

Urologic Complications in 159 Consecutive Renal Transplantations

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ABSTRACT

The urologic complications were reviewed in 159 consecutive renal transplantations. There were 23 major complications (14 %) in 22 patients. One patient died as a consequence of urologic complications and two other grafts were lost. In the remaining cases the grafts could be saved by surgical revision or conservative treatment. The principles of diagnosis and treatment of these complications are discussed.

INTRODUCTION

Although the diagnosis and treatment of graft rejection is the main problem in renal transplantation, surgical complications can create clinical difficulties. Survival of patients and of grafts has improved considerably in recent years (3,14), predominantly due to better understanding of transplantation immunology. The incidence of technical complications has not correspondingly decreased. The complications associated with ureteral reconstruction still cause significant morbidity and also some mortality (9,10,11,13). The present study was initiated to review the incidence of urologic complications in our renal transplant patients in the past 3 $\frac{1}{2}$ years and to evaluate our diagnostic and management procedures.

MATERIAL AND METHODS

Between January 1981 and July 1984, 159 renal transplantations were performed on 144 patients. Ten of the patients received kidneys from living relatives. The first 89 transplantations were made with azathioprine and prednisolone for immunosuppression, whereas in the later 70 cases cyclosporin A and prednisolone were used.

Operative procedures

For the primary urinary drainage, ureteroneocystostomy (1,15) was used in all cases. The bladder was filled with saline solution via a urethral catheter and an incision 3-4 cm long was made in the dome of the bladder down to the mucosa. At the distal end of the incision the mucosa was opened and the split end of the graft ureter was anastomosed to the opening in the mucosa, using a running 5-0 Vicryl^R suture. The muscle incision was closed with interrupted sutures, creating a submucosal tunnel to prevent reflux.

For secondary neocystostomy the same technique was used, provided that the length of the remaining ureter was sufficient for a tension-free anastomosis, but in these cases a ureteral stent was left for 3-10 days. If the ureteral length was insufficient for neocystostomy, a ureteropelvostomy was made, utilizing the graft recipient's own ureter for urinary drainage. In most of such cases the recipient's own kidney was left behind. Percutaneous nephropelostomy was made under ultrasound guidance.

Diagnostic procedures

The patients were monitored with daily routine laboratory tests, including serum creatinine, urea, white blood count, haemoglobin and electrolytes. We have tried to perform ultrasound scanning as a once-weekly routine in the first three postoperative weeks, and additional scans were made if urologic complications were suspected. Renal scintigraphy was performed on the first postoperative day and once weekly for 3-4 weeks. Intravenous pyelography or ultrasound-guided antegrade pyelography was added if further information was needed.

RESULTS

Among the 159 transplantations there were 23 major urologic complications in 22 patients, giving an overall rate of 14 %. Ureteral obstruction occurred on 11 occasions in 10 patients, and urinary leakage in 12. These 22 patients are individually presented in Table 1.

One of the 144 patients died of sepsis following urinary leakage, giving a mortality rate of 0.7 %. Three grafts were lost, two because of upper or lower polar necrosis with urinary leakage, and the third was in the fatal case. The rate of graft loss thus was 1.9 %. To treat the urologic complications, 23 additional procedures were performed (Fig. 1).

Secondary ureteroneocystostomy was successful in seven of nine cases, giving adequate urinary outflow and/or healing of urinary fistula. In one patient a distal ureteral stenosis was corrected by neointplantation, but ureteropelvostomy was necessary 1 ½ years later due to progressive fibrosis of the ureter.

Table 1. Urologic complications in 159 renal transplantations

Case no	Age (yrs)	Immuno-suppression *	Time after transplant	Diagnosis	Management**	Outcome	Ob-serv-ation time
1	33	Az	21 days	fistula	UPS	satisfactory	6 mo
2	52	Az	3 days	obstruction	neointplantation	satisfactory	1 "
3	45	Az	1 mo	fistula	Tx	graft loss	- -
4	33	Az	23 mo	obstruction	clot removal	satisfactory	9 mo
5	28	Az	1 mo	obstruction	neointplantation	obstruction recurred	17 "
			18 mo	obstruction	UPS	satisfactory	2 "
6	53	Az	4 days	fistula	neointplantation	satisfactory	30 "
7	42	Az	4 days	fistula	neointplantation + lower polar resection	graft loss, patient died	2 "
8	38	Az	3 mo	obstruction	neointplantation	satisfactory	26 "
9	38	Az	2 mo	obstruction	NPS	satisfactory	15 "
10	39	CyA	2 days	fistula	neointplantation	satisfactory	17 "
11	62	CyA	2 mo	obstruction	pelvoplasty	satisfactory	14 "
12	38	CyA	40 days	fistula	UPS	satisfactory	13 "
13***	52	Az	4 days	fistula	neointplantation	satisfactory	12 "
14	61	CyA	6 mo	obstruction	NPS	unsatisfact-ory	2 "
15	54	CyA	30 days	fistula	Tx	graft loss	- -
16	59	CyA	4 days	obstruction	UPS	satisfactory	8 mo
17	43	CyA	30 days	fistula	UPS	satisfactory	6 "
18	64	CyA	6 days	fistula	neointplantation	satisfactory	2 "
19	35	CyA	7 days	obstruction	NPS	satisfactory	7 "
20	32	CyA	1 day	fistula	UPS	satisfactory	6 "
21	67	CyA	7 days	obstruction	UPS	satisfactory	3 "
22***	36	CyA	7 days	fistula	neointplantation	satisfactory	4 "

* Az = azathioprine, CyA = cyclosporin A

** NPS = percutaneous nephropylotomy, Tx = transplantectomy, UPS = ureteropelvestomy

*** = living donor

In the ninth patient the secondary ureteroneocystostomy was followed by recurrence of urinary leakage, sepsis and death.

Ureteropelvestomy was successful in all seven cases in which it was performed. In six of them the recipient's own kidney was left behind, without complications. The outcome after clot removal in one case and ureteropelvoplasty in another was likewise satisfactory.

Following conservative treatment, with percutaneous nephropylotomy, the ureteral obstruction subsided spontaneously in two of the three cases and the catheter could be removed. In the third case this conservative treatment was continued because the patient refused further surgery.

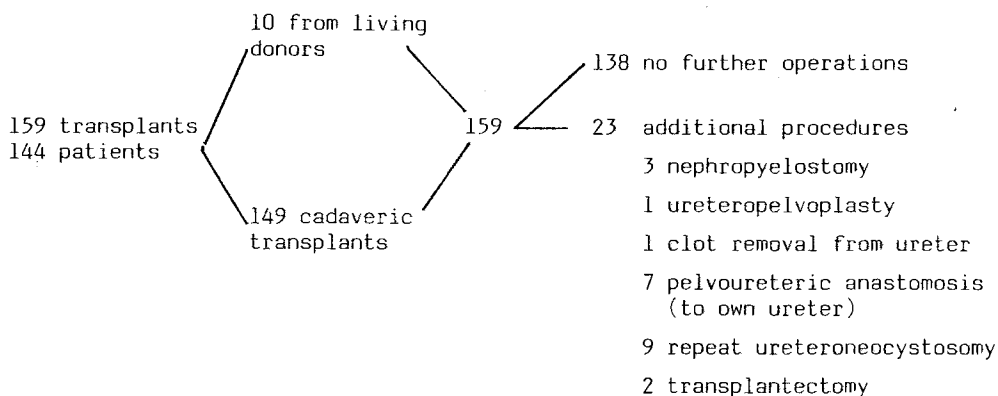


Fig. 1. Additional procedures performed in treatment of urologic complications of renal transplantation

DISCUSSION

In considering the urologic complications of renal transplantation, three figures are particularly important, viz. the rates of mortality and graft loss and the total morbidity. One patient in the present series died as a result of urologic complications. This figure is lower than in many earlier reports (10, 11, 13), but is comparable with other authors' results (2). The rate of graft loss was also fairly low, 3/159. In all three cases there was calyceal leakage due to upper or lower polar necrosis in grafts with multiple arteries. The lesson learned from these disastrous complications is that early removal of such grafts should be considered. An attempt to save one kidney with lower polar necrosis by ureteral neoimplantation and lower polar resection resulted in recurrence of the urinary fistula and, ultimately, death of the patient.

In contrast to mortality rate and graft loss, the overall complication rate was rather high compared with some other series (2, 5, 10, 12), but was largely similar to figures in two reports (9, 11). Analysis of the complications in our series revealed inadequate ureteral blood supply as the probable cause in 75 % of the cases. This stresses the importance of careful handling of the ureteral blood vessels during procurement and transplantation, and consequently these procedures should be entrusted only to surgeons familiar with the techniques. Since urologic complications produce significant morbidity, the emphasis should be on prevention. For this purpose, a method for preoperative or intraoperative assessment of the ureteral blood supply would be of great value. Successful visualization of the ureteral blood supply was obtained with sodium fluorescein in the perfusion solution (6). We have tried this method in six kidneys, but so

far have been unable to draw clinically relevant conclusions from our attempts.

Of the remaining cases with aetiology other than ureteral ischaemia, two had urinary leakage due to insufficiency of ureteroneocystostomy and in one case the ureter was inadvertently anastomosed to the peritoneum. The patient with ureteral obstruction from blood clots was of special interest, since the haematuria was caused by an infection with adenovirus type 11 (4). Our series contained one case of ureteropelvic junction obstruction probably preexisting in the graft but becoming significant when the kidney was in a new position. This complication has been earlier reported (11). Our case was successfully managed with a von Lichtenberg ureteropelvoplasty (7).

Our results indicate that it is possible to perform a ureteropelvostomy and simply ligate the proximal end of the patient's own ureter, leaving the native kidney behind. We have not observed infection in the remaining kidney or other negative effects from this procedure. Nonperformance of nephrectomy minimizes the operative trauma - a great advantage in this group of patients.

Since ureteral obstruction subsided during nephropylostomy treatment in two cases, a conservative approach may be warrantable in obstructive disorders. Possibly this approach may be tried for a longer period than in our study. Successful treatment of urologic complications using percutaneous nephropylostomy and dilation of ureteral strictures has been reported (8). We tried dilation of the ureter through a percutaneous nephropylostomy tube in one patient (Case 16) without success. Probably, however, this mode of treatment merits trial in most patients with stenosis of the graft ureter.

In conclusion we, like other transplant surgeons, recommend that urologic complications in renal transplantation be treated without delay. In complicated conditions, such as renal polar necrosis with calyceal urinary leakage, transplantectomy should be considered at an early stage, to avoid endangering the patient's life. If ureteral obstruction is present, a temporary urinary diversion through a percutaneous nephropylostomy is advisable. The final correction should be done later, with patient and graft in optimal condition. Minor urinary leakage without signs of infection can probably heal during prolonged urinary diversion.

We have found ultrasound scanning extremely useful in the management of urinary complications. The high diagnostic accuracy of this method, in combination with the possibilities for performance of antegrade pyelography and of creating urinary diversion, can solve various diagnostic problems as well as acute difficulties in management.

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