Diagnosis of perforated enterocystoplasty

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SUMMARY

In the operation of enterocystoplasty, now widely practised, segments of bowel are used to augment or replace the urinary bladder. An occasional complication is perforation, and this may present in non-specialist settings. We investigated the management of spontaneous perforations among 264 patients with enterocystoplasty followed by one surgeon for 2–18 years. Patients' charts were examined for data on presentation, diagnosis and treatment.

10 patients had thirteen perforations; data were available for nine perforations in 9 patients. Mean time from enterocystoplasty to perforation was 45 months. Presentation was shoulder pain in 1 and abdominal pain (with or without fever) in 8. Perforation was diagnosed without delay in 3, but the initial diagnosis was urinary tract infection in 4 and small-bowel obstruction in 2. Ultrasound was the most useful investigation being diagnostic in 6 of 7 cases; contrast cystography showed a leak in only 2 of the 6 patients in whom it was performed. Treatment was successful in 8 cases (surgery 6; percutaneous drainage 2); 1 patient, who remained undiagnosed, was treated medically and died.

Patients with enterocystoplasty need to be educated about this potentially lethal complication, so that they can alert non-specialist clinicians to what may have happened. In any patient with enterocystoplasty who reports abdominal pain or shoulder pain, perforation has to be ruled out.

INTRODUCTION

The use of detubularized bowel segments in bladder reconstruction has gained wide acceptance. The primary aim is to maintain a low intravesical filling pressure and achieve a high volume reservoir. It has become an important aspect of management in patients with a neuropathic bladder, exstrophy/epispadias complex, posterior urethral valves, or lower urinary tract tumours. Complications of this procedure include metabolic abnormalities, urinary tract infection, urolithiasis and spontaneous rupture. Perforation of enterocystoplasty is a particularly dire complication.[1,2] We have investigated the way it was diagnosed and managed in a series of enterocystoplasty patients with long follow-up.

PATIENTS AND METHODS

Since 1983, 264 patients who underwent reconstruction of the lower urinary tract with detubularized bowel segments have been followed prospectively by one surgeon. Of these patients, 162 underwent continent urinary diversion, 55 ileocystoplasties and 47 colocystoplasties. Follow-up was 2–18 years (mean 11). Details of the protocol have been published elsewhere.[3] The outlet and continence mechanisms were the urethra and its sphincter, an appendix or ileal tube in a Mitrofanoff tunnel, Kock nipple or ileocaecal valve. Indications for reconstruction of the lower urinary tract were bladder exstrophy (94), neurogenic bladder (79), epispadias (20), imperforate anus (8), interstitial cystitis (6), posterior urethral valves (5), rhabdomyosarcoma (5), detrusor instability (5), vesicoureteral reflux (4), megaureter (3), cloacal exstrophy (3) and miscellaneous (32).

Charts from patients with perforation of enterocystoplasty were analysed for presentation, diagnosis and treatment. Patients who had perforations within three months after operation were excluded.

RESULTS

Thirteen perforations occurred in 10 patients. Three of these were in a single patient over a period of 9 years while she was under the care of another hospital, and details were not available. Her fourth perforation was managed in our unit. The notes of 1 patient were lost. Thus we were able to obtain data on nine episodes in 9 patients.

Mean time from reconstruction to perforation was 45 months (range 3–91). All the patients performed intermittent catheterization, 6 through a Mitrofanoff tube and 3 via the urethra. Table 1 shows the circumstances of

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Table 1 **Circumstances and clinical presentation of perforation**

Circumstances	*No.*
Precipitating event	
Difficulty with catheterization	3
Poor compliance	3
Fall on full bladder	2
Detrusor hyperreflexia	1
Clinical presentation	
Abdominal pain ± fever	8
Shoulder pain	1
Hospitals where patients were admitted and managed	
Initial admission in our centre	4
Secondary referral to our centre	3
Treated elsewhere (1 later transferred)	2

perforation, the clinical presentations and the sites of management. In 3 of the 4 patients who presented initially at our centre, perforation was diagnosed immediately with the aid of ultrasound. They were then treated successfully at laparotomy.

In the 6 patients with delayed diagnosis the original working diagnosis (without urological consultation in 4 cases) was acute pyelonephritis in 4 and small-bowel obstruction in 2. Of these 6 patients, 1 was admitted directly to our unit and 5 were first admitted elsewhere (of whom 4 were eventually transferred to our unit, one after laparotomy). In this group, mean time from admission to correct diagnosis was 8.5 days (range 3–20). Diagnosis was by ultrasound in 3 and laparotomy in 2. Cystography, performed in all 6, showed a leak in only 2. Treatment was by percutaneous drainage in 2 and surgery in 3 (in 1 case after failed percutaneous drainage); the remaining patient, believed to have acute pyelonephritis, was treated at another hospital without involvement of surgeons and died of overwhelming sepsis; the perforation was identified post mortem.

DISCUSSION

The hazard of perforation after enterocystoplasty has long been evident, and with the operation in wide use for 20 years the number of patients at risk is substantial. In an emergency, their care may well fall to doctors without urological experience.

Bauer *et al*.[1] reported fifteen perforations in 12 of 264 children with augmented bladder, 3 of whom died. Our series shows that the complication can still be fatal, and delay in diagnosis is most likely if urologists are not consulted early. The symptoms are often non-specific, and 6 of the 9 patients were initially misdiagnosed. In any patient with an intestinal reservoir for urine storage, signs and symptoms of acute abdomen demand immediate resuscitation with intravenous fluids, broad-spectrum antibiotics and catheterization. Urgent urological help should be sought. Radiological assessment is not always informative;[2,4,5] in the present series cystography was negative in 1 of 6 patients. Abdominal ultrasound and CT are more reliable for identifying pockets of free fluid.[6]

When perforation is suspected, most authorities recommend surgical exploration. Conservative management has been reported successful in patients without haemodynamic instability or progressive worsening of symptoms.[4,7] Laparotomy remains our policy for patients whose diagnosis is immediate. In some with delayed diagnosis, intra-abdominal abscesses develop and can be detected by sonography or CT. In the absence of frank peritonitis, these patients can be managed by percutaneous drainage, as in 3 of the present series (though one required subsequent laparotomy).

Most of the perforations in this series were clearly associated with reservoir fullness (fall on full bladder, poor compliance with catheterization). Decreased sensation in patients with neurogenic bladder and weakness of the abdominal wall in patients with bladder exstrophy may be of importance in the aetiology of this complication. A regular schedule of bladder emptying is essential.

In conclusion, both patient and physician must be aware of the risk of enterocystoplasty rupture. Patients must be reminded of the importance of regular emptying of the reservoir and of urgent attendance in hospital if they get acute abdominal pain. Reservoir perforation must be borne in mind by clinicians in such patients when they have fever of unknown origin, sepsis, abdominal pain or peritonitis.

REFERENCES

1 Bauer SB, Hendren WH, Kozakewich H, *et al*. Perforation of the augmented bladder. *J Urol* 1992;**148**:699–703

2 Mansson W, Bakke A, Bergman B, *et al*. Perforation of continent urinary reservoirs. *Scand J Urol Nephrol* 1997;**31**:529–32

3 Wagstaff KE, Woodhouse CRJ, Rose GA, Duffy PG, Ransley PG. Blood and urine analysis in patients with intestinal bladders. *Br J Urol* 1991;**68**:311–16

4 Slaton JW, Kropp KA. Conservative management of suspected bladder rupture after augmentation cystoplasty. *J Urol* 1994;**152**:713–25

5 Rink RC, Mitchell ME. The role of enterocystoplasty in reconstructing the neurogenic bladder. In: Gonzales ET, Roth D, eds. *Common Problems in Pediatric Urology*. St Louis: Mosby-Year Book, 1991:192–204

6 Glass RBJ, Rushton HG. Delayed spontaneous rupture of augmented bladder in children: diagnosis with sonography and CT. *AJR* 1992;**158**:833–5

7 Rushton HG, Woodward JR, Parott TS, Jeffs RD, Geahart JP. Delayed bladder rupture after augmentation enterocystoplasty. *J Urol* 1988;**140**:344–6