

## Living Donor Nephrectomies-Right Side —Intraoperative assessment of the right renal vascular pedicle in 112 cases—

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*Generally, the left kidney from a living donor is more commonly preferred but the right kidney is occasionally donated because of multiple left renal arteries or repeated transplantation. The right donor nephrectomy is usually more difficult compared to the left because the right renal vein is often multiple and short, which complicates dissection of the vascular pedicle. From Jan. 1989 to Sep. 1992, 112 consecutive cases of right donor nephrectomies out of a total of 771 cases were retrospectively reviewed with the preoperative renal angiography and the intraoperative assessment of the right renal vascular pedicle. The indications for right donor nephrectomy include 1) multiple or proximal bifurcating renal arteries of the left kidney (89.3%), 2) repeated transplantation in the recipient (9%). In 26.8% of the cases, there were more than two right renal veins. In the right donor nephrectomy, it is often necessary to perform vena cava cuff resection because of short and frequently occurring multiple right renal veins. For the dissection of the inferior vena cava (IVC), the aberrantly occurring right gonadal vein, the adrenal vein draining above the junction of the renal vein and IVC, and the lumbar vein below the junction should always be looked for and must be ligated if any are found.*

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**Key Words:** Right donor nephrectomy, vascular pedicle

The left kidney is usually selected for transplantation because it has a longer renal vein and thus is easier to implant in the recipient (Walker *et al.* 1988). However, the right donor nephrectomy is occasionally indicated (Kjellevand *et al.* 1991) but is usually more difficult compared to the left because the right renal vein is short and often multiple, thus complicating dissection of the vascular pedicle. The preoperative renal angiography is helpful by providing information on the renal artery but is not sufficient for the renal vein and its tributaries. Therefore,

prior to any donor nephrectomy it is very important to understand the exact anatomical structure of the right renal vascular pedicle and the potential areas of possible profuse bleeding during dissection (Kjellevand *et al.* 1991). Actually, most of the vascular accidents during the operation are attributed to easy tearing of the renal vein and its tributaries.

Our experience is that the right renal vein and its tributaries on the preoperative renal angiography and the intraoperative findings show the relatively uniform variations rather than the conventional anatomy that is overlooked because of very diverse variations in the right renal vein and its tributaries. Therefore, we retrospectively reviewed the indications of the right donor nephrectomy and the anatomical variations of the right renal vascular pedicle.

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## MATERIALS AND METHOD

From January 1989 to September 1992, we retrospectively reviewed 112 consecutive cases of right donor nephrectomy out of a total of 771 donors with the preoperative renal angiography and the intraoperative assessment of the right renal vascular pedicle.

## RESULTS

Among a total of 771 donors, 112 donors underwent right donor nephrectomy. There were 83 men and 29 women and their mean ages were 30.9 and 36.2 years, respectively (Table 1).

The reasons for right donor nephrectomy are multiple renal arteries in 90 (89.3%), 2nd transplantation in 9 (8.0%), right double collecting system in 2 (1.8%) and previous operation in 1 case (0.9%). Of the multiple renal arteries there were 2 or 3 left renal arteries in 86 (76.8%), 2 right renal arteries and 3 left renal arteries in 9 (8.0%), and proximal bifur-

cation of left renal artery in 5 cases (4.5%) (Table 2).

According to the number of the right renal veins, there was a single in 82 (73.2%), and there were 2 in 22 (19.7%) and 3 renal veins in 8 cases (7.1%) (Table 3). The right gonadal vein was drained into the inferior vena cava in 93 (83.0%), into the right renal vein in 18 (16.1%), and in 1 case (0.9%) it drained into both of them (Table 4). The short posterior draining veins, which are encountered infrequently during operation, can be easily overlooked and torn, resulting in profuse bleeding. Careful dissection of the posterior part of the inferior vena cava is sometimes necessary in order to completely mobilize the right renal artery from the aorta. The ligation of the posterior draining lumbar vein is necessary in 29 (25.9%) but unnecessary in 83 (74.1%) (Table 5). To prevent an accidental tear and profuse bleeding, the draining sites of the gonadal vein, adrenal vein and lumbar

**Table 3. The number of right renal vein**

No. Rt. renal vein	No. cases(%)
1	82(73.2)
2	22(19.7)
3	8(7.1)

**Table 1. The characteristics of right kidney donors**

No. Case(total)	112 (771)
M/F	83/29
Mean age (M/F)*	32.3 (30.9/36.2)

\*age: year-old

**Table 4. The draining site of right gonadal vein**

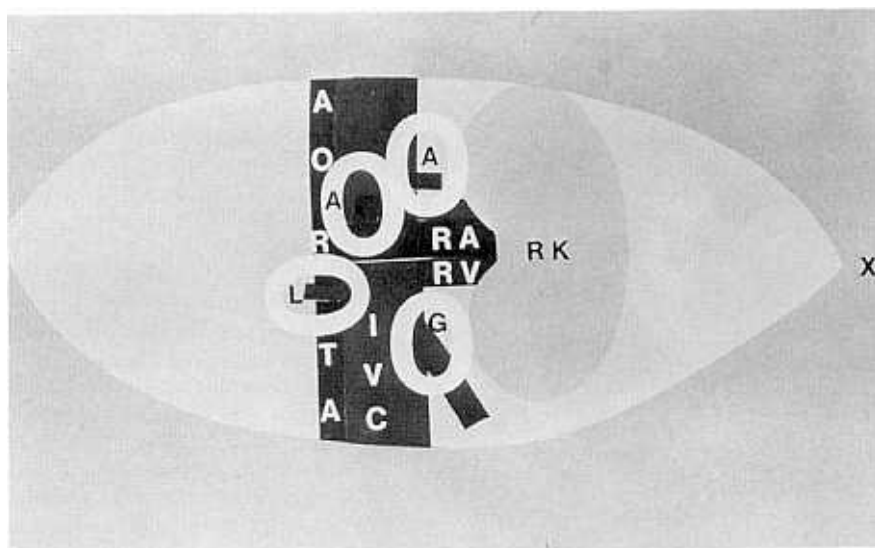
Draining site of Rt. Gonadal vein	No. case(%)
I.V.C.	93(83.0)
Rt. Renal Vein	18(16.1)
Both	1(0.9)

**Table 2. The reasons for right donor nephrectomy**

Reasons	No. cases(%)
Multiple renal arteries	86(76.8)
Rt. 1 and Lt. 2 or 3	9(8.0)
Rt. 2 and Lt. 3	5(4.5)
Proximal bifurcation	9(8.0)
2nd transplantation	2(1.8)
Rt. double collecting system	1(0.9)
Previous operation	

**Table 5. The ligation of lumbar vein is necessary for the dissection of the proximal right renal artery?**

Ligation of lumbar vein	No. cases(%)
Necessary	29(25.9)
Unnecessary	83(74.1)



**Fig. 1.** The white circle is a dangerous area for the dissection of right renal vessels. A) Adrenal artery and vein, L) Lumbar vein, G) Gonadal vein. 'X' indicates the umbilicus.

vein must be carefully dissected (Fig. 1).

## DISCUSSIONS

Renal transplantation is the best therapy for most patients with end stage renal disease (Reinberg *et al.* 1990). Most transplant centers use living related donors whenever possible, because of the superior graft and patient survival rates compared to cadaveric transplants (Streem *et al.* 1989; Riehler *et al.* 1990).

If both kidneys are anatomically similar, the left kidney is usually selected because it has a longer renal vein and thus is easier to implant in the recipient (Walker *et al.* 1988). Also kidneys with single renal arteries are used preferentially for transplantation over those with multiple vessels to facilitate the donor and recipient operations (Spencer *et al.* 1988).

Multiple renal arteries, on one or both sides, were present in 100 cases (12.8%). This finding is lower than the 24~44% prevalence of multiple renal arteries reported previously (Walker *et al.* 1988; Spencer *et al.* 1988).

In 112 (14.5%) of 771 renal donors in our

series, the right kidney was procured because of various reasons. This is somewhat lower than the 24% (Walker *et al.* 1988) and 24.3% (Streem *et al.* 1989) of previous reports. The right donor nephrectomy is usually more difficult compared to the left because the right renal vein is short and often multiple. Also difficult hilar dissection could result in significant bleeding with its attendant complications (Streem *et al.* 1989). In the cases in which the gonadal or lumbar vein drained into the short right renal vein or adjacent vena cava, more careful attention is necessary for the dissection and ligation of tributary vessels to prevent profuse bleeding and to mobilize the renal artery without difficulty (Lucas 1991; Sagalowsky *et al.* 1991). Thus it is important to thoroughly review anatomical variations before the operation.

The junction of the right renal vein and vena cava is cleared completely. A Santinsky clamp is then placed around the perirenal vena cava to occlude the vena cava partially. A cuff of the vena cava is then taken with the renal vein (Streem *et al.* 1989). This procedure improves the shorter length of the right renal vein (Streem *et al.* 1989) and makes it easier to implant in the recipient. In summary, the right donor nephrectomy is

useful if the right kidney is indicated for transplantation. However, sufficient information and careful attention to the dissection of the vascular pedicle is necessary. And it is often necessary to perform vena cava cuff resection because of a short right renal vein and anatomical variations. For the dissection of the inferior vena cava, the aberrantly occurring right gonadal vein, the adrenal vein draining above the junction of the renal vein and vena cava, and the lumbar vein below the junction should always be looked for and must be ligated if any are found.

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