

Urological Complications of Ureteroneocystostomy in Renal Transplantation; A Comparison between Intravesical Ureteroneocystostomy and Extravesical Ureteroneocystostomy^{*)}

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ABSTRACT

The authors have made extensive studies of ureteroneocystostomies, that are intravesical and extravesical methods, and postoperative urological complications on 58 cases of living related renal transplants and 12 cases of cadaveric renal transplants at the Second Department of Surgery, Hiroshima University School of Medicine.

Among the 21 cases in whom intravesical ureteroneocystostomy was employed, there was one case of urinary fistula.

Among the 49 cases in whom extravesical ureteroneocystostomy was employed, two case of postoperative bleeding, a case of stenosis of the ureter and a case of urinary fistula of the anastomosis were observed.

There was one case of graft loss in each method, but no case died.

The incidence of complications is low on both methods. But extravesical ureteroneocystostomy does not require a large incision of the vesical wall and is advantageous in having a possibility to conduct the submucosal tunnel visually and a easy doing of anastomosis between the ureter and the vesical mucosa.

Then, the procedure of our modified extravesical ureteroneocystostomy was reported.

INTRODUCTION

There are at present various methods available for reconstruction of the urinary tract in clinical renal transplantation, but when classified broadly, two methods are commonly employed, the first being intravesical ureteroneocystostomy^{8,10,14)} and the other being extravesical ureteroneocystostomy^{1,2,11)}.

Intravesical ureteroneocystostomy is an easy procedure with hardly any complications such as urinary fistula and postoperative bleeding,

and provides adequate anti-vesico-ureteral reflux, but because of a large incision made of the vesical wall, functional disturbance of the vesica and wound infections are prone to develop.

On the other hand, extravesical ureteroneocystostomy is an excellent procedure with little possibility of infection and functional disturbance of the vesica because only a small incision of the vesical wall is made. Extravesical ureteroneocystostomy must be performed with much more care than intravesical ureteroneo-

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cystostomy because of the possibility of urinary leakage into the extravascular space and of stenosis of the ureter at the site of muscular sutures.

The authors have made clinical studies on ureteroneocystostomy to enable conduct of this procedure with greater ease and precision. This is a report on the study of ureteroneocystostomies of 70 cases of kidney transplantation performed at the Second Department of Surgery, Hiroshima University School of Medicine.

MATERIAL AND METHODS

On a total of 58 cases of living related renal transplants and 12 cases of cadaveric renal transplants performed at the Second Department of Surgery, Hiroshima University School of Medicine, a comparative study was made of intravesical ureteroneocystostomy and extravascular ureteroneocystostomy to determine the differences, if any, in their postoperative complications.

1) Reconstructive methods of urinary tract

a) Intravesical ureteroneocystostomy^{8,10,14)}

We incise 8 cm of the lateral vesical wall and further incise the muscular layer and mucosa of the vesica to reach the vesical cavity. The ureter is guided to the vesica through the submucosal tunnel (2 cm in length). The vessels are ligated at the ureter stump, which is incised

5 mm at 6 o'clock position and then enlarged. Ureteroneocystostomy is performed with 5-0 catgut to create a nipple. Cystostomy closed in three layers suture.

b) Extravesical ureteroneocystostomy^{2,11)}

As shown in Fig. 1, we incise 3 cm of the muscle of the vesical wall to expose the mucosa. This can be done easily if the vesical cavity

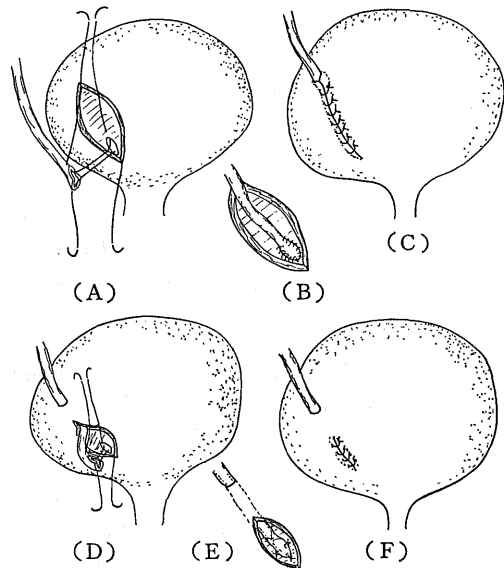


Fig. 1. Extravesical Ureteroneocystostomy
[A, B, C: Original Extravesical Ureteroneocystostomy]
[D, E, F: Our Modified Method]

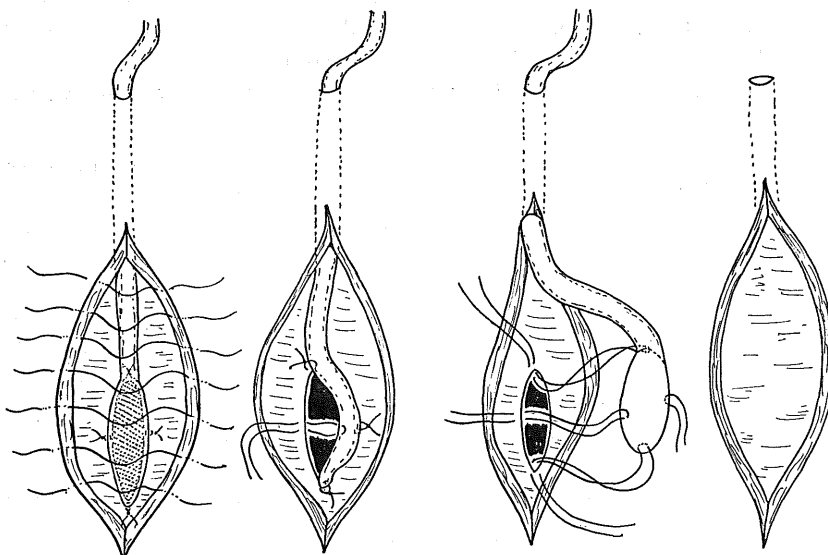


Fig. 2. Extravesical Ureteroneocystostomy
(Our Modified Method)

is filled prior to incision with 100-150 ml of solution. Then, submucosal tunnel of 2 cm is formed between the mucosa and the muscular layer in the upper incised portion of the vesical wall.

We incise the mucosa of the lower incised portion of the vesical wall and perform ureteroneocystostomy using the ureter through the tunnel. Ureter stump is incised in its long axis for enlargement and the bleeding points are completely controlled by sutures. Ureteroneocystostomy is done with continuous 4-0 catgut sutures (Fig. 1-B).

This may also be done by making four mattress sutures to the ureter projecting into the vesical cavity. That is, the ureter is sutured to the vesical mucosa with 5-0 chromic catgut at 3, 6, 9 and 12 o'clock positions of the ureter stump (Fig. 1-D, E) (Fig. 2). Finally, we close the incised muscular layer by continuous sutures of the internal layer and by interrupted sutures of the external layer, and then close the fatty layer and connective tissue layer by interrupted sutures.

RESULTS

In our cases the occurrence rate of urologic complications of intravesical ureteroneocystostomy and extravesical ureteroneocystostomy was 4.8% and 8.2%, respectively (Table 1).

Table 1. Type of Ureteroneocystostomy and complications

	No. cases	No. Complications (%)
Intravesical anastomosis	21	1 (4.8)
Extravesical anastomosis	49	4 (8.2)
Total	70	5 (7.1)

Among the 21 cases in whom intravesical method was employed, there was no complication but one case of urinary fistula. Among the 49 cases in whom extravesical ureteroneocystostomy was employed, massive hematuria was observed in two cases, one case being ureter obstruction due to hematoma of the anastomosis site. They were probably caused by insufficient hemostatic procedure of the ureter stump and were caused by bleeding tendency by ALG (one case) and DIC (one case). Reoperation was performed in the case of ureter obstruction, but in this case being postoperatively complicated by pyelonephritis, nephrectomy was ultimately done.

As other cases of complications, a case of urinary fistula in ureterovesical anastomosis portion and a case of stenosis of the ureteropelvic junction were observed.

Of the five cases with complications summarized in Table 2, two cases lost their grafts due to infections, but fortunately no case died.

The incidence of these complications does not suggest any difference between living related renal transplants and cadaveric renal transplants (Table 3).

Table 3. Urologic complications and type of transplantation

Type of transplant	No. cases	No. complications (%)
Living related doner	58	4 (7.0)
Cadaver doner	12	1 (8.3)
Total	70	5 (7.1)

DISCUSSION

It has been reported that following renal transplantation in about 0.9-29.6% of the cases

Table 2. Type of complications

Complications	No. casis	Treatment	Outoomr
Intravesical anastomosis			
Bladder leakage	1	Reoperation	Infection, Graft loss
Extravesical anastomosis			
Hematuria	2	Reanastomosis 1 Conservative 1	Graft loss Good
Ureter leakage	1	Reanastomosis	Good
Ureat. pelv. junc. stenosis	1	internal stent	Good

complications develop in the urinary tract, such as vesicoureteral reflux, urinary fistula, stenosis of the ureter, obstruction of the ureter, and postoperative bleeding^{4-8,13,15}.

Efforts must be made to prevent these complications and to treat them as much as possible, because these complications, when severe, can lead to death.

Of these complications the most dangerous is urinary fistula, the incidence and the mortality rate of which being 3.8-22.7% and 14-60% respectively in the past¹³. Even among the surviving patients, many have lost their graft function. Generally, the prognosis of urinary fistula from the ureter is worse than that from the vesica⁹. We have also experienced a case of urinary fistula from the vesica after undergoing intravesical method. The patient was fortunately able to survive, but due to infection she lost her graft.

It has been reported that urinary fistula can be prevented by careful operation,¹² but not completely because of the involvement of steroid administration and rejection of the ureter^{3,6}.

Stenosis following ureteroneocystostomy develops in 3% of renal transplants⁷. This complication may be prevented by careful conduct of ureteroneocystostomy with adequate submucosal tunnel. Should such a complication develop, reoperation must be performed to dilate the stenotic site of the anastomosis. Fortunately, only few patients have died due to this complication. We experienced a case of acute obstruction of the ureter by hematoma attributable to bleeding from the mucosa of the anastomosis employed in extravesical ureteroneocystostomy. We performed a reoperation in this case to remove the hematoma and repeated the anastomosis, but the patient lost his graft due to infection.

The incidence of these complications is low in extravesical ureteroneocystostomy^{4,7}. In our case the occurrence rate of complications of intravesical and extravesical ureteroneocystostomy was 4.8% and 8.2%, respectively. Compared with intravesical ureteroneocystostomy, extravesical ureteroneocystostomy established by Gregoir does not require a large incision of the vesica and is advantageous in having a small possibility of wound infection and of postoperative functional disturbance of the vesica⁷.

Furthermore, it is possible to construct the submucosal tunnel visually and thus vesicoureteral reflux can be adequately prevented and postoperative stenosis of the distal ureter rarely occurs. In light of these advantages, many teams have employed this method^{4,7,11,16}. In our conduct of standard extravesical ureteroneocystostomy, it has been observed, however, that the anastomosis between the ureter and the vesical mucosa is easily torn when the vesical mucosa is thin and urinary leakage is prone to occur. There is a technique to be employed in the suture of the muscular layers, for tight sutures will cause stenosis of the ureter while loose sutures bring rise to urinary leakage.

The advantages of our modified method are:

- (1) Small incision of the muscular layer and addition of a submucosal tunnel
- (2) Firm anastomosis between the ureter and the vesical mucosa by four mattress sutures
- (3) Little possibility of ureteral stenosis because the orifice of the ureter is led through the submucosal tunnel and not the muscular incision site

Attention should be made to conduct an adequate hemostatic procedure in the ureter stump in order to prevent postoperative bleeding because the anastomosis between the ureter and the vesical mucosa is made at only four points.

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