Salvage Dextranomer-Hyaluronic Acid Copolymer for Persistent Reflux After Ureteral Reimplantation: Early Success Rates

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Purpose: Endoscopic injection of dextranomer-hyaluronic acid copolymer is an accepted initial procedure to correct vesicoureteral reflux. Less data are available on its role in treating failed ureteral reimplantation.

Materials and Methods: We retrospectively reviewed the charts from 2002 to 2008 and identified 21 patients (26 ureteral units) with persistent reflux after reimplantation.

Results: Mean age was 7 years (range 2 to 13). Mean followup was 2 years (range 10 to 46 months). Of the 17 patients with a single system ureteral reimplantation was extravesical in 9 and intravesical in 8 with tapering performed in 5. Three patients underwent reimplantation of duplex systems and 1 underwent reimplantation due to ureterocele. Residual reflux grade was 1 to 4 in 3 (11%), 17 (65%), 3 (11%) and 3 ureteral units (11%), respectively. Dextranomer-hyaluronic acid copolymer was injected transurethrally. The mean volume injected was 1.2 ml (range 0.7 to 3). After 1 injection reflux resolved in 15 patients (71%) or a total of 20 ureteral units (77%), including 12 of 14 (86%) extravesically and 8 of 12 (66%) intravesically reimplanted units. The resolution rate improved to 84% after multiple injections. Two of the 6 patients with reflux after 1 injection had a single system, 2 had an obstructive megaureter with tapered reimplantation, 1 had a duplicated system and 1 had a ureterocele. Three of the 5 patients with persistent reflux underwent revision surgery. Ureteral abnormalities other than reflux and tapered reimplantation were associated with a statistically significant inferior success rate.

Conclusions: Dextranomer-hyaluronic acid copolymer injection is an efficacious salvage procedure for persistent reflux after ureteral reimplantation. The success rate is inferior for ureteral abnormalities other than primary vesicoureteral reflux and after tapering.

Key Words: ureter, vesico-ureteral reflux, dextranomer-hyaluronic acid copolymer, salvage therapy, abnormalities

Abbreviations and Acronyms

BBD = bladder and bowel dysfunction

DHA = dextranomer-hyaluronic acid copolymer

VUR = vesicoureteral reflux

Study received institutional review board approval.

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ENDOSCOPIC injection of DHA is an accepted initial procedure to correct VUR. Ample data are available on the short-term and long-term results of the procedure.[1,2] While surgical ureteral reimplantation remains the gold standard for VUR surgical treatment with a success rate of 95% to 99%,[3] endoscopic treatment of VUR with its lower morbidity has become a widespread initial treatment option despite a lower success rate.[4,5]

Surgical failure occurs and represents a therapeutic challenge. Available options in these patients are expectant treatment, reoperation or

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attempted endoscopic therapy. Expectant treatment of residual VUR, especially early after ureteral reimplantation, is a valid option since later resolution has been reported.[6] Reoperative ureteral reimplantation is challenging and carries increased morbidity. Thus, endoscopic management of failed reimplantation is an attractive solution that avoids the potential hazards of revision surgery.

Endoscopic DHA injection has been studied in various complicated anatomical and functional variants[7–10] but rarely in the failed postoperative setting.[11,12] We present the results of DHA injection in a cohort of patients with residual VUR after ureteral reimplantation.

MATERIALS AND METHODS

We identified 21 patients (26 ureteral units) with persistent reflux after ureteral reimplantation who underwent endoscopic treatment for residual VUR in 2002 to 2008. With institutional review board approval we retrospectively reviewed data from patient charts on the initial diagnosis that prompted ureteral reimplantation, reimplantation technique, residual VUR grade, BBD, volume of DHA used and persistent VUR after injection.

All patients were screened for BBD signs, including urinary frequency and urgency, prolonged voiding intervals, daytime wetting, holding maneuvers and constipation. Patients with BBD were treated with medical and behavioral therapy as necessary before an attempted antireflux procedure.

The injection technique was tailored according to the site and anatomy of the orifice of the ureteral unit injected. Injection was performed transurethrally via a 10Fr pediatric cystoscope in all patients. When access to the ureteral orifice was difficult, as is the case after cross-trigonal reimplantation, guidewires and ureteral catheters were used to manipulate the orifice orientation and facilitate injection. A subureteral or intraureteral injection site was used according to ureteral orifice anatomy and surgeon preference.

Postoperatively patients were evaluated by renal and bladder ultrasound at 4 weeks, and by voiding cystourethrogram at 8 to 12 weeks. The chi-square test was used for statistical analysis with $p < 0.05$ considered statistically significant.

RESULTS

Mean patient age at injection was 7 years (range 2 to 13). Mean followup after injection was 2 years (range 10 to 46 months). Of the 17 patients with a single system ureteral reimplantation was extravesical in 9 and intravesical in 8. Reimplantation with excisional ureteral tapering was performed in 5 of those patients. Three patients underwent reimplantation of a duplicated system and 1 underwent it for a ureterocele. The mean interval between the failed open operative procedure and DHA injection was 37 months (range 6 to 156). Seven patients were diagnosed with BBD and treated with behavioral and medical therapy before DHA injection. Residual reflux grade before injection was 1 to 4 in 3 (11%), 17 (65%), 3 (11%) and 3 ureteral units (11%), respectively. Units with grade 1 reflux were only injected when there was bilateral residual VUR with higher grade VUR of the contralateral unit. Six patients had a symptomatic presentation with urinary tract infection after ureteral reimplantation. Mean DHA volume injected was 1.2 ml (range 0.7 to 3).

After 1 DHA injection procedure VUR resolved in 15 patients (71%) or 20 ureteral units (77%) and was down-graded to nondilating VUR in 25 units (96%). VUR resolved in 12 of 14 extravesically reimplanted units (86%) and in 8 of 12 intravesically reimplanted units (66%). The table lists success rates, and patient and ureteral unit characteristics. Gender, extravesical vs intravesical surgical technique, a duplicated system and BBD were not associated with procedure failure. Tapered reimplantation and an initial diagnosis other than primary VUR were statistically significant variables affecting endoscopic treatment

Patient characteristics and VUR resolution rate

	No. Resolved/Total No. (%)	p Value
Gender:		0.445
M	10/15 (66)	
F	5/6 (83)	
VUR grade:		
I	3/3 (100)	
II	14/17 (82)	
III	2/3 (66)	
IV	1/3 (33)	
System:		0.750
Single	18/22 (82)	
Duplicated	3/4 (75)	
Pre-reimplantation diagnosis:		0.029
Primary VUR	18/21 (86)	
Other ureteral abnormality	2/5 (40)	
Obstructed megaureter	1/3 (33)	
Ureterocele	0/1	
Ectopic ureter	1/1 (100)	
Implantation:		0.251
Extravesical	12/14 (86)	
Intravesical	8/12 (66)	
Cohen cross-trigonal	3/5 (60)	
Glenn-Anderson	3/5 (60)	
Politano-Leadbetter	2/2 (100)	
Tapered reimplantation:		0.029
No	18/21 (86)	
Yes	2/5 (60)	
BBD:		0.306
Yes	4/7 (57)	
No	11/14 (79)	