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# Intraoperative cystography pre- and post-endoscopic treatment for vesicoureteral reflux: Guaranteed success?

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## KEYWORDS

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treatment;  
Success rate;  
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**Abstract** *Objective:* This study was designed to investigate whether post-endoscopic treatment (ET) intraoperative cystography is predictive of treatment outcome.

*Patients and methods:* Patients diagnosed with vesicoureteral reflux (VUR) and treated endoscopically with polyacrylate/polyalcohol copolymer or dextranomer hyaluronic acid were studied prospectively between August 2009 and April 2011. Slow infusion pre-ET cystography was performed under anesthesia. Post-ET cystography was performed only if the intraoperative pre-ET results demonstrated VUR.

*Results:* Over a period of 20 months, 23 patients were studied (18 girls, five boys), with an average age of 41.9 months (range 13 months–11 years). Thirty-two renal units with reflux were treated: nine bilateral cases, seven right, and seven left. The distribution of reflux grades was as follows: two grade I, 10 grade II, 11 grade III, nine grade IV. All injected ureters demonstrated grade 0 hydrodistention after the procedure. Twelve of 23 of the pre-ET cystography results were negative for VUR, indicating that the sensitivity of this test is 47% compared with the preoperative voiding cystourethrography (VCUG) or nuclear cystogram. There were no procedure complications.

*Conclusion:* Of all patients ( $n = 23$ ), nearly 60% did not demonstrate pre-ET VUR on intraoperative cystography. If a postoperative VCUG had been performed on all patients, more than half would have received unnecessary radiation. Therefore, this study demonstrates that post-ET cystography does not predict the success of ET of VUR intraoperative. Pre-ET cystography under general anesthesia before ureteral injection, has very low sensitivity, creating false-

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negatives that may complicate the interpretation of post-ET cystography. We suggest that intraoperative cystography before and after ET fails to show clinical utility and should not be used to predict the outcome of endoscopic VUR treatment.

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## Introduction

Vesicoureteral reflux (VUR) is a common urologic pathology, with an estimated incidence of 1% in the general pediatric population. The risk of the disease is frequent pyelonephritis, which may lead to renal scarring and, in more severe cases, nephropathy and reduced renal function [1,2].

Voiding cystourethrography (VCUG) is the gold standard for diagnosing and classifying VUR [2]; however, it is an invasive and uncomfortable procedure for the child, and also exposes the patient to a relatively high dose radiation—one VCUG is the equivalent of 60–100 chest X-rays [3].

Endoscopic treatment (ET) of VUR was initially described in 1981, and gained popularity at the turn of this century [1,2,4]. There are various endoscopic techniques based on submucosal injection of synthetic agents into the bladder at the level of the ureteral orifice [1,5,6]. The effectiveness reported for ET is as high as 75–80%, varying with the grade of reflux. The ureteral re-implantation technique, while a more invasive approach, has an effectiveness of 95% [7].

In an attempt to gauge the success of the endoscopic procedure, there is a trend toward using cystography immediately after ET under general anesthesia, with the goal of avoiding postoperative VCUG and the inherent discomfort for children and their parents. Some studies have proposed the use of intraoperative cystography to test for contralateral VUR in patients with unilateral VUR, and when endoscopic injection is used to confirm the success of the procedure. However, the utility of this approach has not been demonstrated, and the procedure outcomes should preferably be measured by the clinical outcomes, rather than invasive techniques [7–10].

The aim of this study was to determine the effectiveness of intraoperative cystography in diagnosing VUR and to correlate the findings with the preoperative VCUG to establish its potential effectiveness in predicting a successful injection.

## Materials and methods

A prospective study was carried out from August 2009 to April 2011, and included all patients attended by the urology team at Exequiel González Cortés Hospital who met the inclusion criteria of VUR with an indication for ET. A VCUG or isotopic cystography had been done within the previous 6 months (Fig. 1).

Informed consent was obtained from the parents of the children included. Patients were anesthetized, and placed in the lithotomy position. A cystogram was done before ET (pre-ET) using slow infusion (approximately 50 mL/min) of

0.9% saline solution with a 25% dilution of hypaque at a volume of about 10.0% greater than the calculated bladder capacity determined by the Koff or Hjalms formula [11,12]. All renal units with VUR in the VCUG or isotopic cystography done up to 6 months earlier were treated in this way.

The results were evaluated to assess for the presence of VUR. ET with polyacrylate/polyalcohol copolymer or dextranomer hyaluronic acid was then performed until achievement of H0 hydrodistention of the ureteral meatus using STING or the double HIT technique, according to the surgeon's preference [5]. If the cystogram demonstrated VUR before treatment, a cystogram was performed after injection of the ET (post-ET), in order to assess for the success of the injection. The bulking agent used was chosen according to its availability in our center.

## Results

Over a period of 20 months, 23 patients met the inclusion criteria: 18 girls and five boys, with an average age of 42.9 months (range 13.0 months–11.0 years). Thirty-two renal units demonstrating reflux were treated with endoscopic injection: nine bilateral, seven right, and seven left. Reflux grade distribution was as follows: two grade I, 10 grade II, 11 grade III, nine grade IV (Table 1).

The mean bulking agent injection volume was 0.8 cc per renal unit (range 0.4–1.8 cc; polyacrylate/polyalcohol copolymer or dextranomer hyaluronic acid), and all patients demonstrated grade 0 hydrodistention after the procedure [5]. Twelve of 23 patients failed to demonstrate VUR on the intraoperative pre-ET cystogram (Fig. 2), indicating that the sensitivity of this test, which measures the proportion of actual positives that are correctly identified as such, is only 47% (Fig. 3). Eleven patients in the study with positive cystogram pre-ET had a negative cystogram post-ET. There were no procedure complications.

### INCLUSION CRITERIA

1. Age > 6 months
2. Grade II–IV VRU or less if bilateralism.
3. VUR diagnosis with VCUG or isotopic cystography in the last 6 months.
4. Excluded or treated voiding dysfunction.
5. Parent approval.
6. Discussed in weekly preoperative case meeting.

### EXCLUSION CRITERIA

1. Grade V VRU
2. Paraureteral diverticulum > 5 mm
3. Obstructive refluxing megaureter

**Figure 1** Vesicoureteral reflux (VUR) endoscopic treatment protocol.

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