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Management of Ureteral Strictures in Renal Transplants by Antegrade Balloon Dilatation and Temporary Internal Stenting

Audrey Alice Yong,[1] Simon Thomas Ball,[2] Marc X. Pelling,[1]
Wladyslaw Michal Witold Gedroyc,[1] Robert Anthony Morgan[1]

[1]Department of Clinical Radiology, St. Mary's Hospital, Praed Street, Paddington, London W2 1NY, UK
[2]Department of Nephrology, St. Mary's Hospital, Praed Street, Paddington, London W2 1NY, UK

Abstract

Purpose: To evaluate the efficacy of percutaneous balloon dilatation and temporary internal stenting in the treatment of transplant ureteral strictures.

Methods: Nine patients presenting with obstructed renal transplants were treated by antegrade nephrostomy insertion, ureteroplasty, and temporary internal stenting. Following stent removal, patients were divided into two groups for analysis according to whether the obstruction occurred less than (group A) or more than (group B) 3 months following transplantation.

Results: All procedures were technically successful. In group A (n = 6), all patients were successfully treated by one or two dilatations with stenting. In group B (n = 3), two patients were successfully treated by one dilatation with stenting. Overall, eight patients (89%) have had their primary or secondary stent removed successfully at a mean interval of 97.5 days after insertion, and remain well at a mean follow-up interval of 22 months.

Conclusion: Balloon dilatation and temporary internal stenting is a useful method for treating transplant ureteral strictures.

Key words: Renal transplantation—Ureteral stricture—Balloon dilatation—Temporary internal stenting

Urologic complications following transplantation occur in up to 12.5% of patients [1–3]. Ureteral stenosis is the most common late complication, and arises as a result of ischemia usually at the site of neoureterocystostomy, although other parts of the ureter may also be involved. The ischemia may be the result of poor harvesting techniques, chronic rejection, or poor healing secondary to steroids. Early strictures occurring within 1 week of surgery are less common, and are likely to be related to technical problems at the time of primary anastomosis. Some transplant surgeons advocate the use of prophylactic, double J, internal ureteral stenting at the time of transplantation, which has been shown to decrease the rate of urologic complications in some studies [4, 5], but the use has been associated with an increased risk of urinary tract infection. In addition, urinary obstruction has been described despite the stent being in situ [6]. Improved surgical techniques primarily involving an extraperitoneal ureterovesical anastomosis have decreased the rate of urologic complications in recent years with and without prophylactic internal ureteral stenting [7, 8], and at our institution, temporary internal stenting has not been standard practice for several years.

The traditional method of treating transplant ureteral strictures has been surgical by retrograde double J stent insertion and by ureteral reimplantation if the former is not successful. Both these procedures require a general anesthetic, and the latter has an associated morbidity. In addition, surgical reimplantation may be technically difficult because of fibrous tissue formation at the site of the anastomosis, and may therefore neccessitate a more complex salvage procedure. In recent years, several articles have been published in the radiologic and surgical literature describing antegrade radiologic techniques in the management of transplant ureteral strictures, which can be performed under local anesthesia. The techniques described have all included balloon dilatation of the ureteral stricture, and in most instances this has been combined with the insertion of a temporary internal stent. Varying degrees of success have been cited, ranging from 30% to 100%, dependent on the site and nature of the stricture and the time interval following transplantation [9–19].

Correspondence to: A. Yong, MB BS, FRCS

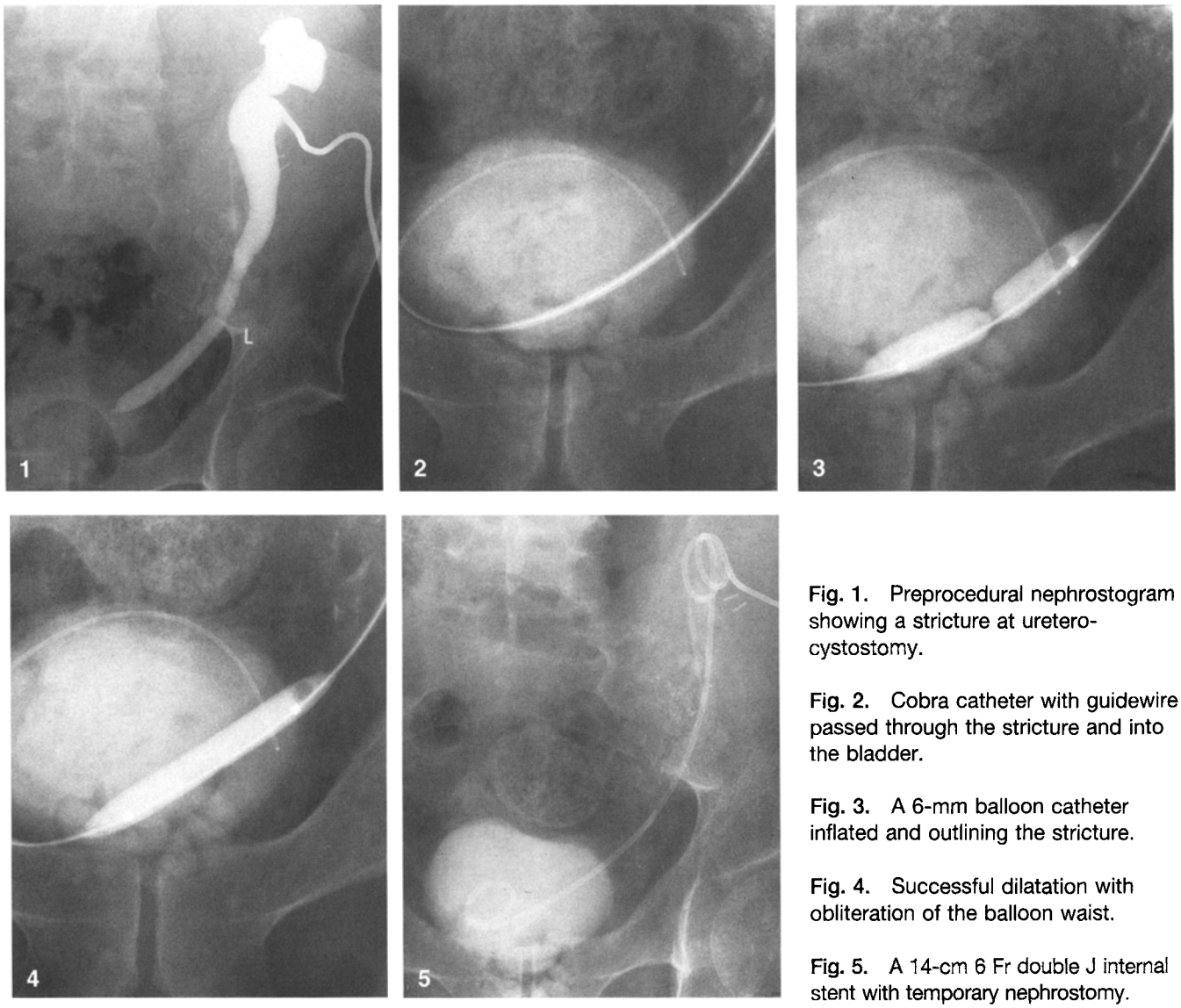

Fig. 1. Preprocedural nephrostogram showing a stricture at uretero-cystostomy.

Fig. 2. Cobra catheter with guidewire passed through the stricture and into the bladder.

Fig. 3. A 6-mm balloon catheter inflated and outlining the stricture.

Fig. 4. Successful dilatation with obliteration of the balloon waist.

Fig. 5. A 14-cm 6 Fr double J internal stent with temporary nephrostomy.

Combined balloon dilatation and internal stenting has been performed as the first-line management of transplant ureteral strictures at our institution since 1992. A retrospective analysis of all cases was performed to determine whether the long-term outcome of this procedure compares favorably with the results cited in the published literature.

Materials and Methods

Between 1992 and 1997, nine patients with transplants presented with renal obstruction, documented by pain over the transplant site and an elevated serum creatinine. Obstruction was confirmed by sonography and scintigraphy in all patients. Patients were treated by percutaneous nephrostomy with a subsequent nephrostogram to delineate the site of obstruction. This was at the pelvi-ureteric junction in one patient and at the uretero-vesical junction in eight patients. Antegrade balloon dilatation of the stricture with internal stenting was performed on all patients between 6 and 18 days (mean 10.8 days) following nephrostomy placement.

Procedure

A preprocedural nephrostogram (Fig. 1) was performed to identify the site of obstruction. After exchange of the nephrostomy tube for a 7 Fr Cobra catheter (Cook, Letchworth, UK), the Cobra catheter and a floppy-tipped Bentson guidewire (Cook) were manipulated down the ureter and gently passed through the stricture and into the bladder (Fig. 2). The floppy-tipped guidewire was exchanged for an Amplatz Superstiff guidewire. Strictures were dilated to between 6 mm and 8 mm (Figs. 3, 4), the size of balloon selected according to ureteral caliber. Following technically successful dilatation, documented by elimination of the waist on the balloon, a 6 Fr internal stent between 12 cm and 16 cm in length was placed over the guidewire (Fig. 5). A temporary nephrostomy tube was inserted and removed 24–48 hr later. The internal stent was left in situ for a variable time period prior to removal by flexible cystoscopy under local anesthesia or by fluoroscopy.

Patients were divided into two groups for analysis: obstruction occurring within 3 months following transplantation (group A) and obstruction occurring more than 3 months following transplantation

Table 1. Patient data

Patient no.	Time between transplant and obstruction	Time between nephrostomy and balloon dilatation/stent (days)	Length of time prior to stent removal (days)	Outcome	Length of follow-up (months)
1	2.5 months	7	119	RA stenosis	
			195	Successful	26
2	2 months	13	61	Successful	8
3	2 days	7	49	Recurrence	
			95	Successful	29
4	5 months	6	173	Successful	3
5	1.5 months (prophylactic stent)	8	95	Recurrence	
			21	Successful	64
6	4 months	18	Repeated stent changes	Failed	59
7	1 month	12	91	Successful	19
8	4 months	14	72	Successful	8
9	2 weeks	14	72	Successful	19

(group B). Patients were followed up clinically by sequential serum creatinine level and radiologically by sequential ultrasound with or without scintigraphy.

Results

All the radiologic procedures of nephrostomy drainage, balloon dilatation, and internal stent insertion were technically successful with no complications (Table 1).

Group A consisted of six patients in total. Three patients were treated successfully by one balloon dilatation combined with temporary internal stenting, and stent removal occurred within 3 months for all patients. Two patients developed recurrent strictures despite the stent being in situ at 49 days and 95 days, respectively, from initial stent insertion, as documented clinically by sonography and confirmed on antegrade pyelography. In the first case (patient 3), the recurrence occurred at the pelvi-ureteric junction and the patient underwent a further balloon dilatation combined with temporary internal stenting, with the stent subsequently removed at 95 days following secondary insertion. In the second case (patient 5), a long 4-cm segment recurrent stricture was identified at the uretero-vesical junction, and a permanent 7-mm × 5-cm metallic Wallstent was inserted following balloon dilatation in view of the length of the stricture, with an internal/external drain left in situ, the latter removed 21 days later. Incidentally, this patient was the only one in this series who had a prophylactic stent inserted at the time of transplantation. The final patient in this group (patient 1), developed a tight stricture in the tranplant renal artery that was refractory to angioplasty. Although this patient did not develop a recurrent ureteral stricture, the initial stent was changed as a precautionary measure. The ureteral stent was removed following successful treatment of the tranplant renal artery stenosis by permanent stenting. Overall, stent removal occurred between 21 and 195 days (mean 91.7 days) following primary or secondary stent insertion. Patients were followed up for between 3 and 64 months (mean 27.5 months). All patients remain well with no evidence of stricture recurrence.

Group B consisted of three patients in total. Two patients were treated successfully by one balloon dilatation with temporary internal stenting, the stents being removed at 72 days and 173 days, respectively, following insertion. The delay in removal of the latter patient's stent (patient 4) was due to difficulty in identifying the stent at flexible cystoscopy and the stent was eventually removed during conventional cystoscopy under general anesthesia. Both these patients remain well at a follow-up interval of 8 months and 3 months, respectively. The last patient (patient 6) suffered a reobstruction within days of primary stent removal due to a recurrent stricture at the ureterovesical junction. Despite redilatation, reoperation, and reimplantation of the transplant ureter, the stricture recurred. This has been managed successfully by repeated stent changes every 3–6 months, and the patient's renal function has remained stable over a period of 59 months.

The success rate of transplant ureteral strictures treatment by balloon dilatation and internal stenting is 100% in group A and 66% in group B. The overall success rate in our series is 89%.

Discussion

Previously published data have cited success rates following balloon dilatation and internal stenting of between 62% and 100% in the early (<3 months) group and between 16% and 66% in the late (>3 months) group (Table 2). Lieberman et al. [9] were the first to document successful balloon dilatation of a transplant ureteral stricture in 1982, followed by Glantz et al. [10], who presented two cases of successful balloon dilatation. The first series of over 10 patients with obstructed transplants was presented by Smith et al. [12] in 1988. This paper dealt primarily with the diagnosis of suspected renal obstruction in 51 transplants but also documents the successful dilatation and stenting of 22 patients out of a total of 44 with confirmed obstruction, giving an overall success rate of 50%. Unfortunately, it is not possible from the data to determine retrospectively the time interval between transplantation and obstruction, and it is also not clear whether the other 22 patients went

Table 2. Results of published series

Reference	No. of patients	Overall success (%)	Success rate		Follow-up (months)
			Early (%) <3 months	Late (%) >3 months	
[9]	1	1/1 (100)			
[10]	2	2/2 (100)			
[11]	5	2/5 (40)			
[12]	44	22/44 (50)			
[13]	14	11/14 (79)	5/5 (100)	6/9 (66)	
[14]	7	4/7 (57)	1/1 (100)	3/6 (50)	
[15]	11	5/11 (45)			
[16]	17	9/17 (53)			3–44
[17]	8	3/8 (37.5)	1/2 (50)	2/6 (30)	15–42
[18]	24	12/21 (57)	10/14 (71)	2/7 (29)	up to 56
[19]	44	13/44 (30)	8/13 (62)	5/31 (16)	9–24

straight to surgery or whether radiologic intervention was attempted in the first instance.

The first series of over 10 patients concentrating on the percutaneous management of ureteral strictures was presented by Voegeli et al. [13] in 1988. A total of 11 of 14 patients (79%) with obstructed renal transplants secondary to ureteral strictures were treated successfully by balloon dilatation and temporary internal stenting, and our analysis of their data showed that all 5 (100%) of the early group were successfully treated compared with 6 of 9 (66%) of the later group. The high success rates were attributed to careful monitoring and follow-up of all renal transplants so that complications could be detected early. Subsequent series by Gregory et al. [14], Streem et al. [15], Farah et al. [16], and Kim et al. [17] give overall success rates of between 40% and 57%, and interestingly, the two latest and also largest series by Lojanapiwat et al. [18] of 24 patients and Fontaine et al. [19] of 44 patients cite success rates following treatment of early strictures at 71% and 62%, respectively, and of late strictures at only 29% and 16%, respectively.

Our results of 100% success in the early group and 66% in the late group compare very favorably with these figures. Although this is a small series, we would suggest that the radiologic management of transplant ureteral strictures should not be limited to the early group, as suggested by Fontaine et al. [19]. Interestingly, our results correlate almost exactly with those obtained by Voegeli et al. [13] and this may be related to the careful monitoring of our transplant patients by the nephrologists and their attention to detail such that minute clinical changes are investigated immediately by sonography and scintigraphy. We recommend that antegrade balloon dilatation and temporary internal stenting should be considered as the first-line interventional procedure in all cases of ureteral strictures in renal transplants, as this may avoid the need for complex reoperation.

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