



ORIGINAL ARTICLE / *Genito-urinary imaging*

Minimally invasive radiologic techniques in the treatment of uretero-enteric fistulas



E.K. Lang^{a,b,d}, A. Allaei^{c,*}, L. Robinson^c, J. Reid^c,
H. Zinn^c

^a Department Radiology, Tulane School of Medicine, New Orleans, LA, United States

^b Johns Hopkins Medical Institutions, 600, North Wolfe Street, Baltimore, MD 21205, United States

^c Department of Radiology, State University of New York Downstate Medical Center, 451, Clarkson Avenue, Brooklyn, NY 11203, United States

^d Tulane University Hospital, 1415, Tulane Avenue, New Orleans, LA 70112, United States

KEYWORDS

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Abstract

Objectives: The goal of this study was to assess the efficacy of minimally invasive interventional radiologic (IR) techniques in the management of uretero-enteric fistulae in comparison to established surgical modalities.

Materials and methods: Twenty-five patients (16 men, 9 women) with a mean age of 47 (range: 19–77 years) with uretero-enteric fistulae were treated with percutaneous nephrostomy, double “J” stent, radiologic uretero-neocystostomy, and radiologic uretero-pyelocalicostomy. All patients had a single fistula each. Uretero-enteric fistulas were due to direct or iatrogenic trauma in 14 patients (uretero-ileal fistulas, $n=6$; uretero-colonic fistulas, $n=4$; uretero-duodenal fistulas, $n=2$; uretero-pancreatic fistula, $n=1$; uretero-fallopian tube, $n=1$), complications of pelvic neoplasms in 4 patients (uretero-sigmoid fistulas, $n=4$), inflammatory disease in 4 patients (uretero-ileal fistulas, $n=2$; uretero-sigmoid fistulas, $n=2$), and avascular necrosis of renal transplants in 3 patients (uretero-sigmoid fistulas, $n=3$).

Results: Drainage by percutaneous nephrostomy and double “J” stent resulted in closure of 8 uretero-enteric fistulae over 7–16 weeks. Four uretero-enteric fistulae obliterated after re-routing urine flow using 3 radiologic uretero-neocystostomies and one IR pyelocalicostomy. In other patients, flow through the fistulae was substantially decreased by five double “J” stents and 3 percutaneous nephrostomies. The duration of inpatient hospitalization was significantly less for patients managed successfully by IR procedures than those treated by surgical modalities, 5.07 versus 10.5 days mean ($P < 0.05$).

* Corresponding author. 451 Clarkson Avenue, Box no 47, B Bldg, 3rd Fl, Room B3304, Brooklyn, NY 11203, United States.
E-mail address: aallaei@gmail.com (A. Allaei).

Conclusions: IR procedures provided definitive treatment in 48% of uretero-enteric fistulae at significantly reduced inpatient hospitalization and cost. As palliative treatment, it improved the quality of life.

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Because of the retroperitoneal location of the ureter, uretero-enteric fistulae are relatively rare, accounting for only about 1% of urinary tract fistulae. However, significant morbidity and severity of consequences mandate closure of these fistulae. Penetrating injury and iatrogenic trauma are the major causes of uretero-enteric fistulae [1–8]. Ischemia and de-vascularization of the ureter as consequence of radiation therapy or occurring in patients with chronic rejection of renal transplants is another cause [2,9,10]. Chronic inflammatory disease of adjacent bowel, such as Crohn's disease, terminal ileitis or diverticulitis, as well as necrotic neoplasms involving bowel and ureter may also result in uretero-enteric fistulae [1,11,12]. Fistulae may also occur between ureters and arteries and are a distinct subtype [13–16].

Surgical management by uretero-neocystostomy, small bowel interposition, Boari flap with ureter re-implantation, uretero-ureterostomy and native ureterostomy to transplant kidney pelvis or calyx are the preferred methods, achieving closure of the fistulae in 70.6% of patients [3,8–10,17]. However, recently conservative measures such as drainage by percutaneous nephrostomy tube (PCN) or stents, in conjunction with immunosuppressive and antibiotic therapy, have reportedly achieved long-term cure rates in 62% of patients [6,10,12,18,19]. The goal of this study was to assess the efficacy of minimally invasive interventional radiologic (IR) techniques in the management of uretero-enteric fistulae in comparison to established surgical modalities.

Materials and methods

We present a retrospective study of 25 patients (16 males, 9 females) with a mean age of 47 (range: 19–77 years) treated for uretero-enteric fistulae by PCN, double "J" stent, percutaneous radiologic uretero-neocystostomy and radiologic uretero-pyelocalicostomy. The data were abstracted from the radiologic data files and PACs of Tulane University Hospital, LSU Medical Center and affiliate hospitals, and Johns Hopkins Medical Institutions, Bayview Center, Baltimore, MD, from February 1979 to March 2011. IRB was waived for this retrospective study but informed consents had been obtained for all procedures.

After the clinical diagnosis of uretero-enteric fistula had been established, patients were offered surgical management or treatment by minimally invasive IR techniques. For assignment to surgical management the selection criteria were: co-existent bowel or other abdominal organ injuries mandating surgery, dehiscence of the mid-ureter segment greater than 5 cm, amenable to general anesthesia. IR management selection criteria included: advanced age (age > 60 years), medical co-morbidities, amenable to

conscious sedation. Exclusion criteria for IR management were: need for additional abdominal surgery, dehiscence of the mid-ureter of greater than 5 cm, uncontrollable bleeding diathesis, and impending necrosis of the ureter. In 25 patients slated for IR management we encountered the following co-morbidities: diabetes in 6 patients, hypertension 5, COPD-emphysema 4, neoplasms 4, obesity 6, prior myocardial infarct 1, prior pulmonary infarct 2, renal disease 2, diverticulitis 2, Crohn's disease 2, biliary calculi 2.

Definitive treatment by IR techniques (endpoint closure of the fistula) was pursued in 13 patients, in another 12 patients this goal was downgraded to palliation after failure to attain the desired goal by the IR intervention became apparent.

The following uretero-enteric fistulae were managed by IR techniques: one uretero-duodenal fistula, one uretero-fallopian tube fistula, 2 uretero-colic fistulae, one uretero-pancreatic duct fistula (Fig. 1a, b), 2 uretero-ileal fistulae (Fig. 2), 6 uretero-sigmoid fistulae (Fig. 3, Table 1). Direct or iatrogenic trauma was the underlying cause in 6 (46%), neoplasm 2 (15.5%), inflammatory disease 2 (15.5%) and avascular necrosis of the transplant ureter in 3 patients (23%) (Table 1).

In twelve patients follow-up nephrostograms failed to show a tendency toward obliteration of the fistular tracts after 3 to 6 weeks of drainage and surgical management was hence instituted. Direct or iatrogenic trauma was the underlying cause in 8 (67%), neoplasm 2 (16.5%), inflammatory disease 2 (16.5%) (Table 2).

Image guided percutaneous nephrostomy was the preferred first intervention in treatment of uretero-enteric fistulae not associated with a significant dehiscence of the ureter or strictures caused by encasement. Image guided access to the posterior interpolar calyx was favored and 4.5 to 8 French pigtail catheters (Bard Urologic, Milwaukee, WI) were seated in the pelvis. Drainage was pursued for 5 to 8 weeks or until the fistular tract was no longer visualized on antegrade pyelogram.

For strictures caused by encasement or dehiscence of the ureteric segments 5 cm or greater, 5 to 9 French polymeric double "J" stents (Bard Urologic, Milwaukee, WI) were favored. These were seated under image guidance preferably via an antegrade approach (8 antegrade approach, 3 retrograde cystoscopic). Occasionally dilatation with 4 cm, 5 mm high-pressure balloon (Olbert, Bard Urologic, AT) was necessary to facilitate passage of the stent.

Percutaneous antegrade image guided uretero-neocystostomy was advocated for patients with a long dehiscence, neoplastic or inflammatory mass obstructing the pelvic ureter. An antegrade pyelogram was performed to characterize the topographic anatomy of the lesion. Under

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