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Our experience in endoscopic treatment of vesico-ureteral reflux in children.

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Summary

Aim of the study: To define the guidelines of endoscopic treatment of vesico-ureteral reflux (VUR) in children in relation to grade of VUR, of the location of the ureteral orifice, of the stage of reflux nephropathy and of the association with other urinary tract malformations. Materials and Methods: 498 children with vesico-ureteral reflux (VUR) were observed in 702 ureters. All the patients were submitted to a complete urological evaluation and to endoscopic treatment (ET) of the VUR with the implant of a stable polyacrylamid gel (DAM+). Results: The reflux was degree I in 53 ureters, II in 174, III in 301, IV in 165 and V in 9 ureters. VUR was primary in 149 children, secondary to a neurogenic dysfunction of the bladder in 271 patients, complex in the remaining cases. An overall 90.5% success rate of endoscopic treatment with “DAM+” implantation was observed. Success of VUR endoscopic treatment was obtained in 80% of cases with orifice lateralisation, in 60% of cases with high and low intravesical orifice ectopy, and in 10% of cases with extravesical orifice. In 151 ureters (21.5%) endoscopic treatment of VUR had to be repeated, while a third procedure was necessary in 42 ureters (5.9% of cases). In total 895 endoscopic procedures were performed. Open surgical ureteral reimplantation was performed in the cases with persisting VUR after the third attempt of endoscopic procedure. Conclusion: These results of the endoscopic treatment of VUR in children confirm the high efficacy and safety of this method. In any case, before choosing the method of VUR correction, it is necessary to inform the parents of the child about the potential rate of success of the endoscopic treatment in function of the peculiarity of the individual patient.

Key words: Vesico ureteral reflux; Endoscopic treatment; Ureteral orifice.

INTRODUCTION

Vesico-ureteral reflux (VUR) is one of the most frequent urodynamic alterations in children that can result in the development of secondary pyelonephritis, reflux nephropathy, scarring and renal atrophy. Endoscopic manipulation of the vesico-ureteral orifice allows to avoid pathological urine regurgitation in the ureter restoring normal physiology. The experience of endoscopic treatment in children with VUR has a 20-year period of existence. However, the guidelines of endoscopic treatment in relation to various grades (G) of VUR, of different positions of the ureteral orifice, of various stages of reflux nephropathy and of the association with other urinary tract malformations have not been well defined yet.

METHODS

Since 1995 to 2003 we carried out endoscopic treatment of VUR in 702 ureters of 498 children in the Urologic Clinic of Saint Petersburg's State Pediatric Medical Academy. In our experience we included 391 girls and 107 boys with median age of 9.3 years and disease duration ranging from 2 months to 15 years. All the patients were studied by voiding cystography and voiding US-pyeloscopy. In order to look at the intermittent VUR, bladder filling and ureteral voiding were investigated under electron-optical transformer control and radionuclide investigation with Tc 99 DMCA. In 92% of children with VUR G 4-5 split renal function was investigated by radionuclide, functional and ultrasound methods. The worse alterations were diagnosed in cases with high activity of reflux nephropathy (renal scarring and atrophy with renal hypertension). Associated urinary tract malformations were found in 85 children (renal duplication in 70 patients, horseshoe kidneys in 5, renal dystrophy in 4, renal hypoplasia in 6). Alterations of split renal function developed more often in this group of patients.
Renal sclerosis and hypertension were diagnosed in 10% of children with VUR G 1-3 and disease duration more than 7 years, but in half of these cases a "sterile reflux", without urine infection and pyelonephritis symptoms, was found.

High vesical pressures were revealed in 69.8% of children by means of cystometry.

Abnormal ureter orifice position was found in 250 cases by means of cystoscopy (orifice lateralisation in 81%, low and high intravesical ectopy in 18%, cervical and diverticular localisation in 1% of children).

Initial monolateral VUR degree I-II in 17 children with a short disease history and a low activity of pyelonephritis were followed for a 6-12 month period while on antibiotic prophylactic treatment obtaining a spontaneous remission in 5 cases (29.4%).

In 75 children with secondary VUR degree I - II endoscopic treatment was deferred after conservative therapy of neurogenic bladder dysfunction within 36 months: out of them 15 children (20%) recovered.

In cases of initial vesico-ureteral reflux degree I - II with a disease history > 4 years, bilateral VUR, and VUR degree III - V immediate endoscopic treatment was offered in order to prevent kidney damage.

A stable biopolymer-polyacrilamid water-structuring gel (DAM+) was implanted under the ureteral orifice. Average gel amount for each implant was 1 ml (0.4-2.9 ml).

RESULTS

The diagnostic work up showed VUR G 1 in 53, VUR G 2 in 174, VUR G 3 in 301, VUR G 4 in 165, VUR G 5 in 9 ureters.

Two hundred and four patients suffered bilateral VUR.

In 151 ureters (21.5%) endoscopic treatment of VUR had to be repeated, while a third procedure was necessary in 42 ureters (5.9% of cases). In total 895 endoscopic procedures were performed.

Cystoscopy and ultrasound investigation were used for the implant settlement revision, the results being successful in 99.6%. Granulate inflammation was revealed in the zone of implantation in 2 cases.

Intravesical implant displacement (caudal, lateral or cervical) was found in 35% of children with orifice lateralisation and extravesicalisation. Fifty per cent of children with VUR G 5 and 25% of children with VUR G 4 had extravesical implant displacement. In case of extravesical displacement the effect of endoscopic treatment was low and the correction had to be repeated 2 and 3 times, with 6-month intervals. Repeated injections were requested in particular for children with ureter extravasicalisation and high pressure in neurogenic bladder.

Complete overall correction of VUR after endoscopical "DAM+" implantation was achieved in 91.5% of cases.

The efficacy of VUR's endoscopic treatment was optimal in cases with VUR G1-3 (97%), while the efficacy in cases with VUR G 4 was 75% and in G 5 38%.

The results also depended on the ureter's orifice position. VUR was cured in 99% of patients with typical orifice localization. Orifice lateralisation led to a reduction of treatment success to 80%, high and low intravesical ectopy to 60%, cervical and diverticular ectopy to 10%.

After the endoscopical treatment of VUR a yearly follow-up was carried out looking for remote results of treatment, renal functional and reflux nephropathy progression.

Patients were followed for 5 years. The activity of reflux nephropathy considerably decreased, pyelonephritis attacks and leucocyturia decreased or disappeared in 78% of cases, proteinuria and bacteriuria levels decreased in 62% of cases.

Children with persisting VUR after 3 endoscopic procedures, high activity of reflux nephropathy and absence of renal hypertension underwent antireflux operations: Gregoir procedure in 18, Polatino-Leadbetter procedure in 2, Cohen procedure in 2, ureterocystectomy in 6.

Four nephroureterectomy and ten heminephrectomy were performed in cases of renal hypertension and scarring with persisting VUR G 4-5.

During the surgical procedures, the implants were removed without technical difficulties. Histology investigations did not show inflammatory alterations in the ureters. The implants were surrounded by a thin capsule of connective tissue. Neither giant cells nor granulomatous tissue were found.

DISCUSSION

Our investigation showed that the efficacy of "DAM+" implantation in endoscopic treatment of VUR was about 90%. According to Puri (6), VUR was cured in 86% of cases after the 1st implantation of dextranomer/hyaluronic acid copolymer and in 100% of cases after the 3rd implantation. According to Kirsch (4) the efficiency of dextranomer/hyaluronic acid copolymer implantation was only 72%, owing to frequent caudal displacement of the implant.

The efficiency of "DAM+" application was higher than that obtained by dermal collagen use with 65-87% 5% immediate success according to Ortenberg (5) and only 9% long-term success according to Haferkamp (3).

A 80% success of VUR endoscopic treatment was obtained in cases with orifice lateralisation, a 60% success in cases with high and low intravesical orifice ectopy, a 10% success in cases with extravesical orifice, in agreement with the experience of Trisinar (7). In his work, Trisinar noted a reliable correlation between bladder pressure values, orifice location and efficiency of endoscopic treatment of VUR.

In any case, before choosing the method of VUR correction, it is necessary to inform the parents of the child about the potential rate of success of the endoscopic treatment in function of the peculiarity of the individual patient.

These results of the endoscopic treatment of VUR in children confirm the high efficiency and safety of this method.

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Archivio Italiano di Urologia e Andrologia 2005; 77, 3