

## LOWERING OF THE LEFT RENAL ARTERY

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### ABSTRACT

A new operation to lower the aortic anastomosis of the renal artery is described. This procedure allows the left kidney to be lowered enough to enable repair after resections of the upper urinary tract. Renal hemodynamics were not altered and good results were obtained with no complications.

In 1978 we described the complete dissection of the right kidney and its vessels with lowering of the anastomosis of the right renal vein in the vena cava.<sup>1</sup> This procedure allowed the right kidney to be lowered sufficiently to enable repair without difficulty after large resections of the upper urinary tract (fig. 1). However, the problem of a short ureter resulting from a large ureteral resection has not been resolved completely for different reasons.

Restoration of the urinary tract by means of an end-to-end anastomosis is not possible except in cases of a limited resection of 2 to 3 cm. More tissue can be resected when there is a floating kidney. However, the surgical lowering of a normally fixed kidney is difficult because the pedicle is not extended easily. When extensive resection does not allow direct anastomosis plastic procedures have been used to obtain the necessary material to re-establish continuity. These procedures have provided acceptable results but they are not the ideal solution. Ideally, reconstitution can be obtained by means of more natural and physiological methods in which the best substitute for the ureter is the ureter itself. This has been demonstrated by results obtained in renal autotransplantation and in the operation to lower the right renal vein.

Based on these criteria I herein describe an operation to lower the aortic anastomosis of the left renal artery to enable repair after resection of 8 to 10 cm. of the upper urinary tract (figs. 2 and 3).

### ANATOMICAL BASES

The extensibility of the renal pedicle (approximately 2 cm.) is limited by the density of the connective vascular sheath. This sheath results from accumulation of the cellular tissue around

the renal pedicle and forms a sleeve that surrounds the proximal segment of the renal vessels, thus, securing the organ.

Important surgical data reveal that the aortic anastomosis of the left renal artery is closer to the kidney and longer (45 or 60 mm.) than that of the renal vein. The anastomosis also is horizontal, presents a preaortic segment and passes through the

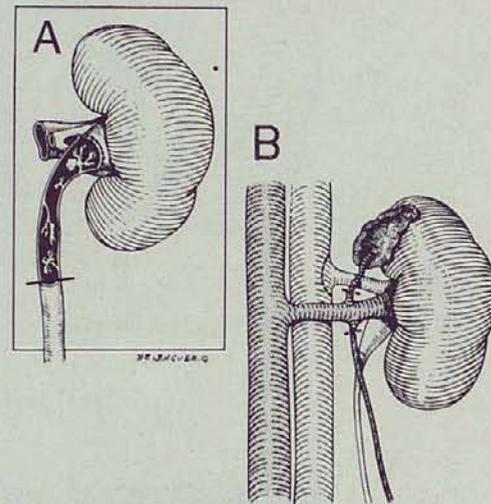


FIG. 2. A, large segmental resection shows ureteral tumors in pelvis and left lumbar ureter. B, section of gonadal and suprarenal veins, and renal artery with its aortic ostium.

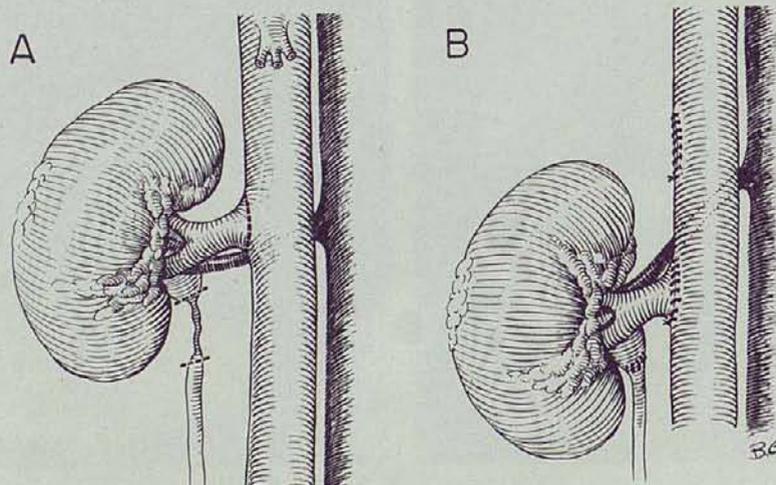


FIG. 1. A, resection of operative scar of ureteropelvic junction and right lumbar ureter. B, pyeloureteral anastomosis after outlet of right renal vein is lowered.

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aortomesenteric region with mediocre hemodynamic conditions. Also noteworthy is the fact that there are no important vascular obstacles in a large segment of the anterior surface of the aorta under the left renal vein to prevent eventual reanastomosis.

CLINICAL DATA

Surgical observation suggested the practical possibilities of lowering of the aortic anastomosis of the left renal artery once the kidney has been mobilized. The kidney will descend only 2 or 3 cm., which proves that the artery and not the vein prevents a greater descent. Therefore, it can be deduced that the height of insertion of the renal artery is in a plane closer to the kidney, which determines how far the kidney can be lowered.

This last observation revealed that if the renal artery is transferred to a lower position on the aorta and freed from its anterior surface to facilitate the pendular course of the vein a significant descent of the kidney is achieved without narrowing

of the vein. Also, hemodynamic conditions of the vein are improved by removing it from the proximity of the aortomesenteric region. Therefore, when the distance between the kidney and the bladder is diminished the ureter remains free and flexible, which allows resection of the urinary tract for 8 or 10 cm. and anastomosis of the ends without tension. The new outlet of the artery is at a right angle to the aorta without any alterations in renal circulation and function.

APPLICATIONS

Indications for this operation include large cicatricial stenoses of the lumbar ureter and pyeloureteral junction (sequelae of repeated operations for lithiasis), failure of plastic procedures for hydronephrosis, ureteral fistulas, tumors and trauma of the upper urinary tract, large losses of substance owing to operations on the digestive tract (colon and appendix) and vascular (aneurysm) and sympathetic systems, and segmental inflammatory ureteritis.

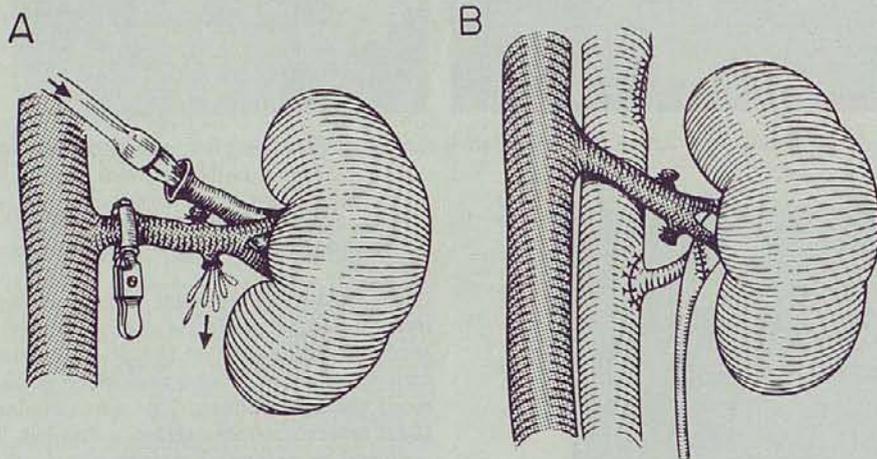


FIG. 3. A, renal hypothermia by means of intra-arterial perfusion with Collins' solution at 4C through venotomy. B, lowering of left kidney, reimplantation of reno-aortic ostium and re-establishment of urinary tract.

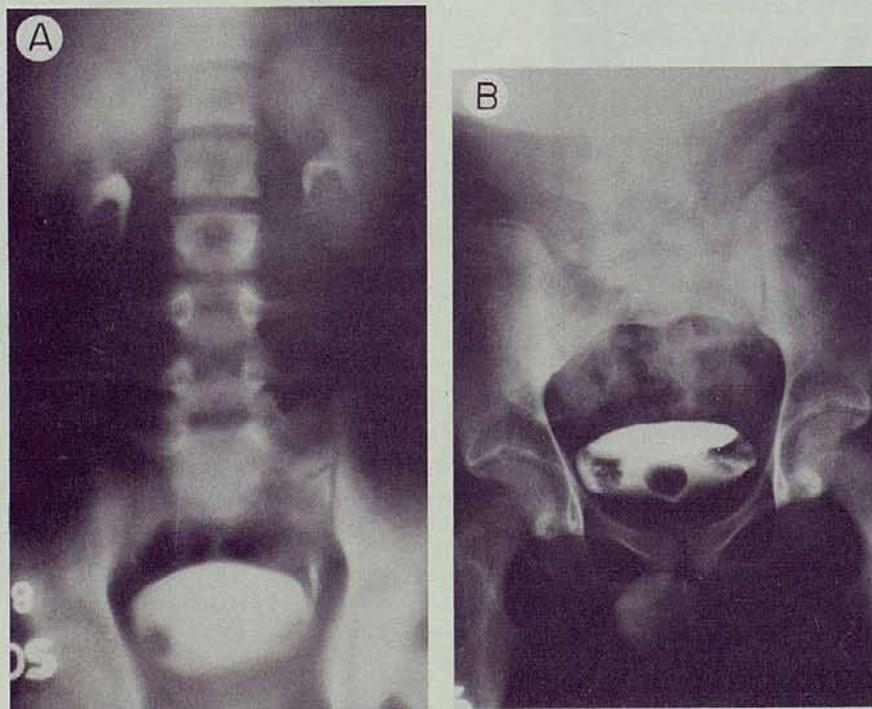


FIG. 4. A, Excretory urogram (IVP) of 19-year-old patient shows multiple papillary ureteral tumors in left renal pelvis and ureter, and bladder. B, voiding cystography shows multiple bladder tumors.

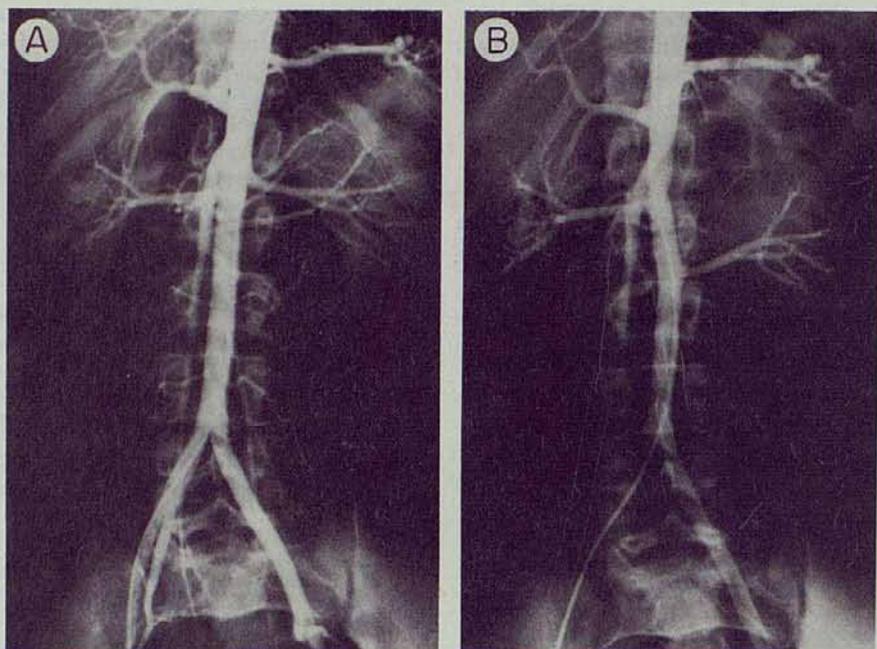


FIG. 5. A, preoperative aortogram. B, postoperative aortogram after lower left reno-aortic anastomosis

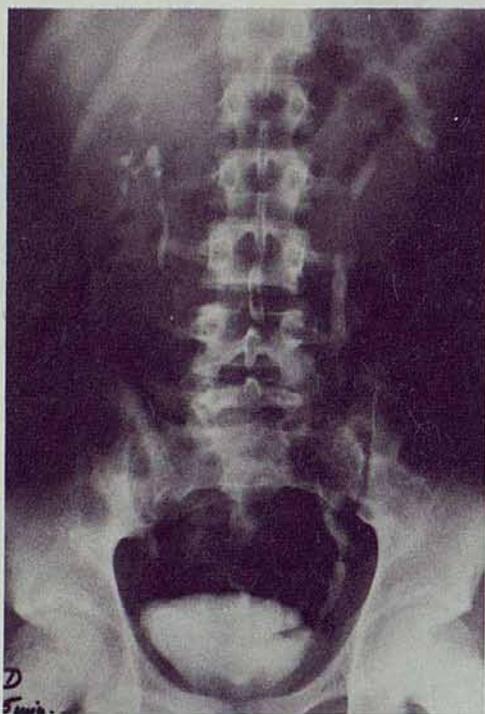


FIG. 6. Postoperative IVP

#### SURGICAL TECHNIQUE

The surgical approach is by the classic postero-lateral lumbotomy, with resection of the 12th rib. The operative procedure involves complete dissection of the kidney and pedicle. When it is verified that repair cannot be accomplished by means of a direct anastomosis the trunk of the artery, the ostium, and the

lateral, anterior and posterior surfaces of the aorta are freed sufficiently to allow the lateral placement of a Satinsky curved clamp.

Except for the gonadal vein all collaterals of the renal vein must be freed along its entire length until the vena cava is reached. Separation of the posterior peritoneum from the anterior surface of the aorta is done to facilitate lowering of the renal vein and kidney. The aorta is clamped laterally and the renal artery with its ostium is divided. The defect in the aorta is closed by means of interrupted sutures. Then, the kidney is perfused in situ with Collins' solution at 4°C according to the technique described previously (fig. 3).<sup>2</sup> The kidney, attached only to the vein, is moved along the aorta until it reaches the lowest possible point and renal circulation is re-established by anastomosis of the renal ostium to the lateral wall of the aorta with interrupted sutures.

The average interval of renal ischemia is 30 minutes. Since the kidney is hypothermic ischemic tubulopathy and intravascular thrombosis are avoided and time is allowed for preparation of the anastomosis. Urinary continuity is re-established with 5 or 6-zero catgut sutures and the anastomosis remains protected by a minimal ureterostomy using a silicone tube with multiple side holes.<sup>3</sup>

#### RESULTS

This procedure has been used in 3 patients, 1 with tumors of the ureter and renal pelvis (figs. 4 to 6) and 2 with cicatricial stenoses of the lumbar ureter and pyeloureteral junction. There were no complications and results were satisfactory.

#### REFERENCES

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