

PERSONAL PRACTICE

The management of urinary incontinence

P S J Malone

Wetting presents in two forms, enuresis and incontinence. Enuresis is defined as wetting when no underlying anatomical or functional abnormality of the urinary tract can be detected. A diagnosis of incontinence implies the presence of an underlying anomaly that requires investigation and treatment. However, the diagnosis of incontinence in children is not simple. When an adult presents with wetting the diagnosis of incontinence is automatic, but most wetting children will be enuretic and in the majority spontaneous improvement is to be expected. Many children are labelled as enuretic and incontinence is missed. The art of paediatrics is to recognise the incontinent patient. This can be done in the majority of patients with a proper history, examination, and knowledge of the conditions that cause incontinence (table 1). Urinary and faecal dysfunction commonly coexist and both systems should be assessed and treated simultaneously.¹

Before discussing the management of incontinence it is important to identify the clinical features that should alert us to the diagnosis.

History

A detailed micturition history is essential. Frequency, urgency, and urge incontinence are suggestive of dysfunctional voiding, as occurs with idiopathic detrusor instability or the urge syndrome.² A history of a weak or intermittent stream raises the possibility of bladder outflow obstruction. A patient who has never been reliably dry in the upright position has an ectopic ureter or sphincter weakness till proved otherwise. An accurate assessment of fluid intake is also important. It is now clear that drinks containing blackcurrant and caffeine can provoke detrusor instability in susceptible patients. Emotional or behavioural problems may coexist, but it can be difficult to distinguish between those causing wetting and those that are secondary to it. A detailed bowel history is also required.

Examination

The abdomen is palpated for a full bladder and faecal masses. The spine should be inspected for cutaneous stigmata of dysraphism. The entire spine is palpated and this must include palpation of the coccyx to exclude sacral agenesis. Inspection of the genitalia is necessary to exclude labial adhesions, which may cause postmicturition dribbling. A bifid clitoris with diastasis of the pubic symphysis is typical of

female epispadias, and isolated epispadias can also occur in the male. In the male the presence of phimosis, meatal stenosis, or urethral duplication must be excluded. Perineal sensation and the anocutaneous reflex are assessed and a rectal examination is carried out to assess rectal loading and resting sphincter tone. A full neurological examination of the lower limbs should be performed.

Investigation of urinary incontinence

Urinalysis is mandatory in all cases to exclude infection, but if polyuria is suspected analysis should include protein, glucose, and osmolality estimation.

In isolated nocturnal enuresis further investigations are rarely indicated. *Spinal x rays* are advisable if the clinical features suggest dysfunctional voiding. More extensive imaging, such as magnetic resonance imaging, may be indicated, depending on the findings of these and other investigations. *Ultrasonography* is the first choice for imaging the urinary tract. The value of the ultrasound is greatly enhanced by performing pre/postmicturition bladder views with a simultaneous assessment of the free flow rate. A poor flow rate with incomplete emptying raises the suspicion of bladder outlet obstruction.

In the majority of patients no further studies are required, and if the clinical diagnosis is suggestive of detrusor instability a trial of anticholinergic treatment is justified, with further investigations reserved for those patients who do not respond. *Videourodynamics* are indicated when a neuropathic bladder is suspected, for incontinent patients with posterior urethral valves, suspected detrusor sphincter dyssynergia, and detrusor instability that does not respond to oxybutynin.^{3,4} Ambulatory urodynamics are now growing in popularity and they will replace the standard studies in the majority of patients soon.⁵ *Intravenous urography* should

Table 1 Causes of isolated urinary incontinence

<i>Structural</i>	
Duplex with ectopic ureter	
Exstrophy/epispadias complex	
Posterior urethral valves	
Miscellaneous bladder outlet obstruction	
Urethral duplication	
Vesical fistula	
Small fibrotic bladder (surgery, radiotherapy)	
Labial adhesions	
<i>Dysfunctional</i>	
Idiopathic detrusor instability	
Urge syndrome	

Department of
Paediatric Urology,
Wessex Centre for
Paediatric Surgery,
Southampton General
Hospital, Tremona
Road, Southampton
SO16 6YD

Correspondence to:
Dr Malone.



Figure 1 Intravenous urogram showing an obvious duplex system on the left and a 'cryptic' duplex on the right that was the cause of incontinence; note the lateral displacement of the upper ureter, the loss of the normal axis of the kidney, and the medial deviation of the lower ureter on the right.

be performed when duplication with an ectopic ureter is suspected. This will usually confirm the diagnosis, but in rare circumstances—with a classical history—the intravenous urogram will be normal and further investigations will be needed (fig 1). *Patent sky blue* can be instilled into the bladder and a pad is then placed over the perineum. This is inspected every 15 minutes until the pad becomes wet; if it is clear urine the diagnosis is an ectopic ureter. A classical history of duplex incontinence, where a single kidney is seen on imaging, requires further investigation as the likely diagnosis is a simplex dysplastic ectopic kidney and ureter. *Isotope renography* should be performed to assess renal function, particularly in duplex kidneys when an upper moiety heminephroureterectomy is considered, and in all cases of neuropathic bladder and bladder outflow obstruction to exclude scarring. *Cystoscopy* is essential for all patients who remain incontinent following reconstructive surgery.

Treatment

It is essential to consider the management of urinary and faecal incontinence simultaneously, but for ease of presentation they will be dealt with separately. Management must be individualised. Patients with a duplex upper tract or a dysplastic kidney with an ectopic ureter usually can be made dry by an upper moiety heminephroureterectomy or simple nephrectomy. Vesical fistulae can be closed and urethral duplications can be excised. A simple

separation of labial adhesions may be all that is required in some girls who suffer postmicturition dribbling. In all remaining cases three general principles govern management. They are (1) establish complete bladder emptying; (2) increase bladder capacity and abolish detrusor instability; and (3) increase bladder outlet resistance. These principles may be applied individually or in combination. They can involve retraining programmes, pharmacological therapy, or surgery.

ESTABLISH COMPLETE BLADDER EMPTYING

Many children void infrequently and in these a bladder retraining programme to produce a regular voiding habit is vital. Failure to make the patient dry with this regimen is not uncommon and a programme of 'cognitive bladder retraining', for which success rates in the order of 70% are reported, is the next step.² This employs biofeedback to teach children how and when to void.

Incomplete bladder emptying and associated incontinence may arise secondary to bladder outflow obstruction such as detrusor sphincter dyssynergia. The use of α adrenergic antagonists may facilitate complete bladder emptying and in males when there is a competent bladder neck an external sphincterotomy should also be considered. Incontinence secondary to posterior urethral valves will frequently be cured by valve ablation alone. Other forms of outflow obstruction such as urethral stricture or meatal stenosis require dilatation or formal surgical correction. Some patients will continue to wet and these need further investigation and treatment.

Incomplete bladder emptying may also be secondary to detrusor failure. The acontractile bladder accounts for about 9% of neuropathic bladders in children. When this is associated with a fixed urethral resistance, chronic retention with overflow incontinence will occur. Complete bladder emptying is all that is required to produce continence. Clean intermittent catheterisation, introduced by Lapedes in 1972, is the cornerstone in achieving bladder emptying and long term results are very encouraging.^{6,7} When urethral catheterisation is impossible, the Mitrofanoff principle—first described in 1980—can be employed. The appendix is reimplanted into the bladder to produce a continent catheterisable abdominal channel⁸ (fig 2). The technique has now been developed further and other tubular structures used include the ureter, fallopian tube, tapered small bowel, or a tubularised detrusor tube; continence rates of 94% are reported.⁹

INCREASE BLADDER CAPACITY AND ABOLISH DETRUSOR INSTABILITY

Detrusor instability is the commonest cause of incontinence and it can be secondary to various different causes. Modification of the type of fluid intake is helpful. In many patients stopping blackcurrant or caffeine containing drinks will make them dry. If there is a convincing history of detrusor instability, and pre/postmicturition bladder ultrasound examination and a free flow rate exclude



Figure 2 The Mitrofanoff stoma.

incomplete emptying or outlet obstruction, a trial of oxybutynin is indicated.¹⁰ If this approach is not successful, videourodynamic studies are helpful.⁴ If the clinical diagnosis of detrusor instability is confirmed, a further trial of oxybutynin or other anticholinergics is indicated. In refractory cases intravesical oxybutynin should be considered: this is more effective but requires intermittent catheterisation.¹¹ It is important to treat constipation and all urinary infections, even asymptomatic bacteruria, aggressively. Transcutaneous electrical nerve stimulation (TENS) is also useful but it is not widely employed and does not produce a long lasting effect.¹²

A small but very difficult group of patients will continue to wet and these pose a major challenge. Should this group undergo bladder reconstructive surgery for a condition that is possibly, though not definitely, self limiting or should they continue to wet throughout childhood until it is clear that spontaneous resolution will not occur?¹³ There is no one correct answer but I believe that reconstruction should only be considered if normal development is being interfered with. These patients require psychological support and the help of incontinence advisors.

The hyperreflexic neuropathic bladder that does not respond to conservative treatment will generally require augmentation. The clam ileocystoplasty remains the commonest procedure to augment the bladder, but any part of the intestine can be used.¹⁴ If the bladder is particularly diseased a 'clam' procedure may not be sufficient and a substitution cystoplasty will be required. There are many disadvantages with enterocystoplasty: mucus production, infection, stone formation, absorption of urea and electrolytes which can cause serious metabolic problems when renal function is compromised, inhibition of normal growth, metabolic bone disease, increased acid production with ulceration and haematuria when stomach is used, spontaneous perforation of the augmented bladder, and finally, though perhaps most importantly, the risk of subsequent malignancy.¹⁵ Because of this long list of

serious complications, every effort is being made to avoid the use of enterocystoplasty whenever possible. Recently there has been a revival in the use of megaureters to augment bladders and in appropriate cases excellent results are achievable.¹⁶ An exciting new concept is the use of intestinal segments stripped of their mucosal lining, used to cover the autoaugmentation and, for the future, the use of cultured urothelium to line augmentations.¹⁷

INCREASE BLADDER OUTLET RESISTANCE

If stress incontinence is a feature of the history, pelvic floor exercises and α sympathomimetic treatment with ephedrine hydrochloride is worth considering.

In the neuropathic bladder several different abnormalities exist and urodynamics are essential if logical treatment is to be selected. A significant number of patients will have sphincter weakness incontinence and, if borderline, ephedrine (15 mg three times daily) should be tried. In the female, urethral plugs may be useful.¹⁸ The only remaining approach is surgery and a wide variety of procedures is available. A variable urethral resistance can only be achieved with the artificial urinary sphincter (AUS) but even then about 60% will need to catheterise themselves and the long term results are not perfect and complications common.¹⁹

The simplest way of increasing bladder outlet resistance is by the injection of inert substances into the bladder neck, such as teflon, collagen, or macropastique.²⁰ Teflon is now known to produce a marked inflammatory response with fibrosis, but the other substances may well have a part to play. Surgical suspension of the bladder neck is another approach and many techniques are available. The bladder neck can be reconstructed using various techniques and the urethra can be lengthened using the Kropp procedure.^{21 22} Finally, the bladder neck or urethra can be closed off and access for emptying provided by the Mitrofanoff procedure. Standard urinary diversion is no longer routinely practised although it still has an important part to play in the occasional patient.

Treatment of faecal incontinence

The initial management of faecal incontinence remains conservative and depends on the use of bowel training, laxatives, suppositories, enemas, and in selected cases biofeedback.^{23 24} However, many patients continue to soil or be reliant on helpers. Under these circumstances operative treatment should be considered.

A progression of the enema technique described by Malone *et al* was to modify the Mitrofanoff principle and provide a catheterisable colonic stoma to enable antegrade continence enemas (ACE).²⁵ This has the disadvantage of requiring an operation, but the siting of the stoma enables easier catheterisation than by the rectal route for many patients. In the absence of an appendix a tubularised caecal/colonic flap or small bowel tube, or a percutaneously inserted catheter, may be used and

reported results are good.^{26 27} It may take several weeks to adjust the enema regimen required to achieve optimum results.

Bladder reconstruction with or without a Mitrofanoff stoma has been simultaneously combined with formation of an ACE stoma.²⁸ The appendix may be split, one for each stoma, or a tubularised caecal/colonic flap or an indwelling catheter or button for the ACE may be required. Short term review shows no additional morbidity from combining procedures, and outcome was the same as that expected from each individual procedure.

The widespread use of these reconstructive techniques has improved the quality of life and increased the independence of patients. Patient selection is of vital importance in the success of this type of reconstruction. Sufficient motivation and manipulative skills are essential to achieve satisfactory outcome. Patients and their families require many hours of instruction and encouragement, and the part played by the urological nurse specialist is vital. Long term results still need to be assessed.

- 1 Malone PS. The management of bowel problems in children with urological disease. *Br J Urol* 1995;76:220-5.
- 2 Van Gool JD, De Jonge GA. Urge syndrome and urge incontinence. *Arch Dis Child* 1989;64:1629-34.
- 3 Weerasinghe N, Malone PS. The value of videourodynamics in the investigation of neurologically normal children who wet. *Br J Urol* 1993;71:539-42.
- 4 Porter T, Weerasinghe N, Malone PS. Modification of therapy based on videourodynamics in neurologically normal children: Southampton 1988-1993. *Br J Urol* 1995;76:779-82.
- 5 Passerini-Glazel G, Cisternino A, Artibani W, Pagano F. Ambulatory urodynamics: preliminary experience with vesico-urethral holter in children. *Scand J Urol Nephrol (suppl)* 1992;141:87-92.
- 6 Lapiques J, Diokno AC, Silber SJ, Lowe BS. Clean intermittent self-catheterization in the treatment of urinary tract disease. *J Urol* 1972;107:458-61.
- 7 Wyndaele JJ, Maes D. Clean intermittent self-catheterisation: a 12-year follow up. *J Urol* 1990;143:906-8.
- 8 Mitrofanoff P. Cystostomie continence trans-appendiculaire dans le traitement des vessies neurologiques. *Chir Paediatr* 1980;21:297-305.
- 9 Woodhouse CRJ, Gordon EM. The Mitrofanoff principle for urethral failure. *Br J Urol* 1994;73:55-60.
- 10 Robinson TG, Castleden CM. Drugs in focus 11. Oxybutynin hydrochloride. *Prescribers J* 1994;34:27-30.
- 11 Madersbacher H, Jilg G. Control of detrusor hyperreflexia by the intravesical instillation of oxybutynin hydrochloride. *Paraplegia* 1991;29:84-90.
- 12 Fossberg E, Serensen S, Ruutu M. Maximal electrical stimulation in the treatment of unstable detrusor and urge incontinence. *Eur Urol* 1990;18:120-3.
- 13 Hellstrom A, Hanson E, Hansson S, Hjalmas K, Jodal U. Micturition habits and incontinence at age 17—reinvestigation of a cohort studied at age 7. *Br J Urol* 1995;76:231-4.
- 14 Woodhouse CR. Reconstruction of the lower urinary tract for neurogenic bladder: lessons from the adolescent age group. *Br J Urol* 1992;69:589-93.
- 15 Mundy AR, Nurse DE. Calcium balance, growth and skeletal mineralization in patients with cystoplasties. *Br J Urol* 1992;69:257-9.
- 16 Hitchcock RJ, Duffy PG, Malone PS. Ureterocystoplasty: the bladder augmentation of choice. *Br J Urol* 1994;73:575-9.
- 17 Atala A, Freeman MR, Vacanti JP. Human bladder muscle and urothelial formation in vivo following attachment to biodegradable polymer scaffolds [abstr]. Lisbon: European Society of Paediatric Urology, 1993:55.
- 18 Nielson KK, Kromann-Andersen B, Jacobsen H. The urethral plug: a new treatment modality for genuine urinary stress incontinence in women. *J Urol* 1990;144:1199-202.
- 19 Bosco PJ, Bauser SB, Colodny AH, Mandell J, Retik AB. The long-term results of artificial sphincters in children. *J Urol* 1991;146:396-9.
- 20 Caoni P, Lais A, De Gennaro M, Lapozza N. Gluteraldehyde cross-linked bovine collagen in exstrophy/epispadias complex. *J Urol* 1993;150:631-3.
- 21 Jones JA, Mitchell ME, Rink RC. Improved results using a modification of the Young-Dees-Leadbetter bladder neck repair. *Br J Urol* 1993;71:555-61.
- 22 Nill TG, Peller PA, Kropp KA. Management of urinary incontinence by bladder tube urethral lengthening and submucosal reimplantation. *J Urol* 1990;144:559-61.
- 23 Loening-Bauke V, Desch L, Wolraich M. Biofeedback training for patients with myelomeningocele and fecal incontinence. *Dev Med Child Neurol* 1988;30:781-90.
- 24 Shandling B, Gilmour RF. The enema continence catheter in spina bifida: successful bowel management. *J Pediatr Surg* 1987;22:271-3.
- 25 Malone PS, Ransley PG, Kiely EM. Preliminary report: the antegrade continence enema. *Lancet* 1990;336:1217-8.
- 26 Squire R, Kiely EM, Carr B, Ransley PG, Duffy PG. The clinical application of the Malone antegrade colonic enema. *J Pediatr Surg* 1993;28:1012-5.
- 27 Shandling B, Chait PG, Richards HF. Percutaneous cecostomy: a new technique in the management of fecal incontinence. *J Pediatr Surg* 1996;31:534-7.
- 28 Roberts JP, Malone PS. Treatment of neuropathic urinary and faecal incontinence with synchronous combined bladder reconstruction and ACE procedure. *Br J Urol* 1994;75:386-9.