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TACTICS FOR BLADDER-URETERAL REFLUX IN CHILDREN

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ABSTRACT

Among children and adolescents, vesicoureteral reflux (PMR) occurs in 1% of cases, the proportion of bilateral reflux is up to 50.9% [1]. At the same time, in 50% of cases, the degree of reflux from different sides is different.

Keywords: vesicoureteral reflux, endoscopy, children.

INTRODUCTION

Among children and adolescents, vesicoureteral reflux (PMR) occurs in 1% of cases, the proportion of bilateral reflux is up to 50.9% [1]. At the same time, in 50% of cases, the degree of reflux from different sides is different. The prevalence of PMR and the consequences of this disease (chronic pyelonephritis, developmental delay, arterial hypertension, chronic renal failure), which inevitably lead to disability, dictate the need to find ways to improve treatment tactics. Among the causes of PMR in boys, the main place is occupied by malformations of the ureteral mouths, while in girls, secondary forms of PMR are predominant, due to urinary tract infection and neurogenic bladder dysfunctions (NDMP). Thus, in the first year of life, the ratio of boys and girls suffering from PMR is 6:1, and as they grow older, this ratio changes exactly the opposite [2].

MATERIALS AND METHODS

For the period from 2000 to 2020, 56 children with VUR from 8 months to 15 years were inpatient treatment and examination in the pediatric urology department of 2 SamMI clinic. The main group of children consisted of 32 children of the first 7 years of life (57.1%), of which the most numerous was the group of children aged 4-7 years of life (30.4%). Among the examined patients, 35 girls (62.5%) prevailed, compared with 21 boys (37.5%). Unilateral lesion was noted in 37 (66.1%) children, on the right - 19 (33.9%), on the left - 18 (32.1%), bilateral - 19 (33.9%).

Endosurgical treatment of VUR consisted in transurethral submucosal injection of collagen manufactured by MIT (Russia) in a volume of 2 to 4 ml under the ureteral

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orifice using a standardized endoscopic needle and the formation of a collagen bolus that serves as a support for the ureter, the walls of which are adjacent to each other, providing a valvular antireflux function, preventing the backflow of urine.

Endocollagenoplasty of the ureterovesical segment of the ureter was performed in all 56 patients (75 ureters), including 9 children on both sides simultaneously.

Comprehensive urological examination of children included clinical and laboratory studies: X-ray and endoscopic methods of visualization of the urinary system: ultrasonography, excretory urography, voiding cystography and cystourethroscopy. According to CT and MRI indications.

RESULTS AND DISCUSSION

To understand the causes of PMR, it is necessary to have an understanding of the normal structure of the vesicoureteral segment (PMS). Anatomically, the closure function of PMS is carried out due to a certain ratio of the length and width of the intravesical ureter (5:1), the oblique passage of the ureter through the wall of the bladder. The long submucosal tunnel is a passive element of the ureterovesical "valve". The active element of the valve mechanism is represented by the musculoskeletal apparatus of the ureter, which closes the mouth when the detrusor is reduced.

The causes of antiphysiological urine flow include pathological conditions that lead to a violation of the closing function of PMS and high intravesical pressure of urine. The first can include congenital malformations of PMS and the inflammatory process of the superficial and deep layers of the triangles of the bladder (cystitis), which disrupts the detrusor or directly the PMS itself.

PMS abnormalities are the result of improper development of the ureteral outgrowth of the wolf duct at the 5th week of embryogenesis [3, 4]. PMS anomalies can be represented as follows: a wide, constantly gaping shape of the ureteral mouth; the location of the ureteral mouth outside the area of the urogenital triangle (lateroposition); complete absence or shortening of the submucosal part of PMS; violation of the morphological normal structure of PMS (dysplasia).

Loss of the closure function of PMS occurs when the bladder wall or PMS area is inflamed. Most often, secondary PMR is a consequence (complication) of granular, bullous or fibrinous forms of cystitis. Urinary tract infection occurs in 1-2% of boys and 5% of girls. More often, the urinary tract is colonized by opportunistic (intestinal) flora, among which the main place is occupied by escherichia coli (40-70%) [3].

Normally, PMS is able to withstand intravesical fluid pressure up to 60-80 cm of water column [5]. High hydrostatic pressure is a consequence of intravesical

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obstruction or functional disorders of the bladder. Intravesical obstruction develops in posterior urethral valves, cicatricial phimosis in boys, sclerosis of the bladder neck (Marion's disease), meatal stenosis in girls.

NDMP occurs in 20% of children aged 4-7 years. By the age of 14, the number of people suffering from these dysfunctions is reduced to 2% [6]. NDMP manifests itself as irritative or obstructive symptoms. Basic forms NDMP: detrusor hyperactivity, hypotonia and detrusor detrusor-sphincter dyssynergia. In these conditions, PMR is also considered secondary and is a consequence of increased fluid pressure in the bladder. Hyperactivity of the detrusor is characterized by sharp jumps in intravesical pressure and a violation of the accumulative function of the bladder. Hypotension of detrusor is characterized by a decrease in the sensitivity of the bladder wall, its overflow and an increase in the pressure of urine in its lumen above critical numbers.

Detrusor-sphincter dissinergia is a violation of the synchronous operation of the detrusor and the sphincter apparatus, leading to functional infravesical obstruction during miction.

With age there is a trend to reduction of the incidence of primary and secondary increase of the TMR. At the same time, the frequency of regression of primary PMR is inversely related to the degree of PMR. Regression is observed in 80% of cases with grade I and II PMR, and in only 40% of cases with grade III PMR. This is explained by the theory of "maturation" of PMS (Hutch, 1961), which gained its supporters later (Kellerman, 1967; King, 1974). The essence of the theory is that with the development of the child there is a physiological transformation of PMS — the intravesical part of the ureter is lengthened, its diameter decreases relative to the length and the angle of flow into the bladder changes.

The current treatment strategy for PMR includes a set of measures (therapeutic and surgical) aimed at eliminating the cause of reflux and eliminating its consequences. The choice of the method of correction of PMR, of course, is determined by its form.

The essence of conservative therapy should be reduced to the eradication of urinary tract infection and the elimination of functional disorders of the bladder and the prevention of death of the renal parenchyma. According to Yu. F. Isakov, the effectiveness of conservative therapy in the I–III degree of PMR is 60-70%. The main complications (manifestations) PMRS are chronic pyelonephritis (50-70%) and reflux nephropathy (60-70%) [2]. The etiological structure of chronic pyelonephritis (according to A. F. Vozianov et al., 2002) is represented as follows: Escherichia coli-40-60%, proteus-9-16%, Klebsiella-7-20%, Streptococcus-4-10%, L-forms-15%,

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microbial associations-10-15%, Enterococcus-2-5%, Pseudomonas aeruginosa-2-7%, Enterobacter-5-15%, Staphylococcus-5-14%.

Antimicrobial therapy should be long-term (6-12 months) and applied according to the results of urine culture. The most convenient drugs for children are oral forms. In hospital treatment, intramuscular or intravenous forms are used. After the use of bactericidal drugs (antibiotics), a long course of uroseptic therapy is prescribed. In order to stop the allergic component, desensitizing agents are prescribed.

An important role is played by the use of drugs that improve intracellular metabolism. A mandatory component of conservative therapy is the use of herbal medicines.

A special place in the treatment of urinary tract infections in children should be given to the normalization of intestinal function. Violation of the normal rhythm of emptying the colon leads to compression of the lower third of the ureter, violation of vascularization, stagnation in the pelvic region, infection of the urinary tract (lymphogenic pathway).

NDMP is observed in patients with myelodysplasia and its various manifestations: meningomyelocele, rachisisis, Spina bifida (incomplete closure of the spinal canal) , etc. Treatment of PDMP is an important link in complex therapy. The elimination of functional disorders of the urinary tract is a very difficult task and requires a long time.

A separate place in the treatment of PMR is given to endoscopic methods. Thus, according to a survey conducted by Italian urologists, 80% of parents choose endoscopic treatment as an alternative to open surgery and long-term drug therapy [7].

Priority in the medical use of teflon paste belongs to the otolaryngologist Arnold, who used it for the purpose of correcting the glottis (1962). The introduction of teflon into urological practice took place in 1974, when V. Politano performed a paraurethral injection for urinary incontinence. For the first time, a minimally invasive endoscopic method for correcting PMR was announced by E. Matouschek. In 1981, with a positive result, he performed insuflation of teflon paste to an 8-year-old child in the area of the mouth of the refluxing ureter [8]. Subsequently, O. Donnel together with P. Puri (1984) described the method of endoscopic treatment of PMR [9]. For 25 years, a large number of implantable materials have been tested, starting with teflon and ending with autogenic cell cultures [8-16]. The most complete classification of injectable materials is as follows [17]: auto - and allogeneic: blood, fat, chondrocytes, detrusor cells, human collagen; xenogenic and synthetic: teflon, silicone, dextranomer/hyaluronic acid,

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calcium hydroxyapatite, bio-glass fiber, polyvinyl alcohol foam, hydroxyethyl methacrylate, bovine collagen, duraspheres (Durasphere B).

The first experience of using antireflux implants alarmed specialists due to the possibility of developing undesirable side effects: the occurrence of necrosis at the injection site, malignancy, migration of material with the formation of granulomas in regional lymph nodes and/or parenchymal organs [18-20]. Modern experimental and clinical studies have proved the inertness and hypo-allergenicity, as well as the safety of currently used biomaterials [12, 13]. Positive results of endoscopic treatment of PMR, according to recent studies, (Chertin, 2003; Kirsch, 2004) reach 70-90%.

Indications for the endoscopic method of correction of PMR are the ineffectiveness of conservative therapy in the period from 6 to 12 months. The absence of an acute phase of inflammation of the bladder is a prerequisite for endocollagenoplasty.

The endoscopic method of PMR correction, due to its simplicity of execution and sufficiently high efficiency, is firmly included in the algorithm of therapeutic tactics. Undoubtedly, an important role should be given to the correct choice of indications for this method. Collagenization of the ureteral mouth is justified in its normal structure, i.e., the absence of a gaping mouth and lateral dystopia. With IV and V degrees of PMR and a decrease in the secretory function of the kidney > 50%, open ureteral reimplantation is indicated.

The method of endoscopic treatment, aimed at lengthening the intramural ureter and reducing the diameter of the mouth, is performed according to the following method. Cystoscopy is performed, during which the clinical and anatomical picture of the bladder is determined: the state of the urogenital triangle, the shape and location of the ureteral mouths, the presence of paraurethral diverticula and ureterocele, inflammatory changes. Through the working channel of the cystoscope tube, a long injector (diameter 5H) is attached to a syringe with collagen. Collagen is represented by a substance in the form of a gel. The standard volume of collagen in a syringe is 2 ml. The injection of the needle of the injector (length 6 mm) is carried out under the mouth of the ureter — at 6 h of the conditional dial, to the full depth. To prevent complications before collagenoplasty, it is possible to catheterize the mouth with a 5CH ureteral catheter. When the pressure is applied to the plunger of the syringe with collagen, a roller is gradually formed in the area of the needle injection. Depending on the degree of gaping of the mouth and the length of the submucosal ureter, from 1 to 2 ml of the substance is administered. In this case, the mouth of the ureter becomes dotted or slit-shaped, after which the instrument is removed. The bladder is drained for a day

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by a double-light urethral catheter Foley 8-14Sh, the balloon of which is filled with 5 ml.

The most effective way to correct PMR remains operative-93-97% of cases [21]. More than 80 methods of open surgical treatment of PMR are known-these are various modifications of ureterocystoanastomosis. The principal mechanism of all types of open interventions is the elongation of the intramural ureter in order to create a valve mechanism capable of passing urine in one direction from the ureter to the bladder. The most successful technique is tunnel anastomosis, due to the ability of the tunnel to withstand high hydrostatic pressure inside the bladder (both when the bladder is filled and when urinating), preventing the reflux of urine into the ureter.

Indications for surgical treatment are: reflux megaureter (with grade IV, V PMR), recurrent nature of PMR at lower degrees and the absence of a positive effect from conservative or endoscopic treatment, a combination of reflux with an obstructive component in the PMS zone.

CONCLUSION

The emergence of new effective drugs in the pharmacological conservative treatment of PMR in children, on the one hand, and the introduction into practical medicine of new surgical methods of treatment, including laparoscopic surgery, robotics, on the other, will certainly change the importance of the usual open methods of PMR correction in the future. But today, open surgical interventions play a key role in the strategy of treating PMR, as they allow eliminating the most complex forms of PMR.

In conclusion, I would like to emphasize that the choice of the method of correction of PMR should be strictly individual and based on an objective analysis of the examination data by the doctor and an assessment of the possibility of using all available methods to eliminate PMR in this particular patient.

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