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A NEW TECHNIQUE OF URETER ANASTOMOSIS IN KIDNEY RAT SURGERY: THE TEMPORARY STENT

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ABSTRACT
A new method of ureteroureterostomy in rat kidney transplantation is presented. It is based in a temporary stent of a 1-0 nylon thread introduced in both ureter ends, which permits an easier and quicker placement of the extramucosal stitches; leaving the last knot untied, you can extract the stent and completed the anastomosis.

INTRODUCTION

Kidney rat transplantation is a widely used experimental model for its simplicity. The use of a small animal model permits making a considerable number of procedures and obtaining consistent results in any experimental situation.

Although the techniques of microvascular anastomosis have improved in these latest years leading to long term survival rates for the graft, many complications have been described in ureteric reconstruction. Since the first bladder to bladder anastomosis of Lee[11] to the latest oblique ureteroureterostomy near the pelvis of Gu[10], many techniques of ureter anastomosis have been proposed, including those using a permanent[7];12 or reabsorbible[4] splint.

As surgical instruments and magnification improved with years, a non-splinted end to end ureteroureterostomy was the most widely method used in the past few years with a complication rate as low as 5%[13]. More recently Gu[10] studied a method previously described by French9 of oblique ureteroureterostomy near the pelvis that enlarge the diameter of ureter thus lowering the chance of ureteric obstruction. Anyway the procedure is time and skill demanding, not been difficult to miss the renal end during the transplantation inside the perirrenal fat being quite tricky to find it.

Taking the advantages of splinted ureteroureterostomy and trying to prevent the disadvantages of the technique, we described a new method of performing ureteroureterostomy introducing a temporary stent (a thread of 1-0 monofilament suture), completing the anastomosis with 4 to 6 interrupted 10-0 stitches and taking out the stent before the last knot is tied.

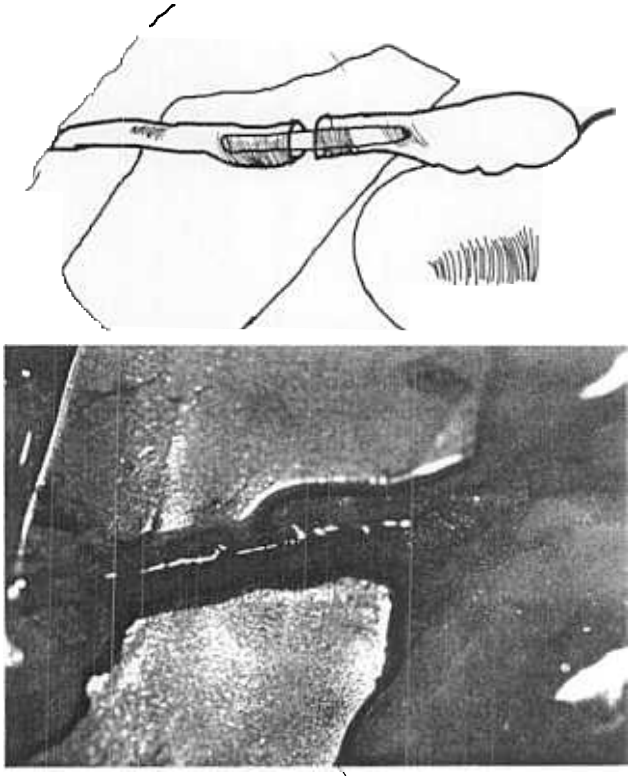
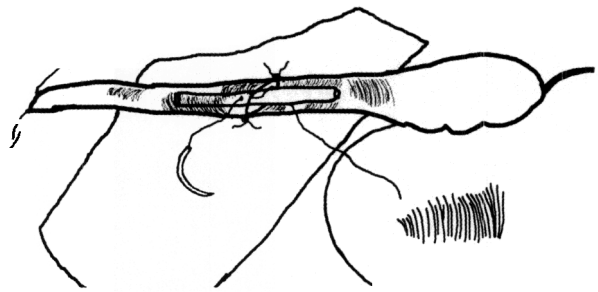


Figure 1A, 1B.- *The tutor of Propypolylene of 1/0 is intruded in both extremes of ureter.*



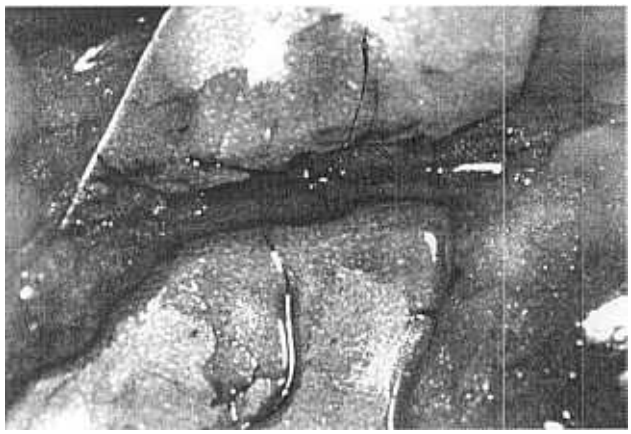
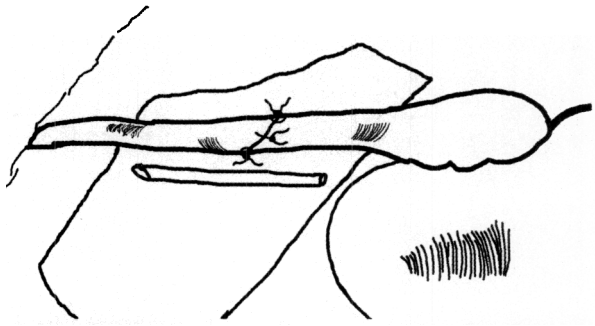


Figure 1C, 1D.- *After of the last point the tutor is explanted*



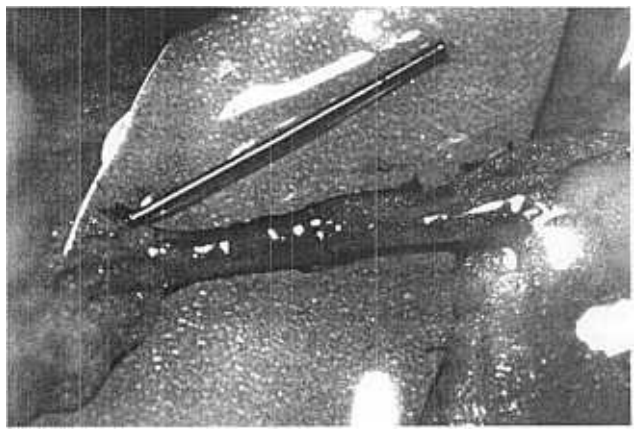


Figure 1E, 1F.- *The knot is made after the last suture. The anastomoses is concluded.*

MATERIAL AND METHODS

Animals

6 wistar rats of 450 g aprox. were used. Rats were housed in controlled cycles of 12 hours light and allowed free access to water and food before and after surgery.

Experimental design

The operations are performed in clean but non-sterile conditions. The rats are first anesthetized with methoxiflurane (forane) introducing them in a chamber for 1 minute. After this, a mixture of Ketamine 50 mg/kg, diacepam 4 mg/kg and atropine 0,2 mg/kg is given intraperitoneally. This is supplemented throughout the experiment as necessary.

The skin is disinfected with povidone-iodine after shaving the abdominal wall. A midline incision is made and the intestines are pulled to the right side to exposure the left kidney and protected with a moist gauze. After this it is dissected free from the surrounding tissues and the ureter is freed in about 2 cm. In order to test the ureterureterostomy procedure, we only performed this instead of the whole kidney transplantation.

An oblique ureterostomy is made in the ureter. After this we cut a small piece of a 1-0 monofilament suture (PROLENE®) and introduce it in both ends of the ureter (**Figure 1A, 1B**). After this, four to six 10-0 Nylon stitches are placed extramucosal leaving the last knot untied (**Figure 1C, 1D**). Then the stent is easily removed and the last knot is tied (**Figure 1E, 1F**).

After finishing the procedure the abdominal cavity is irrigated with saline and the abdominal wall is closed in two layers. The animal is then put in its cage and leaving it to recover allowing it to access free to water and food.

After a week the rat is again anaesthetized and the status of the kidney and the ureter are macroscopically tested. Then the animal is sacrificed introducing the kidney and the ureter in formalin to histological studies.

RESULTS

A total of 6 rats were made, and all the ureters were macroscopically permeable with peristaltic movements and no urine linkage.

The histological study showed a permeable lumen with a normal urothelium without inflammatory cells inside it; moderate inflammatory changes around the permeable anastomosis (**Figure 2A**) with lymphoid, eosinophyl and plasmatic cells; giant multinuclear cells were found around the suture material (**Figure 2B**). The kidney showed no pathological changes, with only moderate vascular stasis and lymphoid cells.

DISCUSSION

Ureteroureterostomy is the most critical step in kidney rat transplantation at this moment. A number of complications have been described in all the methods used in the procedure. Some good revisions of the literature have been made recently about the technique of renal transplantation and the ureter anastomosis[15]. An end-to-end technique, bladder-patch technique[3,6,11,14], insertion of the ureter into the bladder[1,2,8,12] and stent ureterureterostomy[4,7,14] are the current techniques employed in ureter anastomosis.

It is beyond the scope of this paper to make a new revision or to compare the procedures. Our aim is to show a new modi-

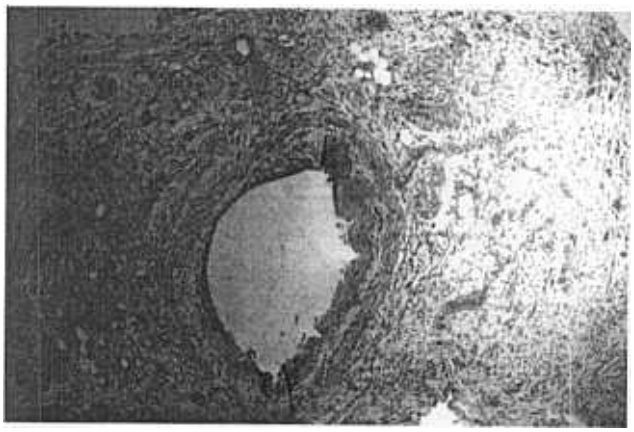


Figure 2A.- *Stein with haematoxylin-eosin of ureter anastomosed. Moderates inflammatory changes with normal urotelium.*

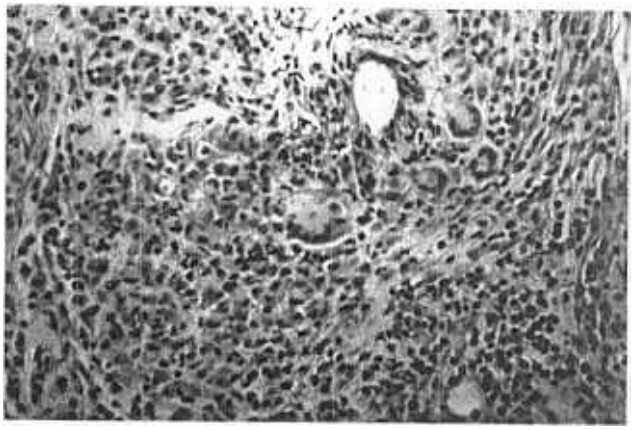


Figure 2B.- *Slide with stein of haematoxylin-eosin of ureter. Changes around the suture material*

fication of the stent ureterureterostomy procedure that in our hands seems easier and faster to perform with good results.

At the beginning we employed the end to end technique and found it difficult and time demanding. The ureteral walls are very thin; the lumen is small, being easy to catch the back wall when passing the stitch. Then we tried the technique of Gu[10] but cutting the ureter near the pelvis sometimes it is missed inside the perirrenal fat making the procedure quite tricky. After this we proved the technique of Castejon[5] but introducing a 6-0 nylon do not prevent of catching the back wall, and you apply the last stitch without stent, rising the chance of this problem. Evermore the stent is so small that sometimes it goes up to the renal pelvis or down to the bladder. Later we tried with a silicone catheter of 26 Gy and we liked very much because it is very easy to apply the stitches and knots over the catheter but it is very difficult to introduce it in the lumen of the ureter. When we tried with the 1-0 Prolene, we found that it is quite easy to introduce it, very easy to suture and more easy to extract it before the last knot is tied. It also easily permits to clean the ureter once the Prolene is extracted of any blood clot than may cause an obstruction of the anastomosis[3].

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