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The incidence of urinary tract infection after open anti-reflux surgery for primary vesicoureteral reflux: Early and long-term follow up

Jin Soon Yeoh [a,b], Saul P. Greenfield [a,b,*], Adefris Y. Adal [a,b], Pierre Williot [a,b]

[a] *Department of Pediatric Urology, Women & Children's Hospital of Buffalo, USA*
[b] *Department of Urology, State University of New York at Buffalo School of Medicine & Biomedical Sciences, USA*

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Abstract *Objectives:* Controversy exists regarding the benefit of open anti-reflux surgery (OS) in reducing the incidence of urinary tract infection (UTI). We, therefore, reviewed our short and long term data in children who have undergone OS.
Methods: 153 children (131F, 22M; ages 2—16 yrs, mean 8 yrs) underwent OS from 1990 to 2008. Reasons for presentation were UTI-131; sibling survey-19; prenatal hydronephrosis-3. Major reasons for OS were: breakthrough UTI-74 (48%), high grade (IV or V)-49 (32%), poor compliance with prophylaxis-15 (10%). Of 153 pre-operative DMSA scans, 60 (39%) had defects. Post-operative studies were performed 6 months after surgery and 151 (99%) had negative voiding cystourethrograms (VCUG's). All underwent urine cultures 6 months post-op and prophylaxis was stopped. 56 (37%) were later contacted at an average 7 yrs post-op (range: 2—13 yrs).
Results: 23 (15% of 153 followed short term, 40% of 56 followed long term)—20F, 3M—had non-febrile UTI's (nfUTI's) and one girl (0.6%) had a febrile UTI (fUTI). Of those who had nfUTI's 7 (30%) had high grade reflux and 16 (70%) had pre-op breakthrough UTI's. 11 (48%) had DMSA scans with defects. 2 had UTI's within 1 year after a negative VCUG and 21 had UTI's later (1—8 yrs). 1 girl had a fUTI 1 month after a negative VCUG.

Abbreviations: DHA, dextranomer/hyaluronic acid; DMSA, dimercaptosuccinic acid; fUTI, febrile urinary tract infection; nfUTI, non-febrile urinary tract infection; OS, open anti-reflux surgery; USG, ultrasound; VCUG, voiding cystourethrogram; VUR, vesicoureteral reflux.

* Corresponding author. Department of Pediatric Urology, Women & Children's Hospital of Buffalo, 219 Bryant Street, Buffalo, NY 14222, USA. Tel.: +1 716 878 7393; fax: +1 716 878 7096.
E-mail address: spg@buffalo.edu (S.P. Greenfield).

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Conclusions: Successful OS effectively eliminates fUTI. Families should be counseled that nfUTI may occur many years after surgery, especially in girls with a history of breakthrough UTI and renal scarring.

Introduction

Vesicoureteral reflux (VUR) is the most common urologic anomaly in children occurring in roughly 1% of the general population [1]. VUR is a risk factor for recurrent febrile and non-febrile urinary tract infections (UTI) along with pyelonephritis. The management goals for children with VUR are to prevent reflux-associated UTI and to minimize the risk of renal scarring secondary to pyelonephritis.

VUR can be managed non-operatively with long term continuous antibiotic prophylaxis until its resolution due to somatic growth. Resolution rates, however, decrease with increasing reflux grade [2]. In addition, this approach requires strict compliance with antibiotic prophylaxis, meticulous follow-up with serial radiographic studies, and risks selection for antibiotic resistance [3,4]. Recently, observation without prophylaxis for some children has also been proposed [5]. Alternatively, surgery is an option especially in the setting of breakthrough UTI, non-compliance with antibiotic prophylaxis, or high-grade (IV, V) reflux that has little likelihood of resolution over time. Surgical methods include open anti-reflux surgery and endoscopic subureteric injection of bulking material. Open anti-reflux surgery has been the gold standard as it affords 95—98% success with a low complication rate [6,7]. However, since the introduction of dextranomer/hyaluronic acid (DHA) subureteric injection, an increasing number of pediatric urologists are now adopting the less invasive method for the management of VUR [8]. Recent studies suggest a short-term success rate of 68—92% [9—12].

Recently published series, however, have documented up to a 27% incidence of post-DHA injection pyelonephritis in association with recurrent reflux [13,14]. In addition, these series have shown that up to 13% of children have experienced non-febrile UTI after DHA injections that were initially successful [15]. Similarly, published series of open anti-reflux surgery have revealed an incidence of post-operative non-febrile UTI ranging from 2 to 43% and an incidence of febrile UTI's ranging from 4.8 to 24% [16—22]. The majority of these patients, however, do not have recurrent reflux. It has been our impression that after open anti-reflux surgery both febrile and non-febrile UTI's were relatively rare. The purpose of this study, therefore, was to retrospectively review the data on all children who underwent open VUR for the past 18 years at our institution.

Materials and methods

Institutional review board approval was obtained for a retrospective study of all children who underwent ureteroneocystostomy for primary VUR by three surgeons from January 1990 to December 2008. The charts of 164 patients were evaluated and 153 met all criteria — 131 girls and 22 boys. The circumcision status was not noted, but most boys in the United States are circumcised. Eleven patients were excluded either because they did not have pre-operative DMSA renal scans or were lost to follow up entirely. VUR was diagnosed by fluoroscopic contrast voiding cystourethrogram (VCUG). Bladder/bowel dysfunction was not prospectively evaluated. Indications for surgery included persistent high grade VUR (grades IV and V), breakthrough UTI, and poor compliance with medications. Intravesical and extravesical methods were employed in 123 patients (81%) and 30 patients (19%) respectively. All subjects underwent dimercaptosuccinic acid (DMSA) radionuclide scans pre-operatively. Patient demographics, including gender, mode of presentation, pre-operative grade of VUR, presence of nephropathy as seen on scan, were tabulated.

The post-operative protocol for follow-up included renal ultrasound (USG) and contrast VCUG at 6 months. If patients were found to have a negative VCUG and USG studies, antibiotic prophylaxis was discontinued. They then returned for follow-up urine culture 6 months after discontinuing antibiotics. We had short-term 6 month data on all 153 patients. Questionnaires were then sent to all 153 families (see sample questionnaire) and long-term follow-up was available in 56 (37%) who responded. The average follow-up was 7 years (time range 2—13 years) from the discontinuation of prophylaxis in these 56 patients (Fig. 1). A UTI was defined in the short term group as greater than 100,000 colonies of a single organism grown in culture.

The presenting clinical characteristics of all 153 patients are summarized in Table 1A and those with longer follow-up in Table 1B. The major reasons for presentation were UTI in 131 (86%) patients, sibling survey in 19 (12%) patients, and prenatal hydronephrosis in 3 (2%) patients. The reasons that the patients were selected for surgery included breakthrough UTI's (74 patients, 48%), high-grade reflux encountered on VCUG (49 patients, 32%) and poor compliance with prophylactic medications (15 patients, 10%). Pre-operative nephropathy was evident in 60 (39%) patients on

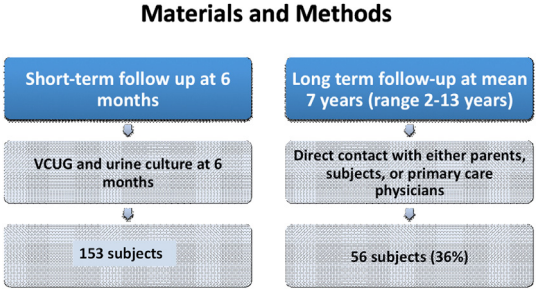

Figure 1 Materials and methods.