Review Article

‘Nerve-Sparing’ Cystectomy in Women

S. N. Venn and A. R. Mundy
Institute of Urology, London, UK

Abstract: Although the indications for cystectomy other than for cancer are few, it is occasionally necessary for severe interstitial cystitis or hemorrhage due to radiation cystitis. The use of substitution cystoplasty after cystectomy has increased in men in the last decade, and this has resulted in the development of ‘nerve-sparing’ approach to cystectomy to improve continence and potency. The use of substitution cystoplasty in women after cystectomy has lagged behind that in men because it was considered necessary to remove the entire urethra, making orthotopic substitution impossible. Recently the need to remove the entire urethra has been questioned, with the finding that if the bladder neck is free of tumour, recurrence of disease in the urethra has not so far been found to occur. In addition, it appears possible to substitute on to the urethra without incontinence. This has led to the development of a ‘nerve-sparing’ technique of cystectomy, and renewed interest in the anatomy of the urethra. This paper reviews the current literature on ‘nerve-sparing’ cystectomy and describes our technique.

Keywords: Bladder; Cystectomy; Female

Cystectomy

The first cystectomy was claimed to have been performed in women over a century ago. The main indication for cystectomy is malignancy, either of the bladder or by invasion from surrounding structures. Other indications are severe interstitial or radiation cystitis. The technique of cystectomy can be either radical or simple. Simple cystectomy is performed for non-malignant indications, and radical cystectomy for malignancy. In women this has often involved anterior exenteration, removing the bladder, urethra and genital organs, including most of the vagina. Cystectomy has been less common in women than men as the main indication, transitional cell carcinoma of the bladder, is rarer in women.

Cystectomy is followed by urinary diversion, originally to a ureterosigmoidostomy, but since the 1950s to an ileal conduit [1]. This has proved a reliable method of urinary diversion, but it is incontinent on to the anterior abdominal wall. In recent years there has been increased use of orthotopic substitution on to the urethra in men. This allows a continent diversion, voiding either spontaneously or using clean intermittent self-catheterization (CISC). There are numerous different methods of forming the conduit, but essentially a portion of the bowel is used and anastomosed to the urethra and the ureter by one of various methods. The concern over continence has led to the development of a ‘nerve-sparing’ approach to cystoprostatectomy in men, which seems to improve both continence and potency rates [2,3].

Until recently orthotopic substitution in women was considered impossible, as it was thought necessary to remove the entire urethra and the majority of the vagina to perform adequate cancer surgery. Continent diversion was therefore only possible by a catheterizable stoma or ureterosigmoidostomy. The continent catheterizable stoma has a revision rate of around one-third [4], which has limited its use. The ureterosigmoidostomy has major complications of renal deterioration due to reflux and pyelonephritis, poor urinary continence and the risk of malignancy [5]. Recent development of the Mainz-type ureterosigmoidostomy [6] has significantly improved the first two of these complications, resulting in a slow resurgence of its use.

Correspondence and offprint requests to: A. R. Mundy, Institute of Urology and Nephrology, 48, Riding House Street, London W1P 7PN, UK.
In 1994, two groups showed that it is unnecessary to remove the entire urethra in women to perform adequate cancer surgery [7,8]. They found a risk of secondary urethral tumors in patients with bladder cancer of 2%. All of these patients had tumor at the bladder neck. It was concluded that if the bladder neck was free of tumor it was safe to leave the urethra, allowing orthotopic substitution in women, and creating the need for a ‘nerve-sparing’ approach to cystectomy.

‘Nerve Sparing’ Cystectomy

The first report of a ‘nerve-sparing’ approach to cystectomy before orthotopic substitution came from Stenzl et al. in 1994 [9]. In a publication combining 14 female cases the early continence rate was 100%, with 2 patients requiring CISC. Hautman published the results in 18 patients in 1996 [10]; 13 patients were available for follow-up. Nine required CISC to void, but 11 of the 13 were continent, the remaining 2 having mild stress incontinence. In 1997 Stenzl published the results in 24 patients with more than 6 months’ follow-up [11]. The daytime continence rate was 87% (night-time 79%), with only 1 patient requiring CISC. We have recently published a large series of patients undergoing a ‘nerve-sparing’ cystectomy for cancer, 8 of whom were female [3]. All our patients were continent, although 3 require CISC to void. Table 1 shows the continence and CISC rates of these and other series to date [3,10–14].

Stenzl et al. have published a number of reports since their original paper developing the ‘nerve-sparing’ approach to cystectomy. Following anatomical dissection of 5 patients they demonstrated that the nerve fibers from the pelvic plexus ran along the lateral wall of the vagina to the bladder neck [15]. They concluded that by leaving the lateral walls of the vagina, and with careful dissection of the bladder neck, the innervation of the urethra would be preserved. Further animal studies have shown that the bulk of the striated (trabeculoparenchyma) muscle lies in the mid and caudal thirds of the urethra, with innervation from the pudendal nerve. Dissection of the urethra at the bladder neck and careful dissection around this area would not destroy this muscle or its nerve supply. This has been confirmed by others [14].

Stein has recently reported on a large pathological analysis of patients undergoing cystectomy for cancer [16]. Again, all patients with tumor in the urethra had involvement of the bladder neck. However, 50% of the patients with tumor at the bladder neck had no urethral involvement, raising the question as to whether all patients with bladder neck tumors need to be excluded from consideration for orthotopic diversion.

Operative Technique

Patients are prepared for surgery with appropriate staging, and biopsy of the bladder neck. Patients with significant incontinence are excluded. All patients are taught CISC, and those unable or unwilling to perform it are advised on other methods of diversion. The various methods of urinary diversion are explained in detail, in particular the high probability of needing CISC, and consent to perform an orthotopic diversion is obtained. Full bowel preparation and prophylactic antibiotics are given preoperatively.

The patients are placed in a low lithotomy position and prepared with access to the entire abdomen and perineum. A midline incision is made and the retropubic space opened on either side down to the endopelvic fascia. The urachus is divided below the umbilicus and the superior hypogastric wing defined, incising the overlying peritoneum on either side. The peritoneum is then excised in front of the round ligament. This plane is deepened, separating the base of the bladder from the vagina until the catheter is palpable in the urethra. The lateral pedicles are now more clearly defined and are divided, taking the superior vesical vessels and dividing the ureters. The inferior vesical vessels are not divided at this stage, as they are close to the pelvic parasympathetics.

The dorsal venous complex is next ligated, by passing a tie between it and the urethra and dividing proximally. The urethra is then incised at the bladder neck until the catheter is visible (Fig. 1). The catheter can then be divided and used for traction, while the posterior part of the urethra is divided, joining the dissection from behind the bladder. The rest of the cystectomy is now performed in a retrograde fashion (Fig. 2), keeping close to bladder wall to avoid damage to the neurovascular bundles. Substitution cystoplasty is then performed using detubularized right colon and anastomosing the most dependent part to the urethra. The ureters are joined left to right by a transureteroureterostomy (TUU), and the right ureter is implanted into a taenia coli of the substituted bladder using a tunneled technique. The ureter is stented across the TUU, bringing the stent through the pouch and out on to the anterior abdominal wall. The pouch is also drained suprapublically and the urethroenteric anastomosis stented with a catheter. At 10 days healing of the TUU, ureteroenteric and urethroenteric anastomosis is confirmed radiologically. The stent and urethral catheter can then be removed. A trial of voiding is performed and, once established, either spontaneously or by CISC, the suprapublic catheter is removed.

Table 1. Summary of the published results of ‘nerve-sparing’ cystectomy in women

<table>
<thead>
<tr>
<th>Reference</th>
<th>Year</th>
<th>No. of patients</th>
<th>Continence (%)</th>
<th>CISC (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancrini [12]</td>
<td>1995</td>
<td>7</td>
<td>100</td>
<td>–</td>
</tr>
<tr>
<td>Venn [3]</td>
<td>1998</td>
<td>8</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>Blute [13]</td>
<td>1998</td>
<td>5</td>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>Montie [14]</td>
<td>1997</td>
<td>8</td>
<td>100</td>
<td>3</td>
</tr>
</tbody>
</table>