Measurement of Renal Vein Renins or Differential Renal Function Studies in the Diagnosis of Curable, Renovascular Hypertension?*

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Measurements of plasma renin activity are now widely used in the evaluation of patients with potentially curable renovascular hypertension, and justifiably so. But a short decade ago, differential renal function studies were received with equal enthusiasm. What are the relative merits of these two methodologies? Because my first research efforts under the guidance of Dr. William Wallace Scott were in the field of renovascular hypertension, I have chosen this subject as my part of the Festschrift in his honor.

We have used both differential renal function studies and measurements of plasma renin activity in the evaluation of our hypertensive patients during the past few years. Using the renin method of Boucher(1), and the technique of differential function studies described earlier(2,3), we can make the following general comparisons:

The advantages of measurement of renal vein renins over differential function studies are that (a) samples can be collected with relative ease and safety and (b) renin determinations are the only way to assess the significance of unilaterally small kidneys with parenchymal disease but normal main renal arteries.

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The disadvantages of using renin activities are (a) the complexity and coefficient of variation of the renin assay, (b) the substantial influence of diet, antihypertensive medications, and position of the patient on the level of renin activity, and (c) the undeniable fact that differential renal vein renins yield no information regarding vascular disease or renal function in the contralateral kidney.

I shall now consider these points in greater detail and present some informative data from three patients.

COLLECTION OF SAMPLES

Perhaps the major reason measurement of renal vein renins will ultimately prevail over differential renal function studies is the ease and safety of collecting renal vein blood. With a fluoroscope and Seldinger catheter, one can catheterize the femoral vein, pass a curved catheter into one renal vein, and later move to the contralateral vein. Provided the patients are observed for a few hours following catheter withdrawal, the procedure can be performed on an outpatient basis. By contrast, differential renal function studies cannot be done on outpatients. More importantly, function studies have never been popular because they are lengthy and demand careful attention to technical detail for an adequate study. Including the saddle anesthesia, equilibration time, and collection of samples which show reproducible differences in consecutive periods, about 3 hr is required for a good function study. Since two prostatectomies can be done in the same period of time, it is understandable that function studies have never been financially rewarding. Furthermore, although the morbidity resulting from differential function studies has been insignificant (especially if the large ureteral catheters are left indwelling until the following day), renal vein catheterization is clearly more comfortable and acceptable to the patient than ureteral catheterization.

As appealing as this argument seems for using renal vein renins, the potential errors in the collection of renal vein blood must be remembered. In the best studies, these errors are monitored. Contrast agents, because of their potential influence on renin secretion, should not be injected into the renal veins to check placement of the venous catheter prior to sample withdrawal; in fact, since one catheter is always used to draw blood from both left and right renal veins, contrast should not be injected after collection from the first vein lest the sodium and osmotic influence of the contrast agent reduce renin activity in the contralateral kidney. Only after both left and right renal vein samples have been drawn should both veins be injected to visualize the placement of the catheter. This is clearly a disadvantage in the case of the first vein because a second catheterization may not end up in the identical position of the first withdrawal. An experienced