Salvage Ureteral Reimplantation After Failure of Dextranomer/Hyaluronic Acid Injection

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Purpose: Ureteroneocystostomy after dextranomer/hyaluronic acid injection is reportedly associated with significantly more morbidity, and increased operative time, length of stay and postoperative obstruction. To evaluate our experience, we reviewed results of patients who underwent salvage ureteral reimplantation following failed dextranomer/hyaluronic acid injection.

Materials and Methods: We retrospectively reviewed charts of patients at a single institution who underwent intravesical ureteral reimplantation as salvage treatment following failed dextranomer/hyaluronic acid injection. Data points such as operative time, blood loss and length of stay were compared to those of controls undergoing de novo reimplantation by the same surgeons. Statistical analysis was performed using Student's t test and chi-square test.

Results: We identified 18 patients who underwent salvage reimplant. We compared data to an equal number of controls. Mean age (4.28 years in patients vs 3.34 years in controls, $p = 0.62$) and mean reflux grade at reimplant (3.15 vs 3.40, $p = 0.97$) were comparable between the groups. Operative time (128 vs 141.9 minutes, $p = 0.14$), blood loss (12.9 vs 11.9 ml, $p = 0.71$) and length of hospital stay (1.68 vs 1.3 days, $p = 0.25$) were not significantly different. No statistically significant differences were found regarding any of the compared variables.

Conclusions: Ureteral reimplantation after dextranomer/hyaluronic acid injection is no more difficult than primary ureteral reimplantation regarding operative time, blood loss and length of hospital stay. These results support dextranomer/hyaluronic acid as initial operative treatment of vesicoureteral reflux when deemed appropriate and may further shift the paradigm of treatment away from prolonged medical management.

Key Words: deflux, dextranomer-hyaluronic acid copolymer, replantation, ureter, ureterostomy

Abbreviations and Acronyms

Dx/HA = dextranomer/hyaluronic acid

UTI = urinary tract infection

VUR = vesicoureteral reflux

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THE treatment of vesicoureteral reflux remains among the most controversial topics in pediatric urology. Treatment ranges from observation on or off antibiotics to open surgical correction and, most recently, endoscopic surgical correction. Open ureteral reimplantation has been the mainstay of surgical correction of reflux for many years. In 1986 endoscopic treatment of reflux was first reported by O'Donnell and Puri using injection of polytetrafluoroethylene.[1] This approach proved successful, although subsequent reports of substance migration in experimental animals and concerns regarding the carcinogenic potential of polytetrafluoroethylene prompted identification of new injectable substances.[2] A matrix of dextra-

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nomer microspheres in sodium hyaluronic acid solution (Deflux®) was introduced in 1994 as an injectable agent to treat vesicoureteral reflux.[3] Dextranomer/hyaluronic acid has since proved to be a safe and reliable endoscopic alternative to open surgery for treatment of reflux.

Some have suggested that intravesical ureteroneocystostomy after injection of dextranomer/hyaluronic acid is significantly more morbid, with increased need for distal ureteral resection, length of hospitalization and need for postoperative intervention.[4] Others have shown that reimplant success rates following endoscopic injection are similar and anecdotally reported that no difficulties have been noted in the salvage procedure.[5] At our institution salvage ureteral reimplantation following endoscopic treatment is not more difficult technically, and patients have a similar postoperative course to those undergoing primary ureteral reimplantation.

MATERIALS AND METHODS

We retrospectively reviewed the charts of 18 patients who underwent salvage open ureteral reimplantation at a single institution following 1 or more failed attempts to correct VUR with injection of dextranomer/hyaluronic acid. Patients were compared to an equal number of controls undergoing open ureteral reimplantation as initial treatment for VUR by the same surgeons during the same period. All patients undergoing reimplantation were identified based on billing codes, and controls were chosen before looking at the demographic information. Preoperative demographic data were obtained from both groups, including age, sex, reflux grade (in cases of bilateral VUR condition was categorized based on side with highest grade) and unilateral vs bilateral VUR. Objective data points such as operative time, blood loss and length of stay were collected for all patients and compared between the groups. We also compared need for postoperative intervention and procedural success rate. Success was defined as no evidence of VUR on followup imaging (voiding cystourethrogram).

The decision to undergo operative treatment in both groups was made by the attending surgeon and the family of the patient. Indications for surgery included recurrent UTI, presence of scarring on nuclear renal scan and desire to truncate antibiotic prophylaxis/followup imaging.

Reimplantation and endoscopic injection were performed at a single institution by 3 pediatric urologists between 2002 and 2008. For each patient the same surgeon performed endoscopic injection(s) and open reimplantation. The technique used Cohen cross-trigonal or Glenn-Anderson advancement in the open repair, decided at operation by the attending surgeon. Bilateral reimplants were performed in patients presenting with bilateral VUR but with only unilateral success after Dx/HA injection. These patients are believed to benefit from bilateral reimplant because the complication rate of reimplantation is minimal (especially in patients already undergoing reimplant on the contralateral side), and adding this step may obviate the need for another procedure/anesthesia in the future. Postoperative followup was also dictated by the attending physician and varied slightly between the 3 surgeons. Statistical analysis was performed using Student's t test and chi-square analysis.

RESULTS

The 18 study patients underwent reimplantation at our institution between November 2002 and June 2008. Followup ranged from 13 to 80 months (mean 38.22). The cohort consisted of 13 females (73.7%) and 5 males (26.3%) with a mean age at reimplantation of 4.3 years (range 11 months to 9 years). VUR was bilateral in 14 patients (73.4%). Mean preoperative reflux grade at presentation was 3.1. Patients underwent 1 (7 patients) or 2 (11) injections of dextranomer/hyaluronic acid before undergoing formal reimplantation, for a total of 29 endoscopic procedures. Endoscopic injection technique used was traditional subtrigonal injection (15 cases) or hydrodistention implantation technique (14). Mean amount of bulking material injected was 0.98 cc per refluxing segment. Time from final endoscopic injection to open surgical repair generally ranged from 5 to 11 months (mean 8), with 1 patient having a 20-month gap between treatments.

The control group was similar to the study group. Patients in the control group also consisted of 13 females and 5 males, and had a mean age of 3.3 years at treatment. VUR was bilateral in 12 patients (60%) and mean preoperative VUR grade was 3.4. There were no statistically significant differences in any of the preoperative characteristics of the 2 groups.

In the salvage reimplant group the technique used for open ureteral reimplantation was a Cohen cross-trigonal procedure in 10 patients and a Glenn-Anderson advancement procedure in 8. Controls underwent 15 Cohen procedures and 3 Glenn-Anderson procedures. Mean operative time was similar between the groups, at 128 minutes for salvage reimplant and 141 minutes for primary reimplant ($p = 0.14$). Blood loss was also similar, at 12.9 cc in the salvage group and 11.9 cc in the primary group ($p = 0.71$).

Intraoperative stent placement was performed at the discretion of the surgeon in all cases. Stents were placed in 2 patients (11.7%) in the salvage group. In 1 instance the stent was placed because the patient had previously undergone dismembered pyeloplasty on the ipsilateral side (not at the same setting). The other patient was stented secondary to ureteral tortuosity at reimplantation. A stent was placed in 1 patient in the primary reimplant group. While the numbers of each subgroup are small, there were no differences noted within the salvage