CAN A SINGLE INDIVIDUALIZED PROCEDURE PREDICTABLY RESOLVE ALL THE PROBLEMATIC ASPECTS OF THE PEDIATRIC URETEROCELE?

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ABSTRACT

Purpose: During the last 10 years we attempted to treat most children presenting with a ureterocele with a single definitive operative procedure. We reviewed the surgical results to assess the success of the preoperative plan in achieving this outcome.

Materials and Methods: We retrospectively reviewed the records and diagnostic studies of all children who underwent surgery for a ureterocele during the last 10 years at our institution. The intent of the surgeon as to whether the procedure was intended to be definitive was stated in the clinic notes in all cases.

Results: Surgery for a ureterocele was performed in 38 children during the study period. Transurethral incision was used in 7 patients and, although it was intended to be definitive in 2, all 7 required subsequent surgery for vesicoureteral reflux. Isolated upper tract surgery was performed with intent to cure in 20 of 21 patients including upper pole heminephrectomy in 17 and upper to lower ureteroureterostomy in 3. Of the 20 patients initially treated with this simplified approach 17 (85%) did not require subsequent surgery for ureterocele and 12 had vesicoureteral reflux preoperatively, which persisted in 2 (10%) and required subsequent surgery in 3 (15%). Total reconstruction of the ureterocele was performed in 10 patients and 1 of whom required subsequent surgery. We achieved resolution of all problematic aspects of the ureterocele with a single procedure in 26 of 32 patients (81%).

Conclusions: A single procedure that definitively treats all problems of a ureterocele can be selected in more than three-quarters of patients. Transurethral incision was unsuccessful at definitively treating these patients in our experience. An isolated upper tract procedure was successful in patients with no or mild associated vesicoureteral reflux. We think that upper tract surgery should be the procedure of choice in this subset of patients, as it usually resolves the problem and does not subject the patient to the potential morbidities of bladder surgery. Although total reconstruction is a more formidable procedure, it can be performed safely with excellent results.

KEY WORDS: ureterocele, ureter, abnormalities

Ureteroceles challenge the reconstructive surgeon with several problems combined in a variety of permutations. When operative intervention is indicated the surgeon must consider the ureterocele and any attendant obstruction of the ureter it subtends, vesicoureteral reflux (ipsilateral or contralateral) and obstruction of any of the other renal moieties or the outlet. The armamentarium of the surgeon includes techniques that can individually address each of these issues. Correction of all problems of a ureterocele may lead to multiple procedures if each issue is addressed piecemeal and a multistage approach is unlikely to be in the best interests of the patient. Experience has proved that a single procedure, for instance upper pole heminephrectomy in the case of a duplex system ectopic ureterocele or transurethral incision of a single system intravesical ureterocele, might resolve all issues of the ureterocele in a particular patient.1,2 On the other hand, it is clear that in many patients these procedures do not definitively take care of all facets of the problem.3-10

Our approach to ureteroceles during the years has been to select and perform in each patient the single, least extensive procedure that we predicted would resolve all problems of the ureterocele. The procedure we chose was determined by the type of ureterocele we were addressing (intravesical versus ectopic), and presence and severity of associated reflux.

We describe our experience with "a single individualized procedure" for the management of ureteroceles.

MATERIALS AND METHODS

We operated on 38 patients with ureteroceles from 1989 to 1999, and we retrospectively reviewed the charts and x-rays. The record stated in all instances whether the initial operation was intended to be definitive. A single procedure individualized to the patient with the intent of addressing all issues of the ureterocele presented was performed in 32 cases (84.2%).

A prenatally diagnosed ultrasonographic abnormality led to the diagnosis of ureterocele in 27 of the 38 patients (71%). Neonates were given 25 mg. amoxicillin daily at birth. These patients ranged in age from 0.5 months to 9.5 years at the time of surgical correction (mean 12.1 months), and 21 were younger than 1 year at surgery. Diagnosis was made during evaluation for a urinary tract infection, in 9 cases, as a consequence of the evaluation for microhematuria in 1 and incidentally during a trauma evaluation in 1.

Duplex system ureteroceles were present in 35 cases and 34 were ectopic. Single system ureteroceles were identified in 3 cases and 2 were intravesical. We use the terminology described by the Committee on Nomenclature of the Section

on Urology of the American Academy of Pediatrics.¹¹ Of the 30 girls in the cohort 28 had duplex system ectopic ureteroceles, 1 had a duplex system intravesical ureterocele and 1 had a single system intravesical ureterocele. None of the 3 children with single system ureteroceles had reflux and 27 of the 36 patients (78%) with duplex system ureteroceles had reflux at presentation.

A transurethral incision of the ureterocele was performed in 7 patients, which was intended to be definitive in 2 with single system intravesical ureteroceles and no vesicoureteral reflux preoperatively. Transurethral incision was used in the remaining 5 children as a temporizing measure. The initial operative procedure was intended to be definitive in 30 of the remaining 31 patients.

An upper tract approach, either upper pole heminephrectomy or upper to lower ureteroureterostomy or ureteropyelostomy was performed in 21 patients, and was intended to be definitive in 20. Of these 20 patients no reflux was demonstrated preoperatively in 8 and 7 had ipsilateral lower pole reflux, which was grade I or II in 3, grade III in 3 and grade IV in 1. Isolated grade II reflux into the ureterocele was demonstrated in 1 patient. The upper tract procedure was performed in the patient with grade IV reflux because the orifice looked only marginally abnormal endoscopically. Contralateral reflux was demonstrated in 5 of the 20 patients (grade II in 4, grade III in 1) and was associated with ipsilateral lower pole reflux in 1.

Total reconstruction of the ureterocele, consisting of upper pole heminephrectomy or preservative procedure for the upper pole, complete excision of the upper pole ureter along with the ureterocele, and reimplantation of the ipsilateral lower pole ureter and if necessary the contralateral ureter, was undertaken in 9 patients. All patients with a duplex system ureterocele in whom total reconstruction was performed had ipsilateral lower pole reflux. One boy with a solitary kidney and a single system ectopic ureterocele associated with mildly impaired renal function underwent total reconstruction by excision of the ureterocele and ureteral reimplantation. Mean patient age at total reconstruction was 31.6 months.

RESULTS

None of the 27 patients diagnosed because of a prenatal abnormality who were placed on prophylactic antibiotics had a breakthrough infection before the scheduled date of surgery. Neither of the 2 patients with single system intravesical ureteroceles undergoing what was hoped to be a definitive transurethral incision were cured by the procedure. In 1 of these patients a repeat incision was required because of persistent hydronephrosis, and reflux occurred after the second procedure. Reflux complicated transurethral incision in the other patient. Both patients required subsequent surgery to correct the reflux.

Of the 20 patients (85%) undergoing isolated heminephrectomy, ureteroureterostomy or ureteropyelostomy with intent to cure 17 (85%) have not required subsequent procedures although 2 still have grade I to III reflux. Of the 8 patients who had no reflux preoperatively 7 (87.5%) required no more operations but one has new bilateral grade II reflux. Reflux resolved postoperatively in 2 of 4 (50%) patients with grade I to II reflux, 2 of 3 (67%) with grade III reflux and 1 (100%) with grade IV ipsilateral lower pole reflux. Four patients had only contralateral reflux, which was associated with a refluxing ectopic upper pole ureter in 1 and resolved in 3 after the initial procedure. All 3 patients undergoing a second operation had ipsilateral lower pole reflux for more than 2 years after the upper tract procedure. Followup of this patient group ranges from 7.4 to 128.8 months (mean 72.3).

Total ureterocele reconstruction was successful in resolving all problems in 9 of the 10 patients (90%). A subsequent

procedure to marsupialize the incompletely excised distal end of a cecoureterocele was required in 1 girl. Overall, we were able to select a procedure that definitively remedied all problematic aspects of the ureterocele in 26 of 32 patients (81%)

DISCUSSION

Transurethral incision of a ureterocele is purported to be a minimally invasive, simple and often definitive initial procedure. It is universally regarded as an appropriate intervention for a severely infected obstructing ureterocele. Proponents suggest that hydronephrosis and impaired upper pole function can be improved and that the procedure is often definitive. 1,5 Although most series confirm that transurethral incision decreases hydronephrosis, the efficacy of incision at improving function is less clearly resolved. Smith et al carefully assessed upper pole function after transurethral incision and could find no significant change in function.6 The fact that transurethral incision may transiently improve hydronephrosis and reflux only to have them recur has only recently been reported in the literature.9 During the years it has seemed that single system ureteroceles fare better than duplex systems after transurethral incision, 1,2,8 and some authors have reported a favorable experience with incision of duplex system intravesical ureteroceles. In a recent review of patients undergoing transurethral incision Hagg et al reported that about a quarter of patients with intravesical duplex and half with ectopic duplex ureteroceles required a subsequent open procedure.2 Most reports suggest that transurethral incision of duplex system ectopic ureteroceles seldom resolves the issues of the ureterocele.6,8,9,12 Shekarriz et al reported a need for subsequent surgery after incision in 23% of patients with intravesical ureteroceles (70% single system) and 100% of those with extravesical ureteroceles (97% duplex).¹³ Our limited experience with transurethral incision of single system intravesical ureteroceles was disappointing. After surgery both systems refluxed and, although hydronephrosis improved initially in both, it subsequently recurred in 1. An overview of the literature suggests that transurethral incision is most likely to provide definitive management for single system intravesical uret-

The "simplified approach" proposed by Cendron et al has been widely adopted in patients with duplex system ectopic ureteroceles.¹⁴ This procedure, by either ablating the upper pole or anastomosing the upper pole ureter to the lower pole ureter or pelvis and decompressing the upper pole ureter and ureterocele, delays the possibility of avoiding bladder surgery or at least delaying that surgery until an age when it is perceived that the complication rate will be lower. While this procedure is successful in a reasonable number of patients, accurate predictability of success is far from precise and in 1 large, long-term series 62% of the patients required a second procedure. It has become apparent that significant reflux into a single moiety or reflux into more than 1 moiety is a predictor of the need for subsequent surgery, whereas preoperative absence of reflux improves the likelihood that the simplified approach will be definitive. 4,7,10 We used this approach most often in patients with no reflux or grades I to III reflux. Of our patients 75% did not have reflux after the upper tract procedure and 85% have not required a second procedure, while 2 still have reflux and may ultimately undergo surgery. The upper tract approach totally resolved all issues of the ureterocele in 75% of our cases.

Total reconstruction of the ureterocele presents the parents and patient with the possibility of a single but at times formidable operation that may result in complete correction of all aspects of the problem. The idea that the problem can be resolved before the child is 1 year old has significant appeal. The unpleasant prospect of repetitive voiding cys-

Results after total reconstruction

References	No. Pts.	No. Second Operation (%)	No. Postop. Reflux	No. Outlet Obstruction	No. Lower Pole Damage
Decter et al ⁴	24	2 (8)	1	1	1
Schrez et al ³	28	4 (14)	4	0	0
Mor et al ¹²	14	1 (7)	3	0	0
Shekarriz et al ¹³	10	0 (0)	1	0	0
Present series	10	1 (10)	0	1	0

tourethrograms at an age when the child may recall them is no longer an issue. The psychological impact of having the problem resolved and being "normal" versus an ongoing concern that may ultimately require further surgical intervention is hard to calculate. These arguments would certainly push one towards considering total reconstruction.

What then are the potential downsides to this approach? Some might suggest that a lengthy operation in a child barely older than the neonatal age group is unnecessarily risky. While in the past this argument probably had merit, this concern seems less compelling in the current era with dedicated pediatric anesthesia and surgical specialists who are expert at neonatal reconstruction. Opponents of total reconstruction may suggest that it represents unnecessary surgery as many patients can be treated with less invasive procedures. Although it is clear that less invasive procedures will at times resolve all problems associated with a ureterocele, it remains somewhat difficult to predict which children will actually be cured by them. Our bias was to perform an upper tract procedure on patients with duplex system ectopic ureteroceles if they had unilateral grades I to III or no reflux. Of that particular subset of patients only 11% required a second procedure after the upper tract procedure. Others may argue that total reconstruction is unnecessarily risky, citing the risk of incontinence. Of the several series recording results after total reconstruction none commented on postoperative incontinence.^{3,4,12,13} None of our patients undergoing total reconstruction has yet had any particular difficulty with potty training, although this complication has been recorded after the simplified upper tract approach.7 Is total reconstruction successful enough to obviate these potential risks? A compilation of current series suggests that total reconstruction provides excellent efficacy with an infrequent need for subsequent surgical interventions (see table).

CONCLUSIONS

Although we cannot draw conclusions from our limited transurethral incision experience, the literature clearly supports its use for single system intravesical ureteroceles. Transurethral incision for duplex system ectopic ureteroceles is almost invariably followed by subsequent surgical procedures. Our data supports the use of the simplified upper tract approach in patients with duplex system ectopic ureteroceles if they have no associated reflux, although this ap-

proach remains a reasonable option in those with mild reflux into a single moiety. Total reconstruction provides reliable and safe correction of all issues of the ureterocele in almost all patients in whom it is used. Our experience suggests that the surgeon can, with a reasonable degree of reliability, select a procedure for the individual child presenting with a ureterocele which will resolve all of its problems.

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