Transpl Int (1998) 11 [Suppl 1]: S150–S151

François Desgrandchamps
Alain Duboust
Pierre Teillac
Jean-Marie Idatte
Alain Le Duc

Total ureteral replacement by subcutaneous pyelovesical bypass in ureteral necrosis after renal transplantation

F. Desgrandchamps (✉) · P. Teillac · A. Le Duc
Department of Urology, Saint-Louis Hospital, 1 avenue Claude Vellefaux, 75010 Paris, France

A. Duboust
Department of Nephrology, Broussais Hospital, Paris, France

J.-M. Idatte
Department of Nephrology, Saint-Louis Hospital, Paris, France

Abstract *Objectives*: Ureteral necrosis is a rare complication of renal transplantation, and is seldom cured by endoscopic management alone. To avoid the potential hazard to the graft created by an open ureteral reconstruction in cases of renal transplant ureteral necrosis, we have appiled a new minimally invasive technique of total ureteral replacement, initially described for the palliative treatment of ureteral obstructions. The subcutaneous bypass technique is based on the use of a silicone-PTFE-bonded tube tunnelled underneath the skin. *Methods*: Total ureteral replacement by subcutaneous pyelovesical bypass was performed in three renal transplant patients (two men and one woman; mean age 41 years, (range 23–58) years with ureteral necrosis after failure of primary endoscopic treatment. The ureteral lesion was distal necrosis in two patients, and a total necrosis in the other. Under general anaesthesia and fluoroscopic guidance, a percutaneous tract was created and progressively dilated. The ureteral prosthesis was introduced into the pyelocaliceal cavities through a 30 F Amplatz sheet, then subcutaneously tracked down to the suprapubic area, and introduced into the bladder via a short incision. *Results*: There was no operative or postoperative morbidity. There was no obstruction, dislodgement or encrustation of the prosthesis. There were no bladder-related symptoms, or clinical reflux, and no abdominal wall complications. An asymptomatic episode of lower urinary tract infection (*Staphylococcus epidermidis*) was observed in the female patient. All the grafts were functioning with fine pyelocaliceal cavities, with a mean follow-up of 32 months (13–69 months). *Conclusion*: Total ureteral replacement by subcutaneous pyelovesical bypass is a simple and safe technique of ureteral reconstruction in renal transplantation. Late encrustation of the prosthesis may occur, and the prosthesis may need to be changed in such cases. Subcutaneous pyelovesical bypass can be regarded as an alternative to an open procedure to treat ureteral necrosis after renal transplantation.

Key words Kidney transplantation, postoperative complications · Ureteral fistula · Stents · Ureter (surgery)

Introduction

Ureteral necrosis continues to raise difficult problems of management in renal transplantation. An endourological approach is not always feasible and open ureteral reconstruction remains the standard treatment. In order to avoid the potential hazard to the graft created by a difficult open ureteral reconstruction, we have applied a minimally invasive technique of artificial ureteral replacement to renal transplantation [1]. This technique was ini-

tially described as an alternative to the palliative use of a percutaneous nephrostomy tube in patients with pelvic malignancies. We report our experience with this urinary reconstruction in three kidney transplant patients.

Materials and method

An artificial ureteral replacement was performed in three cadaveric renal transplant patients with ureteral necrosis: two men and one woman with a mean age of 41 years (range 23 to 58 years). The ureterovesical anastomosis was an extravesical ureteroneocystostomy intubated with a double-J stent for 4 weeks in all the patients. The mean time to the diagnosis of ureteral necrosis was 6 weeks (5 to 8 weeks). Intravenous or antegrade pyelography, showing the urinary leak, confirmed the diagnosis of ureteral necrosis in all three patients. One had complete ureteral necrosis, related to a ureteral injury during harvesting, and the other two had distal necrosis involving the distal third of the ureter. The decision for artificial ureteral replacement was always taken after the failure of an initial endourological approach. Antegrade and retrograde ureteral stenting was impossible in two patients, and ureteral stenosis recurred after a 6-week period of ureteral stenting in the remaining patient.

Technique

The patient is placed in the supine position, and a nephrostomy tract is progressively dilated to insert a 30 F Amplatz sheet into the graft cavities. A tuneller is used to create a subcutaneous tract starting in the suprapubic region and ending at the level of the Amplatz sheet. The ureteral prosthesis is inserted into the graft pelvis through the Amplatz sheet. We use a composite structure ureteral tube. The external tube is composed of spiraled porous expanded polytetrafluoroethylene (e-PTFE). The spirals ensure immediate anchoring of the tube and its porous structure allows ingrowth of the surrounding tissue ensuring watertightness of the system. The internal tube in direct contact with urine is made of silicone. The Amplatz sheet is removed and the tube is brought down through the subcutaneous tunnel, to the suprapubic area. The tube is then introduced into the bladder via a short incision and secured to the bladder wall by two absorbable sutures.

An initial retrograde cystogram is obtained to check for vesical reflux. Patients are then followed periodically with serial serum creatinine, urine culture, intravenous pyelography and renal ultrasonography.

Results

All tubes were easily placed. There were no immediate operative or postoperative complications. No secondary complications were observed with a mean follow-up of 32 months (13 to 69 months). All grafts had good late function and all tubes were patent with no evidence of encrustation or obstruction. An asymptomatic episode of lower urinary tract infection (*Staphylococcus epidermidis*) was observed in the female patient. The tubes were well tolerated underneath the skin. Reflux was present in all three patients, but with no clinical manifestations.

Discussion

Reoperation on a transplanted kidney for ureteral reconstruction may be difficult and exposes the patient and the renal graft to potentially serious secondary complications, with a mortality rate following surgical correction of up to 8% and a 1-year graft survival rate of 71% [2]. Simple ureteral stenting is not always possible and, when it can be performed, ureteral necrosis may lead to secondary fibrotic ureteral obstruction, for which the reported long-term dilatation success rate is less than 50% [3].

An artificial ureter may be considered for a selected population of patients with ureteral graft necrosis after failure of a primary endourological treatment attempt, when open surgery is likely to be hazardous because of local conditions. The superficial position of the transplant allows easy access to the collecting system. The coils of the tube ensure a constant diameter and self-retaining fixation in the tissues, and the large inner diameter limits the risk of obstruction by encrustation [1].

The results presented here indicate that the minimally invasive technique of artificial ureteral replacement may be an effective alternative treatment for ureteral necrosis after renal transplantation. However, ureteral prostheses are exposed to a long-term risk of encrustation and urinary tract infection. Maintaining a high fluid intake, correcting secondary hyperparathyroidism and renal tubular acidosis may help to prevent stone formation in kidney transplant patients [4]. However, late encrustation of ureteral prostheses may occur and changes of the stents may be necessary in such cases. Bacterial colonization of alloplasts is a major problem facing the development of urological prostheses. It has recently been shown that antimicrobial-impregnated alloplasts may delay or prevent bacterial colonization of alloplastic devices [5]. Future applications of artificial ureteral replacement, currently under evaluation, will use antimicrobial-coated ureteral stents to reduce the incidence of urinary tract infection.

References

1. Desgrandchamps F, Cussenot O, Meria P, et al (1995) J Urol 154: 367
2. Kinnaert P, Hall M, Janssen F, et al (1985) J Urol 133: 17
3. Streem SB, Novick AC, Steinmuller DR, et al (1988) J Urol 140: 32
4. Harper JM, Samuell CT, Hallson PC, et al (1994) Br J Urol 74: 147
5. Raad I, Darouiche R, Hachem R, et al (1996) J Infect Dis 173: 418