Nephrectomy and upper pole heminephrectomy for poorly functioning kidney: Is total ureterectomy necessary?

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ABSTRACT

Objective: We analyzed our experience with nephrectomy and upper pole heminephrectomy combined with subtotal ureterectomy to determine the incidence of the problems associated with the distal ureteral stump.

Materials and Methods: The records of 48 children who underwent nephrectomy or upper pole heminephrectomy with subtotal ureterectomy for a poorly functioning kidney were reviewed.

Results: No patient who underwent nephrectomy for a poorly functioning single-system kidney required secondary surgery. No secondary surgery was required in any patient who underwent upper pole heminephrectomy for ectopic ureter, while secondary surgery was required in five of 17 patients (29%) who underwent upper pole heminephrectomy for ectopic ureterocele. All five patients presented with recurrent febrile urinary tract infection after upper pole heminephrectomy. They also had reflux into the ipsilateral lower moiety, contralateral kidney, or distal ureteral stump. Our results and data from other reports suggest that recurrent urinary tract infections after upper pole heminephrectomy were treatment outcomes based on the initial surgical approach to ectopic ureterocele rather than isolated problems associated with the distal ureteral stump.

Conclusion: We consider that total ureterectomy is unnecessary at the time of nephrectomy or heminephrectomy for a poorly functioning kidney because the distal ureteral stump rarely causes a problem.

Key words: Heminephrectomy, nephrectomy, ureteral stump

INTRODUCTION

One method of managing a poorly functioning kidney is nephrectomy or heminephrectomy in the case of a single or duplex system, respectively. However, there has been much debate about the natural history of the distal ureteral stump after nephrectomy and heminephrectomy. Proponents of total ureterectomy argue that complete excision of the ureter minimizes the risk of future problems associated with the distal ureteral stump, including febrile urinary tract infection (UTI), lower quadrant pain, and hematuria.[1] On the other hand, several authors consider that total ureterectomy is unnecessary because the distal ureteral stump rarely causes a problem.[2-6]

We reviewed our experience with nephrectomy and upper pole heminephrectomy combined with subtotal ureterectomy to determine the incidence of the problems associated with a distal ureteral stump.

MATERIALS AND METHODS

We reviewed the records of 48 children who underwent nephrectomy or upper pole heminephrectomy with subtotal ureterectomy for a poorly functioning kidney at Kobe Children’s Hospital from January 1982 to March 2009. The appropriate Institutional Review Board approval was obtained. We analyzed sex, affected side, age at surgery, background disorder, and treatment outcome. Seven patients who underwent nephrectomy for a poorly functioning kidney associated with ureteropelvic junction obstruction were excluded. Nephrectomy or upper pole heminephrectomy was performed through a flank incision.
Through the same incision, the corresponding ureter was taken down as low as possible and transfixed after aspirating the urine in the distal ureter.

RESULTS

A total of six male and 14 female patients underwent nephrectomy for a poorly functioning single-system kidney, while a total of one male and 20 female patients underwent heminephrectomy for a poorly functioning upper moiety of a duplex-system kidney. Nephrectomy was performed on the right side in eight patients and on the left side in 12 patients. Upper pole heminephrectomy was performed on the right side in 11 patients, on the left side in nine patients, and on both sides in one patient. The mean age at surgery was 33 months (range 1 month to 123 years). The mean and median follow-up period was 72 months and 52 months, respectively (range 3 months to 17.4 years). Of the 20 patients with a poorly functioning single-system kidney, five had vesicoureteral reflux (VUR), one had ureterovesical junction obstruction and 14 had ectopic ureter. In two of the five patients, VUR was associated with ipsilateral dysplastic kidney and posterior urethral valve, the so-called “VURD syndrome”.[2] Of the 21 patients with a poorly functioning upper moiety of a duplex-system kidney, four had ectopic ureter and 17 had ectopic ureterocele.

No patient who underwent nephrectomy for a poorly functioning single-system kidney required secondary surgery. No secondary surgery was required in any patient who underwent upper pole heminephrectomy for ectopic ureter, while it was required in five of 17 patients (29%) who underwent upper pole heminephrectomy for ectopic ureterocele. That showed 37 distal ureteral stumps were in situ in all patients.

All of the five patients presented with recurrent febrile UTI after upper pole heminephrectomy. The characteristics of the five patients are shown in Table 1. Of the four patients with unilateral ectopic ureterocele, two had reflux into the ipsilateral lower moiety, one had reflux into the distal ureteral stump and 14 had ectopic ureterocele. In the remaining patient with bilateral ectopic ureterocele, reflux into the ipsilateral lower moiety, distal ureteral stump and

| Pt. No. | Age at hemiNx | Sex | Background disorder | Surgery before hemiNx | Symptoms | VUR | Time to additional surgery | Secondary surgery Other than DUS removal |
|---------|----------------|-----|---------------------|-----------------------|----------|-----|---------------------------|-----------------------------------------|
| 1       | 1 mos          | F   | Rt. ectopic ureterocele | -                     | f-UTI   | Rt. lower moiety | 6 mos | Rt. UCN (lower moiety) | Rt. ureterocele marsupialization          |
|         |                |     | Rt. duplex system     |                       |          | Rt. DUS          |       |                         |                                          |
| 2       | 2 mos          | F   | Bil. ectopic ureterocele | Bil. TUI-cele         | f-UTI   | Rt. lower moiety | 6 mos | Rt. UCN (lower moiety) | Lt. UCN (en bloc)                         |
|         |                |     | Bil. duplex system    |                       |          | Rt. DUS          |       |                         | Bil. ureterocele marsupialization         |
| 3       | 4 mos          | F   | Lt. ectopic ureterocele | -                     | f-UTI   | Lt. DUS          | 6 yrs 7 mos | Lt. UCN (lower moiety) | Lt. ureterocele marsupialization          |
|         |                |     | Lt. duplex system     |                       |          | Lt. ureterocele marsupialization |       |                         |                                          |
| 4*      | 4 mos          | F   | Lt. ectopic ureterocele | -                     | f-UTI   | Lt. lower moiety | 3 mos | Lt. UCN (lower moiety) | Lt. ureteral tapering                     |
|         |                |     | Lt. duplex system     |                       |          | Lt. ureteral tapering |       |                         | Lt. ureterocele marsupialization         |
| 5       | 2 mos          | M   | Lt. ectopic ureterocele | -                     | f-UTI   | Lt. lower moiety | 3 mos | Lt. UCN (lower moiety) | Lt. ureteral tapering                     |
|         |                |     | Lt. duplex system     |                       |          | Lt. ureteral tapering |       |                         | Lt. ureterocele marsupialization         |

Rt.: Right, Lt. left, Bil.: Bilateral, VUR: Vesicoureteral reflux, f-UTI: Febrile urinary tract infection, DUS: Distal ureteral stump, hemiNx: Heminephrectomy, TUI-cele: Transurethral incision of ureterocele, UCN: Ureterocystoneostomy, “She underwent Lt. UCN (lower moiety) and transurethral resection of the ureterocele 1.5 years after the second surgery
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ccontralateral upper moiety were recognized. The reflux into the lower moiety was recognized at the time of upper pole heminephrectomy in all of the five patients. All of them underwent lower urinary tract reconstruction including ureteral reimplantation and ureterocele marsupialization in addition to the distal ureteral stump removal. The median follow-up period after the secondary surgery was 65 months (range 23 months to 118 months). One of the female patients developed recurrence of reflux into the ipsilateral lower moiety after the secondary surgery. Subsequently, she underwent ureteral reimplantation and transurethral resection of the ureterocele one and a half years after the secondary surgery. She has not developed febrile UTI since. The other four patients did not develop febrile UTI after the secondary surgery.

DISCUSSION

There is still controversy whether to excise the distal ureteral stump at the time of nephrectomy or heminephrectomy for a poorly functioning kidney. Total ureterectomy requires an additional lower abdominal incision and possible dissection into the bladder neck and urethra, particular in ectopic ureters. In addition, distal ureters in a duplex system share a common sheath and vasculature, and close dissection of one ureter may lead to ischemic injury of the other. On the other hand, stasis of infected urine in the distal ureteral stump is suspected to increase the risk of recurrent urinary infections, although documentation of isolated stump infection is difficult to prove. Persad et al., showed that the distal ureteral stump may behave like a diverticulum and cause symptoms mimicking pyelonephritis, and therefore recommended that the whole ureter be excised.1

Cain et al., reviewed the outcome of 38 refluxing ureteral stumps after nephrectomy or heminephrectomy, with a follow-up period of up to 13 years, and found that only two patients (5%) required secondary surgery to excise the distal ureteral stump because of breakthrough UTIs. These two patients were girls with risk factors for UTI such as contralateral reflux and ureterocele.2 Other authors also reported that the rate of secondary surgery to deal with the distal ureteral stump after nephrectomy or heminephrectomy was 4–17%, as shown in Table 2.2-6 The risk factors appeared to be ureterocele and reflux into the ipsilateral lower moiety or the contralateral kidney. In our series, five of 17 patients with ectopic ureterocele (29%) required secondary surgery after upper pole heminephrectomy, while the other patients required no secondary surgery after nephrectomy or upper pole heminephrectomy. In addition, reflux into the ipsilateral lower moiety or the contralateral kidney was recognized in four of the five patients. The reflux into the ipsilateral lower moiety was recognized at the time of upper pole heminephrectomy. Our approach for patients younger than six months with ectopic ureterocele is upper urinary tract surgery including heminephrectomy or ureteropyelostomy because we consider the size of the bladder too small for lower urinary tract reconstruction. All of the five patients were younger than six months at the time of the primary surgery, so we performed upper pole heminephrectomy for them although they had reflux into the lower moiety.

Overall, a significant proportion of children will require lower urinary tract reconstruction for definitive treatment of persistent or new onset VUR and recurrent UTIs after upper pole heminephrectomy. Husmann et al., reported upper pole heminephrectomy definitively cured only 16% of patients with a duplex-system ectopic ureterocele and VUR.8 Shekarriz et al., also showed that almost half of patients treated with upper pole heminephrectomy eventually require secondary surgery after long-term follow-up.9 In addition, the results of our previous study were similar to those reports.10 These findings suggest that recurrent UTIs after upper pole heminephrectomy were treatment outcomes based on the initial surgical approach.
to the ectopic ureterocele rather than isolated problems associated with the distal ureteral stump although the limitations of retrospective study should be taken into account.

In conclusion, our results and data from other reports suggest that the distal ureteral stump rarely causes a problem. We consider that total ureterectomy is unnecessary at the time of nephrectomy and heminephrectomy for a poorly functioning kidney.

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