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OPERATIVE TECHNIQUE AND UROLOGICAL COMPLICATIONS IN KIDNEY TRANSPLANTATION: EXPERIENCE OF A SINGLE CENTER

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Between January 30, 1971 and January 30, 2004, 767 kidney transplants were performed at our center, 348 (45.37%) from living related donor and 419 (54.63%) from cadaver. During first eight years an ureteroureterostomy was routinely used. The notable incidence of urological complications (fistula 12%, complications of stenting 10.7%, stenosis and lithiasis 4%) was observed after 140 transplants. Majority of these complications (60%) were treated conservatively. A significant reduction in this incidence ($P < 0.001$) was achieved (fistula 1.12%, complications of stenting 0.32%, lithiasis 0.16%) by introducing an extravesical ureteroneocystostomy by Lich-Gregoire. Stenosis had the highest incidence (3.67%). Unfortunately two patients with urinary fistula died in the early phase of its application, before the routine use of ultrasound. Majority of complications (82%) were treated surgically. A native ureter was commonly used in replacing the transplant ureter. In majority of patients an end-to-end pyelo(uretero)stomy was performed. Two patients were reoperated because of fistula, and the third had a prolonged healing. In last five patients with urological complications an end-to-side pyelo(uretero)stomy was done. There was no urinary leakage. The safety of method results probably from an intact native ureter which has normal blood irrigation.

KEY WORDS: *Clinical renal transplantation, Urologic complications, Urinary anastomosis*

Urological aspects have been an important factor in successful outcome of renal transplant. In the beginning we chose an ureteroureterostomy for urinary reconstruction because of its simplicity, obviation of a vesical opening and a shorter stay of urethral catheter. High incidence of urological complications, particularly fistula, forced us to looking for a better method. Groups experienced in performing ureteroneocystostomy (UNCS) presented better results^{1,2}. For this reason we changed the method of urinary reconstruction to UNCS after eight year experience in kidney transplantation.

PATIENTS AND METHODS

Between January 30, 1971 and January 30, 2004, 767 renal transplantations included kidneys from living related donors in 348 (45.37%), and from cadavers in 419 (54.63%) patients. In 140 (18.25%) patients, an ureteroureterostomy was constructed. An UNCS was performed in 627 (81.75%) patients. In majority of patients an extravesical UNCS according to the Lich-Gregoire technique was performed. The modified technique by Leadbetter-Politano was used in 10 patients without own ureter in the period when an

ureteroureterostomy was routinely performed. In all patients with immediate function a stent was used. An ureteroureterostomy was accompanied by ureterostomy in situ or nephrostomy. In patient with UNCS a stent is placed from the renal graft pelvis along the whole ureter in the bladder and piercing the anterior bladder wall pulled out through the operative wound.

RESULTS

Table 1. presents all treated complications in the group of 140 patients with ureteroureterostomy. The incidence of urinary fistula was 12%, stenosis and lithiasis 4%. Majority of complications (60%) were treated conservatively. When necessary an open repair was performed, such lithotomy, sutures of fistula, resection of stenosis. In one patient a trans-ureteroureterostomy was performed urgently in the treatment of ureteral obstruction as a consequence of ureterostomy. There was no mortality but two patients lost the transplant because of urological complication.

Complications after 627 UNCS are shown on the Table 2. The incidence of fistula (1.12%), lithiasis (0.16%) complications caused by stenting (0.32%) and common appearance of urological complications

Table 1. Urological complications of 140 kidney transplants with ureteroureterostomy

Type of complication	Number (%)	T r e a t m e n t			
		Conservative	Results	Operative	Results
Ureteral anastomotic fistula	16 (12%)	12	1 late stenosis	4	good
Stenosis	5 (4%)	1	persistent	1	1 good 3 development of renal insufficiency
Lithiasis	5 (4%)	1	good	4	2 good 2 recidive
Calicocutaneous fistula	1 (0,07%)			1	nephrectomy
Bilateral epididymitis	1 (0,07%)	1	good	1	orchietomy
Complications of stenting:					
Urinary fistula	8 (6%)	6	good	2	good
Bleeding	6 (4%)	5	good	1	good
Ureteral obstruction	1 (0,07%)			1	good
Total	43 (31%)	26		17	

(7.18 %) was significantly lower after UNCS ($P < 0,001$). Stenosis was the most frequent complication (3.67 %). Majority of complications (82 %) were treated surgically. The operative procedures are mentioned in Table 2. A native ipsilateral ureter was commonly used in replacing transplant ureter. In three patients the transplant ureter was replaced with an ileal loop. In one of them an ileal loop was constructed before for his native single kidney. In two patients a Boari flap was constructed and in one a transureteroureterostomy.

In majority of urteroureterostomy with recipient's native ureter an end-to-end technique was done. In two patients an reoperation was necessary because of fistula. In the third patient a prolonged healing was observed.

An end-to-side pyelo(uretero)stomy was performed in the last five patients who needed ureteral correction. In one of these patients, a longer period was needed for achievement of optimal function of a new ureteroureterostomy. This was controled by measuring pressure in pylon by means of percutaneous nephrostomy. In the other patient, an oliguric episode appeared seven weeks after new anastomosis. A clinical investigation revealed dehydration with no urinary leakage. A

»double J« stent was introduced ureterorenoscopically. The convalescence of the remaining three patients was uneventful.

Two patients lost their transplant because of urological complication. In two patients a death was associated with an urological complication, with septicemia and pulmonary embolism after operation for urinary fistula, respectively.

DISCUSSION

The incidence of urological complications following kidney transplantation fortunately decreased from 20-30 % in the 1970s¹⁻³ to less than 5 % in 1990s⁴. This improvement has been achieved by several circumstances, as a consequence of improved surgical technique of organ harvesting and ureteral implantation, more selective immunosuppression and introduction of new diagnostic methods and surgical techniques which contribute to better discovery and treatment of complications. Our surgical technique in the beginning was under the influence of the transplant group in Necker Hospital in Paris. The continuity of urinary tract was established by ureteroureterostomy. In predominant surgical milieu the choice of this method

seemed suitable. The use of ureteroureterostomy resulted in high incidence of urological complications, particularly fistula. Although the final outcome was good we changed the technique to UNCS. The use of UNCS has significantly decreased the appearance of urinary fistula and of urinary complications in generally. At UNCS it is not necessary to remove the recipient's own kidney, except in special indications. The operation is shorter and preserves a source of erithopetin. Unfortunately two patients with urinary fistula died in the early phase of the application of UNCS, both before the routine use of ultrasound.

In several urological complications a percutaneous and endourological treatment was successful. In case of their failure the patients were treated surgically. In

substituting transplant ureter a recipient's own ipsilateral ureter was used. In majority of patients an end-to-end ureteroureterostomy was performed. In few cases a transureteroureterostomy, Boari flap and pyelo-(uretero)ileocystostomy was done.

Beause of several complications after an end-to-end pyelo(uretero)stomy we continued to look for a better solution. We have found it in an end-to-side pyelo(uretero)stomy⁵. Our experience with end-to-side anastomosis has been favorable. No leakage was observed. The safety of method results probably from an intact native ureter which has normal blood irrigation. With this operation we avoid nephrectomy or ligation of ureter and the possible development of infection in the nondraining hydronephrosis.

Table 2. Urological complications of 627 kidney transplants with ureteroneocystostomy.

Type of complication	Number (%)	T r e a t m e n t			
		Conservative		Operative	
		Number	Results	Method and number	Results
Anastomotic fistula	7 (1,12%)	3	2 good 1 death (sepsis)	1 ureterostomy 2 sutures of UNCS 1 end-to-end ureteroureterostomy	death (embolysm) good delayed healing
Ureteral necrosis	8 (1,27%)			1 pyeloileocystoplasty 1 Boari flap 3 end-to-end pyeloureterostomy 3 end-to-end pyeloureterostomy	megaloop syndrome good 2 good 1 fistula (operative treatment) good
Stenosis	23 (3,67%)			1 pyeloileocystoplasty 1 Boari flap 1 sutures of UNCS 1 correction of UNCS stenosis 2 re-UNCS 11 end-to-end uretero (pyelo)ureterostomy 1 trans-ureteroureterostomy 2 end-to-side uretero (pyelo)ureterostomy 1 endourologic resection 1 endourologic dilatation 2 anterograde dilatation	good renal insufficienci good good good 10good 1 staghorn calculus good 1 long achievement of optimal function good good good
Lithiasis	1 (0,16%)			1 ureteroileocystoplasty	death from hepatic failure (HBV)
Bleeding	1 (0,16%)	1	good		
Epididymitis	3 (0,48%)	3	good		
Complication of stenting: Fistula of bladder Ureteral lesion	2 (0,32%)	1	good	1 re-UNCS	good
Total	45 (7,18%)	8		37	

KIRURŠKI POSTUPAK I UROLOŠKE KOMPLIKACIJE U TRANSPLANTACIJI BUBREGA ISKUSTVA KLINIČKOG CENTRA U RIJECI

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Od 30. siječnja 1971. do 30. siječnja 2004.godine, u našem su centru izvedene 767 renalne transplantacija i to 348 (45,37%) sa živog srodnika i 419 (54,63%) s kadavera. Kroz prvih osam godina postupak uspostave kontinuiteta urinarnog trakta rutinski je postupak bila uretero-ureteralna anastomoza. Incidencija uroloških komplikacija u prvih 140 zahvata (urinarna fistula u 12%, komplikacije u vezi s drenažnom protezom urinarne anastomoze u 10,7%, stenozе i urolitijaza u 4%) bila je primjetljiva. Većina ovih komplikacija bila je liječena konzervativnim postupcima. Incidencija uroloških komplikacija značajno je smanjena ($p < 0,001$) uvođenjem ekstravezikalne ureteroneocistostomije po Lich-Gregiore-u (urinarna fistula u 1,12%, komplikacije proteze u 0,32%, litijaza u 0,16%). Najvišu incidenciju imale su stenozе (3,67%). Nažalost dva su bolesnika s urinarnom fistulom umrli u početnoj fazi primjene ove metode i to dok još nije bila uvedena ultrasonografija kao rutinska metoda. Većina komplikacija su bile liječene kirurški. Obično je primjenjen postupak upotrebom vlastitog uretera primaoca umjesto oštećenog uretera transplantata. U većine bolesnika izvršena je termino-terminalna pijelo(uretero)stomija. Dva su bolesnika morala biti ponovo operirana radi urinarne fistule, a kod jednog je bilo prisutno odloženo zaraštavanje. U zadnjih pet bolesnika s urološkom komplikacijom izvedena je termino-lateralna pijelo(uretero)stomija. U njih nije bilo primijećenog urinarnog ekstravazacije. Pouzdanost ove metode temelji se vjerojatno u intaktnom vlastitom ureteru bolesnika s normalnom i neoštećenom irigacijom.

Ključne riječi: *Klinička transplantacija bubrega, urološke komplikacije, urinarne anastomoze.*

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