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The Taguchi Technique of the Transplanted Kidney Ureter Implantation – Single Centre Experience

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Abstract

Taguchi technique of ureteral implantation was used in 22 kidney transplant patients (group T). Group T was compared with 25 patients who were treated using Lich-Gregoir technique (group LG). Immunosuppression, incidence of biopsy evidenced acute cellular rejection (ACR), haematuria rate and ureteral complications (stricture, reflux) were assessed in both groups. The immunosuppression used was based on cyclosporin A (63.6%), tacrolimus (27.3%) and sirolimus (8.1%) in T group. Cyclosporin A (72%), tacrolimus (20%) and sirolimus (8%) were used in LG group. No induction was used. The incidence of ACR was similar in both groups – T resp. LG was 50% resp. 52%. Haematuria after operation was on average 4.0 days in the T group and on average 3.1 in the LG group. Ureteral complications were observed in 18.2% of cases in T group and in 16% of cases in LG group. No reflux was evidenced in any group. Taguchi technique is fast and very easy to do. A slightly higher incidence of ureteral complications and a longer period of postoperative haematuria were observed in T group. Taguchi technique is very easily performed with a shorter operating time. We advocate it as a method of ureteral implantation on the thin-wall urinary bladder. The results were very good in these cases.

Introduction

Kidney transplantation has become the standard surgical treatment of renal failure. Kidney transplantation is the most frequently performed organ transplantation at present. The results are based on two major surgical factors. Firstly well done vascular anastomosis between donor and recipient vessels and secondly well done ureteral implantation. This is the most common reason for postoperative short term and long term complications resulting in graft dysfunction or in graft failure.

The role of the urologist is essential in choosing and performing ureteral implantation to the urinary bladder. Every transplanting urologist tries to find easily performed, safe and fast methods to offer other surgeons for the use of. That is why so many techniques have been developed. There are three basic approaches to ureteral implantation – extravesical, intravesical and a combination of the two. In case of the extravesical approach we open the bladder wall only in an anastomosis location. Suture of the ureter and bladder mucous is on the external side of the bladder wall. This method is the most popular and the most often used (Lich-Grègoir technique) [1–3]. In the case of the extravesical approach we open the bladder wall and the suture between bladder mucous and transplanted ureter is performed inside the

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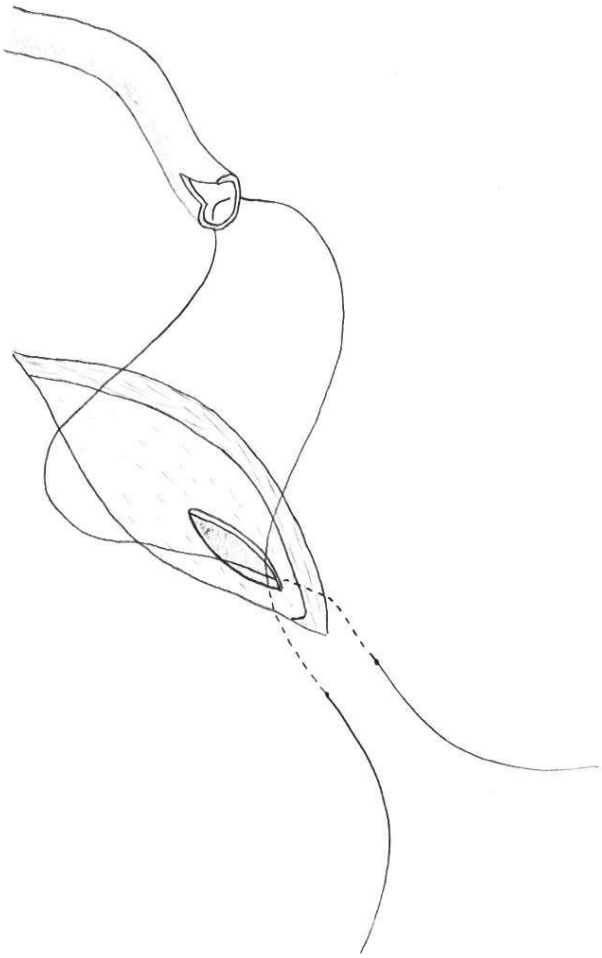

Figure 1. Opening of the bladder wall and insertion of the absorbable stitch to the ureteral and bladder wall together.

bladder (Politano-Leadbetter technique) [4]. This technique is more complicated and not so often used in transplant surgery.

Taguchi technique is an example of a combined approach of ureteral implantation. It was developed in 1971 as a modification of Paquin technique from 1959 [5, 6]. The bladder wall is fenestrated by a short incision from outside. The orifice in the bladder wall is as large as the external diameter of the implanted ureter. This orifice is used only for running the transplanted ureter into a bladder cavity. The ureter passage through the wall must be free of strangulation and tension. The implanted ureter is then fixed to the mucous of the internal side of the bladder wall by the only monofilament absorbable stitch (Fig. 1, 2). That is why this technique is so fast and easy to do. Double J ureteral stent is not usually used, a urinary bladder catheter is essential for correct and safe anastomosis healing because of a higher risk of urinary leakage.

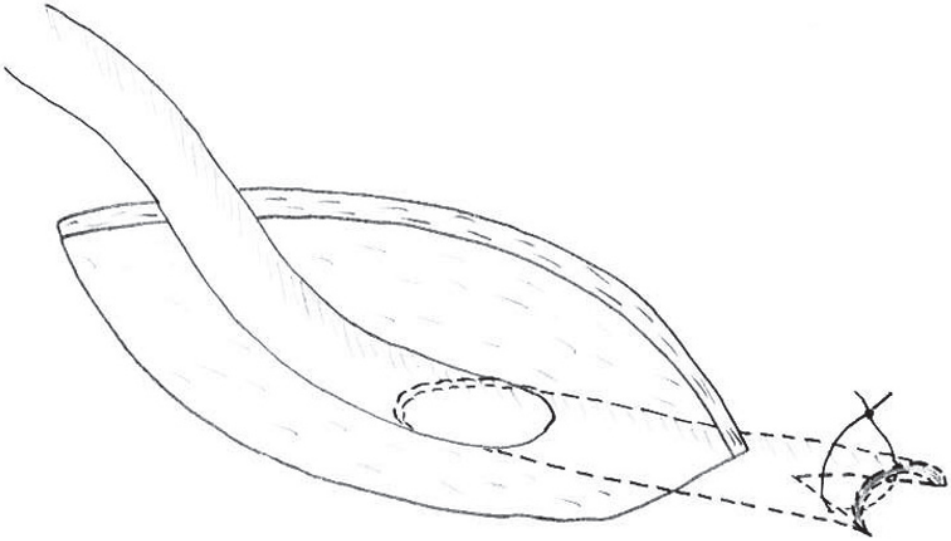

Figure 2. Final status of implanted ureter with tight stitch knot. Distal ureter is fixed inside the bladder cavity.

Material and methods

The Taguchi technique (T) of ureteral implantation was used on 22 consecutively transplanted patients. The control group was 25 kidney transplanted patients with standardly used Lich-Gregoir (LG) ureteral implantation technique. The choice of technique depended on surgeon's option only. No other factor was taken into consideration. We have analyzed the immunosuppression used, haematuria rate, age of patients, incidence of biopsy evidenced acute cellular rejection (ACR) episode and the time of its appearance. The most important factor we have analyzed was the incidence of ureteral complications (necrosis of ureter, ureteral stricture in anastomosis). All patients with graft hydronephrosis underwent cystography to avoid vesicoureteral reflux as an etiological factor. We have retrospectively analyzed and compared these two groups.

Results

Group T had 22 patients, 6 females (27.3%), 16 males (72.7%) aged 23 to 64 (average 46.7, median 48 years). Control group LG had 25 patients, 9 females (36%), 16 males (64%) aged 23 to 69 (average 48.4, median 48 years). Follow-up time in T group was 23 to 38 months (average 28.2, median 27 months), in LG group 22 to 38 months (average 29.8, median 30 months).

The immunosuppressive regime was similar in both groups based on cyclosporin A, tacrolimus or sirolimus in combination with mycophenolate mofetyl (MMF) and

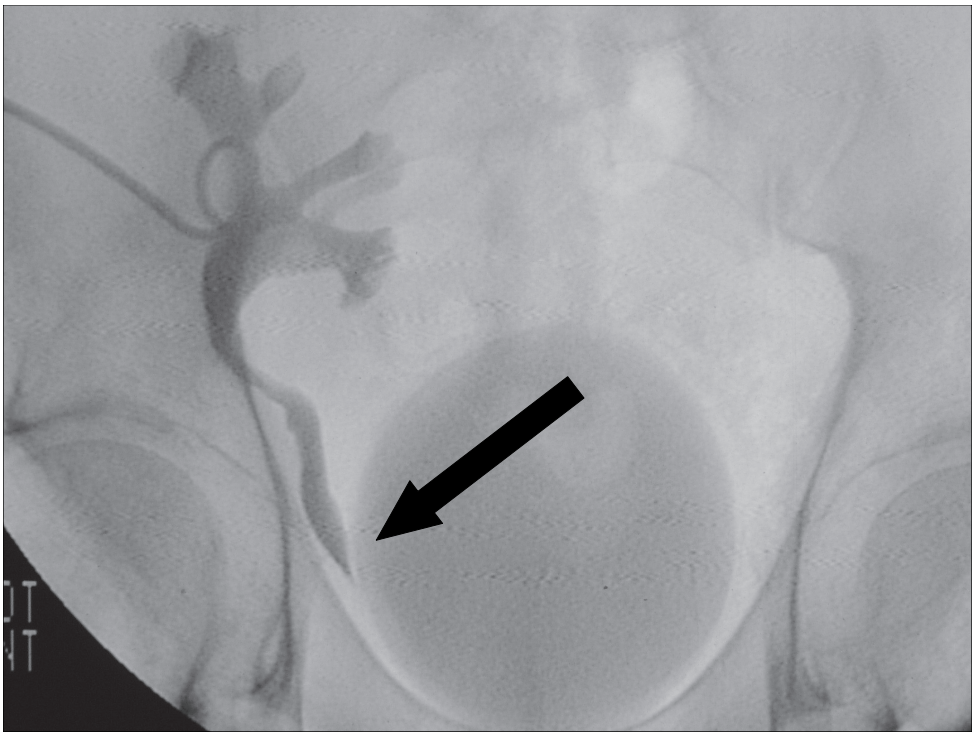

Figure 3. Pyelogram and cystogram of transplanted patient. Black arrow shows ureteral obstruction in the intramural ureteral segment.

corticosteroids. No induction therapy was used. Immunosuppressive therapy in T group was based on cyclosporin A in 14 patients (63.6%), on tacrolimus in 6 patients (27.3%) and on sirolimus in 2 patients (8.1%). In LG group immunosuppression was based on cyclosporin A in 18 patients (72%), on tacrolimus in 5 patients (20%) and on sirolimus in 2 patients (8%).

Biopsy evidenced acute cellular rejection episode was observed in 11 patients (50%) on days 7 to 16 (average 9.8, median 9) after transplantation in T group. ACR was observed in 13 patients (52%) on days 4 to 14 (average 7.7, median 7) after transplantation in LG group. Follow-up intravenous corticosteroid therapy was successful in all cases and graft function was completely repaired.

Macroscopic haematuria was observed on days 0 to 13 (average 4, median 3) in T group and on days 0 to 6 (average 3.1, median 3) in LG group. Haematuria persisting for 13 days was found in only one case of a man with a hematological disorder. Administration of blood transfusion was not necessary due to haematuria in any case.

Ureteral complications were discovered in 4 patients (18.2%) in group T and in 4 patients (16%) in group LG. Detail studies of T group have shown that necrosis of distal ureter occurred in 1 patient (4.6%) and stricture of distal ureter was found in 3 patients (13.6%). All strictures were found on the distal segment of ureter passing

through muscular bladder wall in all cases. We have never seen stricture just in ureteral and bladder mucosa junction (Fig. 3). Distal ureteral necrosis was found in 2 patients (8%) and ureteral stricture in 2 patients (8%) in LG group. Ureteral double J stent was inserted during transplantation in 5 patients (22.7%) in T group and in 1 patient (4%) in LG group. One patient with ureteral stent in T group experienced stricture developing just 1 month after stent removal.

If graft hydronephrosis was found cystography was performed. Vesicoureteral reflux was not found in any patient. Re-surgery (ureteral re-implantation to the urinary bladder) was performed in all these patients. If re-surgery was performed double J ureteral stent was inserted for 6 weeks in all cases. The results of these re-operations were excellent in all cases. All these patients are satisfied with their fully functional graft without hydronephrosis now.

Discussion

Kidney transplantation is partially vascular surgery and partially urologic surgery. All transplanting urologists want to improve their technique to achieve the best possible results. That is why so many new surgical approaches are being developed and old techniques are being re-innovated and perfected. The aim of transplanting urologists is to find an easily and quickly performed technique for common use. We must consider two basic conditions: a minimal risk of stricture development and a minimal risk of vesicoureteral reflux. We know that stricture leads to hydronephrosis with high pressure in the urinary tract. It is one of the most common surgical reasons for graft dysfunction. On the other hand vesicoureteral reflux is very dangerous for a graft. This kind of reflux has always a high-pressure character because of a short ureter and a low position of graft in comparison with the native kidney. From this point of view the Taguchi technique is an adequate method for our requirements. It is a combined technique of extravesical approach and intravesical fixation. In general, the extravesical approach is easier and less associated with patient discomfort [7]. An assessment of this technique is slightly controversial. All authors with experience of using Taguchi technique declare a longer period of significant haematuria 1.0% resp. 6.8% in Lich-Gregoir resp. Taguchi technique [7–10]. We have not observed a significantly longer period of haematuria. Because of a similar rate of urological complications between the Taguchi and Lich-Gregoir techniques some authors recommend Taguchi technique for ordinary use [8, 9]. Some other authors prefer Lich-Gregoir technique despite a shorter operation time. Although minor complications occur in Taguchi technique, fewer incidences of those were observed among Lich-Gregoir patients [7].

Conclusion. Taguchi technique is very simple with a very short operation time and minimal suture material utilization. These are the main advantages of this technique. On the other hand there is a marginally higher, but not significant rate of postoperative haematuria without the need of blood transfusion. Incidence of stric-

ture or distal ureteral necrosis is similar in Taguchi and Lich-Gregoir patients. No reflux was evidenced in Taguchi patients.

Based on our own experiences we recommend Taguchi technique if thin-wall bladder is found at the time of transplantation. Dissection of mucous membrane from the muscular wall is rather complicated in this case and we advocate the use of Taguchi technique being the first choice. On the other hand patients with heavy-wall bladders should be excluded from utilization of the Taguchi method. This patient cohort is at high risk of stricture development. We recommend double J ureteral stent insertion in case of very thin ureter or in case of imperfect ureteral viability. Ureteral stent utilization has no influence on stricture avoidance in our experience.

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