Introductory Remarks Concerning the Urologic
Aspects of Hypertension

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Urologic experience with uninephrectomy for renal hypertension is reviewed and a case with a prolonged postoperative period of normotension is presented. In certain instances aortograms are necessary to identify vascular lesions in the kidney causing hypertension, but renograms using radioactive I^131 may be of value as a screening procedure. An unusual case is described in which contrast material injected into the bladder could be seen to enter the renal pelves. When antibiotics and a program of frequent voiding were commenced the blood pressure fell toward normal and has remained at only minimally elevated levels for the subsequent 2 years.

In 1937, Longcope^1 and Butler^2 discussed separately the relationship of chronic pyelonephritis to hypertension. In 1938, Leadbetter and Burkland^3 reported the first clinical cure of hypertension following nephrectomy in a child who was operated upon in Johns Hopkins Hospital for an undiagnosed renal lesion which proved to be a vascular anomaly of the renal artery. In 1938, Boyd and Lewis,^4 and Barker and Walters,^5 reported relief of hypertension following removal of the unilateral, chronic, pyelonephritic kidney.

The first patient operated upon in the University Hospital for the treatment of hypertension by nephrectomy was a 37-year-old man who had a blood pressure of 185/100 mm. Hg on admission. While under observation, it ranged between 185/110 and 200/110 mm. Hg. He had marked eyeground changes. He was referred to Dr. Max Peet for splanchnecctomy. Following the work of Dr. Goldblatt, we performed pyelograms on all patients with hypertension. This man had no urinary symptoms whatever, but he did have some abnormality of the urine and was found to have a rather marked abnormality of the right kidney which we interpreted as being evidence of shrinkage of the cortex, probably the result of chronic infection (fig. 1). This man was operated upon because of hypertension, not because of any urinary tract symptoms. His kidney when removed weighed 30 Gm. Nine years after operation, this man's blood pressure was normal (132/72 mm. Hg) and his eyegrounds were normal. I see him at least once a year and his blood

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pressure has been consistently at a normal level (140/80 to 130/68) since that time.

Routine pyelograms on hypertensive patients have been made in the University of Michigan Hospital since 1937 and 4.5 to 5 per cent of the cases show bilateral or unilateral abnormalities of the kidneys which might conceivably produce hypertension. Of these 4.5 to 5 per cent, only a small proportion are unilateral. In unilateral renal lesions, such as chronic pyelonephritis, the results of nephrectomy have been satisfactory in about 50 per cent of the patients seen here and elsewhere, and our “cure rate” has been approximately 20 per cent.

Various tests have been utilized in attempting to predict the outcome of operation in unilateral renal lesions. Differential excretion of phenolsulfonphthalein, creatinine, sodium and other substances, has been studied. Our own experience, and we have carried out extensive investigations in this line, has failed to demonstrate their value as a prognostic aid in these cases. Dr. Winter of the University of California in Los Angeles has developed an isotope clearance test using Diodrast labeled with $^{131}$I which demonstrates abnormalities of the renal blood supply as well as abnormalities in the emptying power of the kidney. We have been employing the technic for over a year now in a large series of cases and have not demonstrated that the Diodrast-$^{131}$I renogram has given us any information that other tests have failed to yield. We now know that hypertension due to vascular lesions in the kidney may occur in cases where the pyelograms as well as the renal clearance tests are all normal. In these cases, the diagnosis of vascular occlusion must depend upon arteriography. However, most of the gross vascular lesions of the renal artery also demonstrate an abnormal Diodrast-$^{131}$I renogram pattern. The test therefore may prove of value in screening hypertensive patients who have normal pyelograms but in whom arteriography is felt to be contraindi-

Fig. 2. Eleven-year-old girl with severe hypertension and pyelonephritis. *Left*, Intravenous pyelogram; *right*, cystogram. Note reflux of contrast material into ureters and kidney pelves. Following program of frequent voiding and treatment of urinary infection, blood pressure fell markedly and cystograms made approximately 1 year later show absence of ureteropelvic reflux.
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cated, for the renogram is safe and easy to perform, while arteriography does carry a significant risk.

I want to discuss one other case because it tends to confuse the issue just a little bit more. This is a girl who was 11 when first seen. She had had hypertension for 4 or 5 years. Dr. Hoobler studied her extensively. I copied out of her record this morning these blood pressure reports from his laboratory: 180/140, 190/140, 170/140 mm. Hg; that seems to have been the pattern. She had x-ray evidence of chronic bilateral pyelonephritis, but the right kidney looked worse than the left as you will see in the pyelogram. There was some question brought up as to whether we should take out this girl’s right kidney, and we all decided that we would not because she had manifest disease in both kidneys. She had a splanchnicectomy performed in 2 stages, and at the time of each of these operations a biopsy of the kidney was done. Both biopsies showed chronic pyelonephritic changes. Following splanchnicectomy she was relieved of her hypertension temporarily, but the blood pressure soon returned to the preoperative level. The splanchnicectomy was performed in December 1954, and one year later she was referred back to our clinic because of recurrent urinary tract infection. She was having some fever and a great deal of bladder irritation. One of my associates saw her and inquired into her micturitional behavior and found that she was one of the peculiar individuals—and we have seen them occasionally—who only urinate once every 24 hours. On the left side of figure 2 is the pyelogram before operation showing the changes of pyelonephritis. The x-ray on the right was made after the injection of contrast material into this girl’s bladder, and it was retained in her bladder for about 30 minutes. You can see that there is reflux of the contrast medium up both dilated ureters into both of the kidneys which are infected. In order to control her infection, she was given the appropriate medication and told to urinate every 4 hours by the clock, which she has done from that time to this, which is now 2 years. I talked to this girl’s mother and to her physician about 2 hours ago to inquire what had happened in the last year, because we had last seen her a year ago. At that time, 1 year after she had been put on this program of frequent urinations, we found that her blood pressure was 125/85 mm. Hg, and on another occasion it was 110/70 and the urine was normal. We made another one of these delayed cystograms in January of 1956, and since she has been following this program she no longer has reflux of urine up her ureters. Her physician told me today that in January 1957 her blood pressure was 125/90, and in February 1957 it was 130/90 mm. Hg. I do not believe that this is a cure of hypertension, but it is a very unusual and remarkable instance of a drop in blood pressure towards a more satisfactory level, simply by clearing up an infection in the urine and asking the child to urinate 4 times a day instead of once every 24 hours.

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