (PUS) zone and the uretero-vesical segment (UVS), the maximum expansion of the pelvis was noted in 15 minutes, but did not exceed 30% of the initial parameters, and the return to the original size occurred by 45-60 minutes.

On Dopplerography of the renal vessels: the vascular tree is preserved, the blood flow is determined in all parts of the parenchyma. Renal blood flow was assessed by the resistance index (IR). Normally, IR values fluctuated within 0.78 in children of the first months of life, 0.68 in older children. The spread of IR values at different levels of the renal artery did not exceed 0.03.

Dopplerography of ureterovesical ejection of urine was performed in all children. Emissions from the ureter were characterized by unchanged qualitative characteristics and frequency of ejection, the direction of the ejections was oriented towards the opposite wall of the bladder, their trajectories intersected in the projection of the midline and were alternating, independent of each other (Table 2).

Table 2.
Dopplerographic indicators of ureteral ejection in health children (n-45) and with functional OU (n-203)

Age	Vmax, cm/s		Vмin, cm/s		RI	
	normal	FOU	Норма	FOU	Норма	FOU
1 - 3 years	18,8±0,05	16,2±0,03	5,5±0,03	4,05±0,04	0,70±0,02	0,86±0,03
4 - 7 years	22,7±0,02	19,1±0,02	7,6±0,03	6,1±0,03	0,65±0,02	0,79±0,02
8 - 12 years	33,1±0,03	27,0±0,03	11,6±0,02	9,0±0,02	0,63±0,02	0,75±0,03

Following the table, the quantitative parameters of Dopplerograms with functional obstruction approach those of the control group (normal). In the organic form of obstruction, the expansion of the pelvicalyceal system was observed in 30-40 minutes after the administration of lasix, in the absence of regression of values by the 60th minute of the study. Emissions from the ureter are characterized by a significant decrease in the resistance index, a decrease in the frequency and speed of urine ejection, as well as a violation of renal hemodynamics, which are reliable hallmarks of organic obstruction (FO).

With vesicoureteral reflux of I-II degree, echographic and Doppler parameters of the kidneys corresponded to the standards. In children with grade III VUR, the size of the kidneys on the side of the lesion was reduced, differentiation into the cortical and medulla of the parenchyma was indistinct. Diffuse or focal impoverishment of blood flow was determined in CDI and ED.

In order to determine the nature of kidney vascularization, we used a high-tech, minimally invasive and informative method: magnetic resonance urography (MRU) with an angiographic phase. The advantage of this technique, in addition to improving the visualization of the PCS and ureters, was that after the introduction of the diuretic, there was an acceleration of blood flow in the vessels of the kidney, including additional ones, which in turn significantly improved the conditions for visualization of the vessels and allowed in most cases (78%) to diagnose an accessory vessel in the area of the LMS or in/3 of the ureter (Fig. 1).

The conducted complex examination allowed us to make a differentiated approach to the choice of treatment tactics.

Children with functional hydronephrosis 119 (59%) received a course of conservative treatment.

From 83 patients with an organic form of hydronephrosis, 67 patients underwent plastic surgery of the pyeloureteral segment according to the Hines-Andersen method. The remaining 16 children underwent laparoscopic nephroureterectomy due to the lack of kidney function.

Since 2007, we have been using a minimally invasive lumbotomy anterior-lateral approach (Figure 2).

This access allows to work locally in the area of the UPJ, without excessive injury to the paranephria of the kidney.

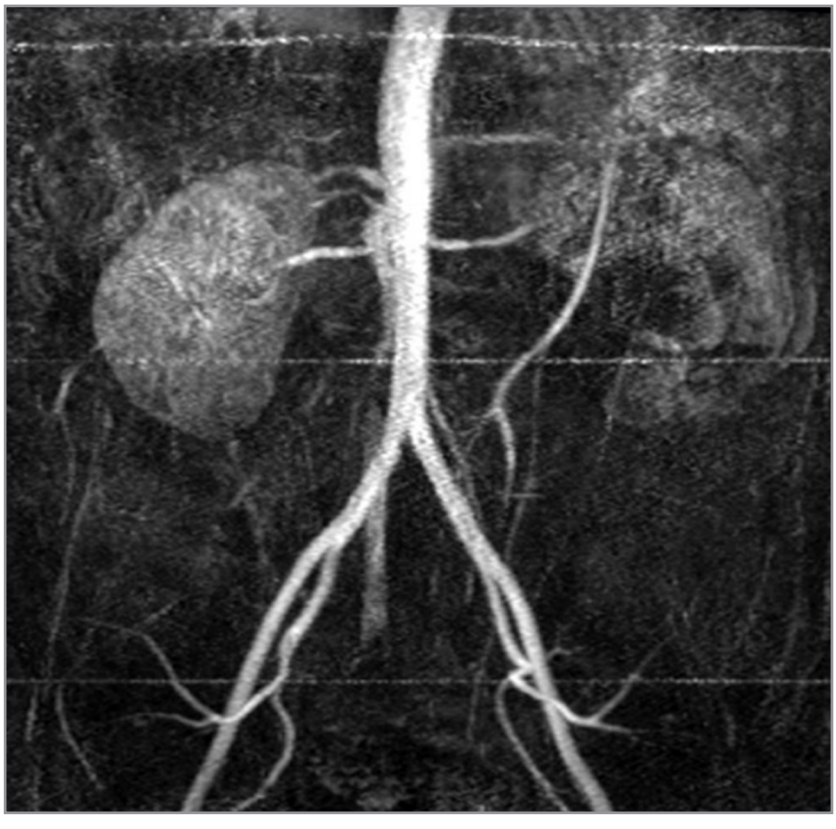

Figure 1.
Left-sided hydronephrosis. MR angiography

Figure 2.
Anterior-lateral
access for hydronephrosis
(surgical navigation)

A positive effect of surgical treatment was obtained in 64 (95.5%) patients, of which in 46 (71.9%) it was regarded as good - complete recovery or significant improvement in urodynamics and kidney function, in 18 (28.1%) as satisfactory - a slight improvement or stabilization of the function of the operated kidney, preservation of preoperative obstructive manifestations of urodynamic insufficiency - expansion of the pelvis and a violation of its evacuation function. In 3 (4.4%) patients, worsening of kidney function was noted.

A bladder-dependent variant of urodynamic disturbance in obstructive megaureter due to neurogenic hyperreflex bladder dysfunction was detected in 53 (67.1%) patients (Group I). These patients received conservative treatment for neurogenic bladder. In 16 (20.2%) patients, the ureteral variant of the functional form of obstructive megaureter was diagnosed (group II). These patients underwent endovideoscopic treatment (bougienage, dilatation and stenting) of the ureterovesical segment. In general, positive results of endovideosurgical treatment of OMU were obtained in 85% of cases.

In all these children, the course of chronic pyelonephritis from the stage of constant exacerbations

passed into a stable phase of remission, the amount of antibiotic therapy was significantly reduced. The developed technique for endosurgical treatment of the ureteral variant without resection of the ureterovesical segment made it possible to change the existing concept of active surgical treatment of children with obstructive megaureter, in particular, to sharply limit the indications for open surgical treatment and expand the scope of endosurgical interventions.

Group III - children with an organic form of obstruction of urodynamic disorders, which was detected in 10 (12.7%) patients. Children of this group underwent various types of antireflux surgery.

In the treatment of VUR, we have identified 3 main methods: conservative, endoscopic and surgical methods. In the presence of VUR of 1-2 degrees, a course of conservative treatment was performed. In case of grade 3 VUR, as well as in case of failure of conservative therapy in grade 1-2 VUR, we performed endoscopic correction with glycogel.

The effectiveness of endoscopic treatment for VUR of stage 1-2, according to our data, was 100%, for stage 3 - 80%, of which the elimination of reflux from the first injection of glycogel was achieved in 45%, in another 20% of patients reflux was eliminated with repeated administration through 3 months, and in 15% due to the persistence of reflux, a third injection of glycogel was required, after which a positive result was obtained.

At the same time, even against the background of reflux persistence, almost all patients showed a decrease in its degree, as well as a decrease in the phenomena of bladder dysfunction and the frequency of exacerbations of pyelonephritis.

Thus, the use of an integrated approach to diagnosis using minimally invasive, highly informative methods made it possible to pathogenetically substantiate the choice of tactics for the treatment of obstructive uropathy in children and significantly improve the results of this complex category of patients.

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