

Secondary surgery for vesicoureteral reflux after failed endoscopic injection: Comparison to primary surgery

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Purpose: As endoscopic treatment for vesicoureteral reflux (VUR) has increased, secondary ureteral reimplantation (UR) after failure of endoscopic treatment has increased. We studied the clinical feature and efficacy of secondary UR after failure of endoscopic treatment compared with primary UR.

Materials and Methods: Eighty-one children who had UR for VUR were enrolled. Charts were reviewed retrospectively for age, sex, grade of VUR before surgery, operative time, hospitalization period, postoperative complication, and success rate. Primary UR (group A, n=64) was compared with secondary UR after failed endoscopic treatment (group B, n=17). In group B, telephone survey for the satisfaction of endoscopic treatment and surgery was done.

Results: Mean age of each group was 49.6 ± 37.1 and 56.6 ± 22.5 months ($p=0.236$). There was no significant difference between each group in sex, mean operative time, postoperative transfusion, complication rate, and success rate. As telephone survey in group B, eleven responders preferred endoscopic treatment as primary treatment of VUR because it was a simple method and no hospitalization.

Conclusions: Secondary UR after failure of endoscopic treatment was similar to primary UR. Parents preferred endoscopic treatment as first line treatment for VUR in spite of the need for secondary UR after failure of endoscopic treatment.

Keywords: Replantation; Ureter; Vesicoureteral reflux

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INTRODUCTION

Vesicoureteral reflux (VUR) occurs commonly in children, resulting in potentially serious complications [1]. About 30% of those with a urinary tract infection also have VUR [2]. This could result in renal scarring, hypertension, and even end-stage renal failure [3-5]. Therefore, appropriate treatment of VUR is important to prevent

these complications. Treatment options for children with VUR include continuous antibiotic prophylaxis, endoscopic injections, and laparoscopic or open ureteroneocystostomy. Since Hutch [6] introduced open ureteral reimplantation to correct VUR in 1952, many such techniques have been developed [7]. In 1984, endoscopic injections of tissue-augmenting material for the correction of VUR were introduced; since then, many urologists prefer this procedure

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[1]. Endoscopic injection is frequently used now as a first-line treatment because it involves less pain and a shorter hospitalization period and leaves no scar, in contrast to open reimplantation. It also has a relatively high success rate of 51%–79% [7,8]. However, when an injection treatment fails, open ureteral reimplantation should be considered for treating persistent VUR [9]. We aimed to test the usefulness of open reimplantations, which were performed primarily and after failed endoscopic injection procedures. We also surveyed parental preferences for treatment options, comparing the two procedures.

MATERIALS AND METHODS

We analyzed the records of 81 children who underwent open reimplantation surgery over about 10 years. Among them, 64 underwent open reimplantation as a primary procedure (group A), and 17 underwent it after failed endoscopic injection (group B). We retrospectively analyzed the clinical data of both groups, including age, sex, preoperative reflux grade, operation time, laterality of surgery, postoperative complications, and hospitalization period.

All patients were classed in terms of preoperative reflux grade using voiding cystourethrography (VCUG). Reflux grade was classed as grades I–V according to the International Classification System of the International Reflux Study Committee. We classified patients with reflux grades I–III as a low-grade reflux group, and patients with grades IV and V as a high-grade reflux group. We then compared the results between the 2 groups.

Success of surgery was defined as resolution of the VUR as determined by VCUG 6 months after surgery. In addition, we conducted a telephone-based survey of the parents of group B about their preference for endoscopic injection or open reimplantation, and the reasons for their preference; we asked the parents “Which surgery do you choose primarily between endoscopic injection again and ureteral reimplantation if your child have to undergo surgery for vesicoureteral reflux again? And what is the reason?”.

Statistical analysis was performed using IBM SPSS Statistics ver. 20.0 (IBM Co., Armonk, NY, USA). Student *t*-tests and Chi-square tests were applied to compare the parameters of each group; *p*-values <0.05 were considered statistically significant.

RESULTS

The mean ages of groups A and B were 49.6±37.1 months

and 56.5±22.5 months, respectively. The male-to-female ratios of groups A and B were 43:21 and 12:5, respectively. There were no statistically significant differences in age or sex distribution between the 2 groups (*p*=0.236 and *p*=0.312, respectively).

The low-grade reflux rates in groups A and B were 12 (18.8%, grade II were 2 [3.2%] and grade III were 10 [15.6%]) and 8 (47.1%, grade II were 3 [17.7%] and grade III were 5 [29.4%]), respectively, and the high-grade reflux rates were 52 (81.2%, grade IV were 34 [53.1%] and grade V were 18 [28.1%]) and 9 (52.9%, grade IV were 7 [41.3%] and grade V were 2 [22.2%]), respectively. There was no patient with grade I reflux in both groups. Patients with high-grade reflux were significantly more common in group A than B (*p*=0.022).

At 6 months after endoscopic surgery in group B, the numbers of patients with low- and high-grade reflux were 10 (58.8%, grade II were 5 [29.4%] and grade III were 5 [29.4%]) and seven (41.2%, grade IV were 6 [35.3%] and grade V were 1 [5.9%]), respectively. There was no significant change in the numbers before and after primary endoscopic surgery in group B (*p*=0.738). However, group A still had more patients with high-grade reflux after endoscopic surgery than did group B (*p*=0.020).

The operation times for unilateral cases in groups A and B were 167±36 minutes and 155±18 minutes, respectively. Those for bilateral cases in groups A and B were 215±33 minutes and 216±23 minutes, respectively. There were no significant differences between the two groups (*p*=0.080). The mean hospitalization periods for groups A and B were 10.4±5 days and 8.8±2 days, respectively. Again, there was no significant difference (*p*=0.446) (Table 1).

There were no serious postoperative complications except that bleeding occurred in both groups. In groups A and B, 7 (11.0%) and 2 patients (11.9%), respectively, needed postoperative blood transfusions because of anemia. However, this difference was not statistically significant (*p*=0.107). At 6 months after surgery, resolution of VUR was found in all patients who underwent VCUG.

In the survey of the parents of children in group B, all responded. Eleven parents (64.7%) answered that they would choose endoscopic injection first in the same situation. The reasons included the convenience of endoscopic treatment, that there was no need for hospitalization, that it involved less pain than open surgery, and that it avoided the discomfort from urethral catheterization after open surgery. However, 6 parents (35.3%) answered that they would prefer open surgery. The main reason was that they did not want their children to have multiple procedures and anesthesia. Among the eleven parents who chose primary endoscopic

Table 1. Clinical characteristics between groups A and B

Characteristic	Group A (n=64)	Group B (n=17)	p-value
Age (mo)	49.6±37.1	56.5±22.5	0.236
Sex			0.312
Male	43 (67.2)	12 (70.6)	
Female	21 (32.8)	5 (29.4)	
Reflux grade			0.022
Low grade	12 (18.8)	8 (47.1)	
I	0 (0)	0 (0)	
II	2 (3.2)	3 (17.7)	
III	10 (15.6)	5 (29.4)	
High grade	52 (81.2)	9 (52.9)	
IV	34 (53.1)	7 (41.3)	
V	18 (28.1)	2 (22.2)	
Reflux grade after primary endoscopic surgery in group B			0.020
Low grade	12 (18.8)	10 (58.8)	
I	-	0 (0)	
II	-	5 (29.4)	
III	-	5 (29.4)	
High grade	52 (81.2)	7 (41.2)	
IV	-	6 (35.3)	
V	-	1 (5.9)	
Operation time (min)			0.080
Unilateral	167±36	155±18	
Bilateral	215±33	216±23	
Hospitalization period (d)	10.4±5	8.8±2	0.446

Values are presented as mean±standard deviation or number (%).

Group A, open reimplantation as a primary procedure; group B, open reimplantation after failed endoscopic injection.

Table 2. Survey result of group B parents' preference of primary surgery

	Endoscopic injection	Open UR	p-value
No. of patients (%)	11 (64.7)	6 (35.3)	0.064
VUR grade			
Low	7	1	
High	4	5	

UR, ureteral reimplantation; VUR, vesicoureteral reflux.

surgery, 7 of their children had low-grade reflux, and 4 had high-grade reflux. Among the 6 parents who chose primary open surgery, one of them had a child with low-grade reflux, and 5 had a child with high-grade reflux. Parents of children with low-grade reflux preferred endoscopic surgery; however, there was no statistically significant difference ($p=0.064$) (Table 2).

DISCUSSION

Selecting the treatment option for different grades of VUR reflux depends on the clinical presentation and renal function. However, minimally invasive treatments

such as endoscopic injection have advantages over open surgery, including less postoperative pain and fewer bladder spasms and infections, and the absence of surgical scarring. Furthermore, this procedure can be performed in a short operation time, in an outpatient setting, and with minimal use of postoperative analgesics. Therefore, endoscopic treatments have been preferred as the first-line treatment for children with VUR [10-13].

In a meta-analysis, Elder et al. [8] showed that after one injection the reflux resolution rate was 78.5% for grades I and II reflux, 73% for grade III, 63% for grade IV, and 51% for grade V [14]. The American Urological Association (AUA) Vesicoureteral Reflux Guideline Update Committee

analyzed data from 17,972 patients, and reported that the overall success rate of a single endoscopic treatment was 83.0% [15].

As seen above, endoscopic treatment of children with VUR had many advantages and a high success rate, but there were also many failures, especially in the children with more severe reflux. When the first endoscopic treatment fails, endoscopic treatment needs to be repeated or reimplantation surgery is indicated.

In this study, we analyzed the characteristics of our patients who underwent open reimplantation surgery. Patients who underwent reimplantation as a primary treatment did not differ from those who underwent it after endoscopic injection in terms of age, sex, operation time, hospitalization period, or postoperative complications. However, patients with high-grade reflux tended to have primary reimplantation surgery. All the cases of VUR were resolved in our series.

It is generally assumed that a secondary operation after failed a primary procedure is more difficult and has more complications. In open reimplantation for VUR after failed endoscopic surgery, we also supposed that it may show less success rate, more operation time, more complications, and more hospitalization periods because of ureteral adhesion or inflammation due to primary injection or because each patient had more severe VUR.

However, as in our findings, several studies have reported that previous endoscopic treatment does not have an adverse effect on the success of subsequent open reimplantation. In many studies, open reimplantation for VUR showed much higher success rates than endoscopic treatment for all grades of reflux. In the AUA guidelines, the success rate for open surgical procedures was 98.1% [15]. Chertin et al. [1] reported the success rate of open reimplantation following failed Deflux injections to be 100%. A similar study by Moreira-Pinto et al. [16] reported a success rate of 98%. Sencan et al. [17] showed that previous endoscopic injections could cause difficulties in dissection of the ureter because of fibrosis; however, they did not alter the success rate or complications following open surgery.

We also surveyed parental preferences for endoscopic treatment or open surgery. More parents preferred endoscopic treatment, for its advantages over surgery. Parental preference has a major role in the selection of endoscopic treatment compared with long-term antibiotic treatment. In a survey, 80% of parents preferred endoscopic treatment rather than antibiotic prophylaxis or open surgery when given the option of any of the three treatment modalities [14].

This study has a limitation of small cases of secondary ureteral reimplantation group. This is due to the failed cases of endoscopic injection is very small, because of high success rate of endoscopic injection. These patients were received endoscopic injection again or ureteral reimplantation to treat VUR after failed endoscopic injection according to patients conditions and parents demand. Therefore, the number of patients underwent ureteral reimplantation was very little, and this study was not analyzed by patient matched-analysis.

In addition, the follow-up duration after surgery was not long, and several patients did not undergo a follow-up VCUG. Accordingly, further studies with more patients and a longer follow-up duration are needed.

However, it is meaningful that this study showed open reimplantation can be applied effectively for failed endoscopic surgery. In addition, even a parent whose child experienced failed endoscopic injection prefer endoscopic injection as primary treatment for VUR.

CONCLUSIONS

Patients with high-grade VUR tended to have open ureteral reimplantation as their primary surgery rather than endoscopic injections. However, there were no significant differences in operation time, postoperative complications, hospitalization period, or surgical success rates between open ureteral reimplantation surgery after failed endoscopic injection for VUR and primary open reimplantation. We conclude that open reimplantation can be conducted safely and effectively after failed endoscopic treatment. In addition, parents prefer endoscopic injection as the first-line treatment option for their children with VUR because of its convenience and reduced postoperative discomfort.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

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