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Long-term adult renal graft outcome after ureteric drainage into an augmented bladder or ileal conduit

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Abstract Patients with an augmented or diverted urinary system are considered higher risk recipients in view of increased technical problems and infective complications. We studied the long-term renal graft function and survival in patients with a pretransplant ileal conduit or ileal/caecocystoplasty. Between 1986 and 1997, 14 of 1253 (1.1%) renal transplant recipients had their transplant ureters anastomosed into an abnormal urinary tract. These consisted of ten ileal conduits and four ileal/caecocystoplasties. Median follow up was 42 months (range 1–156). All ten ileal conduits were discharged with a functioning graft. There was one graft loss chronic rejection and one cardiac death. The

median creatinine level was 130 mmol/l and 50% have a urinary infection. All the patients with an ileal/caecocystoplasty were discharged with a functioning graft and these are still functioning; median creatinine of 132 mmol/l and 75% have a urinary infection. One- and 3-year graft survival was 93% and 86%. We conclude that the long-term outcome of renal transplantation in carefully assessed patients with an abnormal urinary tract is satisfactory despite a high incidence of urinary infection.

Key words Renal transplant · Bladder augmentation · Ileal conduit

Introduction

It is necessary for the ureter of a transplanted kidney to be anastomosed onto a suitable reservoir. This reservoir should ideally have adequate compliance, adequate capacity and efficient voluntary emptying. For patients with an abnormal lower urinary tract the bladder may not be suitable. In these cases augmentation of the bladder, or urinary diversion via an ileal conduit are options.

An ileal has traditionally provided a relatively uncomplicated means of allowing low-pressure urinary drainage. Posttransplant urinary tract infection (UTI) and patient dislike of a stoma are, however, negative factors. Bladder augmentation, usually in association with use of clean intermittent catheterisation has become an accepted part of urological practice and has been used for implantation of the transplant ureter

[1–4]. Augmented bladders have been used for renal transplantation in relatively small numbers and their suitability remains controversial.

Patients and methods

A retrospective analysis was carried out to analyse the outcome of renal transplants performed onto an abnormal renal tract. Between 1986 and 1997, 1253 renal transplants were performed at this unit. Of these, 14 (1.1%) were performed in the presence of an abnormal lower urinary tract. Notes and current creatinine levels were reviewed. An ileal conduit was used as the method of reconstruction in 10 out of 14 patients (M/F: 7/3, median age 41 years, range 31–68; Table 1). The pretransplant diagnoses were: neurogenic bladder ($n = 8$), ectopia vesicae ($n = 1$) and tuberculosis ($n = 1$). Location of the conduit intraoperatively was facilitated by passing a Foley catheter and inflating the balloon. In all but one case the kidney was implanted extraperitoneally.

Table 1 Ileal conduit patients (*UTI* Urinary tract infection)

Patient	Age (years)	Sex	Tx	Diagnosis	Conduit	Complications	Follow up (years)
JM	60	M	18 Feb 1984	Tuberculosis	1975	Nil	13
DF	41	M	8 Sept 1987	Ectopia vesicae	1986	1 UTI	10
AW	34	M	11 Jul 1942	Spina bifida	1992	1 UTI	5
AM	32	M	24 Jun 1992	Spina bifida	1991	1 UTI	5
KL	68	M	28 Nov 1993	UTI's	1961	Died (cardiac)	NA
AP	44	M	30 Jan 1992	Neurogenic bladder	1991	1 UTI	5
SB	39	F	18 Jan 1996	UTI's	1994	Chronic rejection	NA
YW	32	F	4 Sept 1988	Neurogenic bladder	1969	1 UTI	9
MH	31	M	21 Jun 1994	Neurogenic bladder	1994	Acute rejection (treated)	3
LP	33	F	13 Dec 1996	Spina bifida	?	Nil	Eight months

Table 2 Bladder augmentation patients (*UTI* Urinary tract infection)

Patient	Age (years)	Sex	Tx	Diagnosis	Complications	Follow up (years)	Latest creatinine
LG	34	F	20 Dec 1986	Neurogenic bladder	UTI, chronic rejection	11	NA
LW	24	F	3 Sept 1996	Neurogenic bladder	3 UTI's	1	148
MW	25	M	18 Sept 1996	Spina bifida	3 UTI's	1	147
GB	26	M	7 Jan 1997	Spina bifida	Numerous UTI's, nephrectomy 7 Aug 1997	Six months	NA

In 4 of the 14 patients (all with neurogenic bladders) the transplant ureter was implanted into an ileal or caecocystoplasty (M/F: 2/2, median age 27 years, range 24–34; Table 2). The bladder was washed out pre- and intraoperatively with chlorhexidine prior to making the surgical incision. Ureteric reconstruction was preferably carried out to the bladder mucosa rather than the bowel mucosa wherever possible. The median follow up was 5 years (range 0.5–13) in the conduit group and 1 year (range 0.5–11) in the ileal/caecocystoplasty group. We analysed graft outcome, incidence of infective complications and current serum creatinine levels.

Results

Of the 10 ileal conduit patients, all were discharged with a functioning graft. There were two graft failures (one chronic rejection at 6 months and one late cardiac death with a functioning graft). The median current creatinine level in this group is 122 mmol/l (range 87–186). Urinary infections occurred in 5 out of 10 patients, with no patients experiencing more than one episode of infection. Of the 4 bladder augmentation patients, all were discharged with a functioning graft with bladder emptying by intermittent self-catheterisation. There were two graft failures (chronic rejection at 11 years) and recurrent urinary sepsis in 1 patient starting 3 months post-transplant and resulting in graft nephrectomy at 6 months). Urinary infections occurred in all patients, and 3 out of 4 patients developed multiple UTI episodes. The overall graft survival in these 14 patients was 85% at 1 year and 71% at 3 years.

Discussion

Neurogenic bladders caused by spina bifida and sacral agenesis, and posterior urethral valves are the congenital anomalies that result in unsuitable urinary bladders for transplantation. Renal transplantation into an abnormal urinary tract was known as early as 1966, when Kelly transplanted a kidney draining into an ileal conduit [5]. The options for urinary drainage after careful urodynamic assessment is either into an augmented bladder with clean intermittent catheterisation or into a low-pressure conduit to a collection appliance [1–3, 5]. Careful preoperative assessments include urodynamic studies and a retrograde cystogram when indicated. In patients with bladder augmentation, an acceptable low intravesical pressure (less than 40 cm water) should be documented within the respective range of working bladder volumes. If intermittent catheterisation is necessary, patient training and compliance should be demonstrated whenever possible before transplantation. A functionalised augmentation reconstruction is preferable to a dry augmentation, since the augmented portion may contract and failed to expand after transplantation [3].

Our study demonstrated that all 14 patients were discharged with a functioning graft, although a higher incidence of urinary infections was documented. The average hospital stay was similar to patients with implantation into a normal urinary tract. The ileal conduit patients had a lower incidence of urinary infections (50%) and multiple UTI episodes were not observed. In pati-

ents with bladder augmentation, urinary infections were universally observed, despite careful washout of the bladder prior to transplantation and intermittent self-catheterisation. Multiple UTI episodes were seen in 75% of patients, and one graft was lost secondary to persistent sepsis. Despite the high incidence of UTIs, graft survival is not dissimilar to patients with implantation into a normal lower urinary tract. An abnormal urinary tract should not preclude renal transplantation provided a suitable reservoir has been achieved.

In conclusion, the results of renal transplantation onto an ileal conduit are good with survival not dissimilar to patients with a normal lower urinary tract. Urinary infections are common, but do not appear to preclude long-term survival. The outcome in patients with transplantation onto augmented bladders can also be satisfactory. Infections in this group can present a significant problem. Patient compliance with intermittent self-catheterisation is vital.

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