



Clinical algorithms for the diagnosis and management of urological leaks following pelvic exenteration

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Abstract

Background: Urine leak following pelvic exenteration for locally advanced pelvic malignancy is a major complication leading to increased mortality, morbidity and length of stay. We reviewed our experience and developed a diagnostic and management algorithm for urine leaks in this patient population.

Methods: Consecutive patients who underwent en bloc cystectomy and conduit formation as part of pelvic exenteration at a single quaternary referral centre from 1995 to 2012 were reviewed. Patients with urine leak were identified. Medical records were reviewed to extract data on diagnosis and management and a suggested clinical algorithm was developed.

Results: Of 325 exenterations, there were 102 conduits, of which 15 patients (15%) developed a conduit related urine leak. Most (14/15) patients were symptomatic. Diagnosis was made by drain creatinine studies (12/15) and/or imaging (15/15). Management comprised of conservative management, radiologic urinary diversion, early surgical revision and late surgical revision in 3, 11, 2 and 1 patients respectively. Important lessons from our 17 year experience include a high index of suspicion in a patient who is persistently septic despite appropriate treatment, the importance of regular drain creatinine studies, CT (computer tomography) with delayed images (CT intravenous pyelogram) when performing a CT for investigation of sepsis and early aggressive management with radiologic urinary diversion to facilitate early healing.

Conclusion: Urine leak after pelvic exenteration is a complex problem. Conservative management usually fails and early diagnosis and intervention is the key. It is hoped that our algorithms will facilitate diagnosis and subsequent management of this group of patients.

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Introduction

The management of locally advanced and recurrent pelvic malignancy is challenging.^{1–3} Extensive multi-visceral resection is often required in order to achieve clear resection margins (R0 resection), which is now well established as the single most important predictor of long-term survival.⁴ In patients where there is involvement of the trigone of the bladder or where the anticipated

urinary function is likely to be poor, en bloc cystectomy is indicated with urinary diversion in the form of ileal or colonic conduit.⁵ Recent large exenterative series suggest that this may be necessary in 30–50% of all patients undergoing curative resection for locally advanced or recurrent pelvic cancer.^{6,7} Leakage of urine from a newly formed conduit is a major postoperative complication. In an earlier study from our institution, a conduit related urine leak rate of 16% was reported,⁶ which is a disparately different result from that within contemporary urological literature, where rates of 2–6% are reported.^{8,9} This is likely to be attributable to our cohort of patients having re-operative pelvic surgery with multi-visceral

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resection in an extensively irradiated field. However, this experience is not unique to our institution as high leak rates have also been reported following pelvic exenteration for urological and gynaecological cancer.^{10–12} Urological leaks are a considerable source of morbidity following pelvic exenteration, leading to increased resource consumption as necessitated by prolonged in and outpatient management, as well as a shorter median survival.⁶ In view of our experience with the management of urine leaks, the lack of consensus in appropriate management and an increasing interest in exenterative radical resection,¹³ it was felt that a suggested diagnostic and management algorithm may facilitate the management of this complex problem. With this in mind we reviewed our experience with a view to develop a suggested clinical algorithm for the diagnosis and management of urine leaks after pelvic exenteration surgery.

Patients and methods

Patients who underwent pelvic exenteration surgery for locally advanced or recurrent pelvic malignancies (including rectal cancer, SCC and sarcoma) at Royal Prince Alfred Hospital, between December 1995 and September 2012 were identified. Operations were considered exenterative when there was en bloc resection of at least one adjacent organ, as defined by Heriot and coworkers.¹⁴ Those who had an ileal or colonic conduit and subsequently developed a postoperative urine leak formed the study cohort. A urine leak was defined as the presence of creatinine rich effluent from abdominal drains or wound sites, and/or evidence of contrast extravasation from the conduit or ureteric anastomosis identifiable on imaging. Urine leaks with contrast extravasation arising from the ureteroenteric anastomosis were considered ‘anastomotic leaks’, whereas contrast extravasation from anywhere else on the conduit (e.g. the distal conduit staple line) were considered ‘conduit leaks’.

Patient medical records were reviewed for preoperative urological history, type of conduit, cause of leak, diagnosis, and subsequent investigations and management. Urine leaks were identified as early or late according to time to diagnosis and categorised as controlled or uncontrolled based on the patient’s drain and urine output volumes. The choice of day 6 as the cut off point for early versus late leak diagnosis was based on a study by Hensle et al.¹⁵ and because it would fit in with our general approach to management in that leaks within a week of surgery will be considered for early surgical revision. The first suspicion of a urine leak was noted, and from this the delay to diagnosis was estimated; defined as the period of time between initial suspicion and diagnosis. Complications following image-guided investigations or interventions such as sepsis were recorded. Sepsis was defined as proof of bacteraemia or clinical suspicion of sepsis, as well as the signs and symptoms of the systemic inflammatory

response syndrome.¹⁶ Persistent urosepsis is defined as sepsis of the urinary tract that does not resolve despite an appropriate course and duration of treatment including antibiotics and general supportive measures. For the purposes of this study, conservative management refers to any supportive management that did not require any radiologic or surgical intervention. Radiologic urinary diversion refers to any radiological interventions including the insertion of percutaneous nephrostomies for urinary diversion or percutaneous drain insertion whereas surgical intervention (early or late) refers to patients who required operative interventions such as conduit revision.

Ethics approval for this study was granted by the Sydney Local Health District (RPAH Zone) human research ethics committee.

Surgery

The decision to perform en bloc cystectomy and form a urinary conduit was based on preoperative discussions at a multidisciplinary exenteration meeting. The choice of reconstruction was at the discretion of the operating surgeon at the time of surgery, depending on evidence of radiation injury to small bowel and whether or not there was an established colostomy. Conduits were constructed according to standard technique. In summary, the isolated ileal or colonic segment was stapled closed at the blind abdominal end, the ureteroenteric anastomoses were constructed using the Bricker technique over ureteric catheters¹⁷ and a Brooke (end) or Turnbull (loop) stoma created. Depending on the surgeon, ureteric catheters were sutured in place to the stoma or within the conduit to prevent migration. At least one intra-abdominal drain was placed in each patient, and antibiotics were administered routinely for 5 days. Drain fluid creatinine analyses were routinely performed on day 2 and repeated regularly between every 5–7 days and as clinically indicated. Contrast radiology of the urinary tract was performed largely to confirm urinary leaks in the presence of clinical suspicion, although routine imaging was also performed in selected patients depending on surgeon preference. Imaging modalities included computer tomography intravenous pyelogram (CT IVP), CT conduitogram, “stentogram” and nephrostogram. A CT conduitogram is a contrast study of the conduit where the contrast is directly administered into the conduit via a Foley catheter whereas a “stentogram” is a fluoroscopic examination of the urinary tract that involves administration of contrast via the externally draining surgically placed ureteric catheters. Fluoroscopic screening is carried out as the contrast is being excreted naturally from the renal pelvis into the conduit. A nephrostogram (CT or fluoroscopic) is a contrast study whereby the renal pelvis is directly cannulated for contrast examination. This is usually performed at the time of insertion of percutaneous nephrostomy.

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