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Lower urinary tract dysfunction in children after intravesical ureteric reimplantation surgery under one year of age

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Abstract *Objective:* To report the results of a study conducted on voiding function in children who have undergone intravesical trans-trigonal Cohen ureteric reimplantation surgery before the age of one year.

Subjects: Twenty-eight children (18 males, 10 females) had surgery at a mean age of 4.9 months (range 8–352 days).

Methods: Bladder function was assessed at a mean age of 7.3 years using questionnaires, the dysfunctional voiding scoring system, PinQ quality of life tool, uroflowmetry and post-void residuals.

Results: Of the total children, 72% had normal lower urinary tract (LUT) function. Eight children (28%) had evidence of LUT dysfunction, two had urge incontinence, two had giggle incontinence, two had voiding postponement, one had dysfunctional elimination syndrome and one had evidence of dysfunctional voiding. Five of the eight children were managed with continence physiotherapy (urotherapy) and one required ongoing anticholinergic therapy.

Conclusion: When compared to the published rates of LUT dysfunction in the general paediatric community, no evidence was found to suggest an increased incidence of bladder dysfunction in children undergoing intravesical Cohen ureteric reimplantation surgery under one year of age.

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Introduction

The aim of this paper was to investigate for any evidence of an increased risk of lower urinary tract (LUT) dysfunction in

children who had previously had intravesical Cohen ureteric reimplantation surgery at less than one year of age.

Only three studies had previously investigated LUT dysfunction after early bladder surgery, which suggested

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that there was no evidence for an increased risk of LUT dysfunction after ureteric reimplantation in infancy [1–3]. These previously published studies included children who had various surgical techniques used for intravesical and extravesical ureteric reimplantation; one study had included a significant number of children with PUV [2]. The present study specifically evaluated the intravesical Cohen ureteric reimplantation technique; infants with known neurogenic bladder or bladder outflow obstruction were excluded. Based on the data from the previously published studies, it was hypothesised that there would be no increased risk of LUT dysfunction in the patient cohort.

Ureteric reimplantation surgery in this group of children was performed for: high-grade VUR, VUR associated with febrile UTI, primary obstructed megaureter (POM) and after excision of ureterocele associated with duplex or single systems. The present study did not seek to add to the debate about the indications and timing for ureteric reimplantation surgery for VUR, POM or ureterocele, or to compare outcomes of early ureteric reimplantation surgery versus ureteric reimplantation surgery performed later in life. It aimed to establish whether ureteric reimplantation could be performed safely in infants less than one year of age, if clinically indicated, without evidence of an increased risk of LUT dysfunction.

Surgery on the infant bladder has traditionally been avoided due to concerns about perioperative surgical and anaesthetic risks in the small infant. However, the apprehension related to infantile surgery has largely dissipated with modern anaesthetic and surgical techniques and equipment. There is a concern about potential neurological damage, or bladder and urethral dysfunction, from trigonal and periureteral dissection. There is still some uncertainty about possible long-term LUT dysfunction after infantile reimplantation surgery, although this has been considered to be low. The present study is thought to be the first in the published literature to specifically evaluate bladder function after toilet training in children who have undergone intravesical trans-trigonal Cohen reimplantation under the age of one year.

Methods

Approval was granted by the Perth Princess Margaret Hospital for Children ethics committee prior to study commencement. All children who had undergone ureteric reimplantation surgery from 2000 to 2009 were identified from the operating theatre database and specialist rooms. At the time that the surgery was performed, it was the practice of the unit to offer ureteric reimplantation surgery less than one year of age to all infants with:

- High-grade VUR (Grade IV and V), whether or not the infant had suffered from febrile UTIs. High-grade VUR has the lowest rate of spontaneous resolution and the highest risk of febrile UTI and renal scarring [4,5].
- POM with split renal function < 40%, febrile UTI or progressive hydronephrosis.
- Ureterocele – excision with ureteric reimplantation (\pm heminephrectomy).

Seventy-two children had ureteric reimplantation surgery before one year of age. Their medical records were examined and 27 were excluded from the study for the following reasons: not toilet trained (6), intellectual impairment (1) and remote or rural location (20). For the remaining eligible 45 children, parents or guardians were contacted by telephone and invited to participate in the study. Seventeen were uncontactable, declined to participate or failed to attend a scheduled appointment. Twenty-eight children were thus recruited into this study: there were 18 males and 10 females. The mean age at surgery was 4.9 months (range 8–352 days).

The 28 children who enrolled were a fair representation of the eligible group of 72. The indications for surgery were similar for children who were not enrolled ($n = 44$), either because of exclusion criteria ($n = 27$) or refusal to participate or non-attendance ($n = 17$), as shown in Table 1. Overall post-surgical outcomes were favourable, and similar between the study group and group not enrolled.

All children had intravesical trans-trigonal (Cohen) reimplantation: 14 infants had bilateral ureteric reimplantation and 14 had unilateral ureteric reimplantation. None of the children had VUR or vesicoureteric obstruction secondary to conditions such as neurogenic bladder or PUV. The ureteric reimplantation surgery done at eight days old was for POM, with severe hydronephrosis in a solitary kidney.

The mean age at assessment of bladder function was 7.3 years (range 2.9–11.9 years). Children attended one appointment, and were assessed by a paediatric urologist and a continence physiotherapist. The assessment consisted of: a screening questionnaire, which addressed

Table 1 Indications for ureteric reimplantation.

	Enrolled group ($n = 28$)	Eligible but not enrolled ($n = 44$)	<i>P</i> -value
Mean age at surgery (range) in days	149 (8–352)	178 (7–294)	0.23
Male:female	18:10	25:19	0.53
Indications for ureteric reimplantation under age 1:			
Bilateral Gr IV – V VUR	2	10	0.08
Unilateral Gr IV – V VUR with contralateral lower grade VUR	7	15	0.41
Unilateral Gr IV – V VUR	8	9	0.43
Gr IV – V VUR in solitary functioning kidney	3	–	–
Bilateral POM	1	–	–
Unilateral POM	2	9	0.13
POM in solitary kidney	1	1	0.74
Ureterocele in duplex systems	3	–	–
Ureterocele in single systems	1	–	–

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