Bibliography

1. Frostberg, N.: Characteristic Duodenal Deformity in Cases of Different Kinds of Peri-Vaterial Enlargement of the Pancreas, Acta radiol. 19:164, 1938.
2. Beeler, J. W., and Kirklin, B. R.: Roentgenographic Findings Accompanying Carcinoma of the Pancreas, Am. J. Roentgenol. 67:576, 1952.
3. Hodes, P. J., Pendergrass, E. P., Winstom, N. J.: Pancreatic, Ductal and Vaterian Neoplasms: Their Roentgen Manifestations, Radiology 62:1, 1954.
4. Doubilet, H., Poppel, M. H., and Mulholland, J. H.: Pancreatography, Radiology 64:325, 1955.
5. Boyd, W.: Text Book of Pathology, Philadelphia, W. B. Saunders Co., ed. 5, 1947, p. 591.
6. Ackerman, L. V., and del Regato, J. A.: Cancer, St. Louis, C. V. Mosby Company, ed. 2, 1954, p. 681.
7. Chamberlin, G. W., and Imber, I.: Pyelography for the Diagnosis of Lesions of the Body and Tail of the Pancreas, Radiology 63:722, 1954.
8. Ormond, J. K., Wardsworth, G. H., and Morley, H. V.: Pancreatic Lesions Confusing Urologic Diagnosis. Report of 3 Cases, J. Urol. 48:650, 1942.
9. Poppel, M. H.: Roentgen Manifestations of Pancreatic Disease, Springfield, Ill., Charles C. Thomas, Publisher, 1951, p. 69.
10. Stone, E. P.: Pancreatic Cysts Simulating Renal Disease, J. Urol. 62:104, 1949.

Operation for Tumor of a Solitary Kidney*

J. A. CAMPBELL COLSTON, M.D., *Baltimore, Md.*

Fortunately tumor in a solitary kidney is a rare finding. When it does occur its management offers a problem to the surgeon.

CONSERVATION OF TISSUE has always been and always will be the objective of the surgeon in operative procedures on the kidney. Partial excision of localized pathologic conditions is accepted as the best procedure when the surgeon reaches the decision, from information gained from diagnostic data, that the particular lesion present can be completely excised and the remaining normal renal tissue, with its blood supply intact, can be preserved. Calycectomy, which is especially indicated in dilated calyces containing stones, is the best operation to employ when the remaining portion of the kidney, from pyelographic evidence, presents a normal appearance. Heminephrectomy, especially in dealing with a pathologic condition of one portion of a reduplicated pelvis, has been a well recognized procedure when the other segment of the kidney is normal. However, in many cases, in spite of the accuracy of present-day diagnostic methods, the ultimate decision as to the appropriate procedure to employ in a given case must rest on surgical exposure of the organ and direct observation. Excision of localized tuberculomas has been advocated by Lattimer[1] and by various Scandinavian surgeons. Simple excision of serous cysts with preservation of the kidney is certainly preferable to nephrectomy.

When the contralateral kidney is absent, or its function so impaired that its ability to preserve life may be questioned, the necessity of using conservative methods is obvious, if surgical intervention is indicated on the better or only kidney. Any operation upon a solitary kidney must be considered with the utmost caution, and only undertaken with the hope of improving or, at least, conserving the function of the kidney upon which life depends.

Neoplasm of the kidney always has been and will be a mandatory indication for nephrectomy when the function of the contralateral organ has been proven adequate to preserve life. However, Vermooten[4] has advocated the excision of localized tumors if such a method is technically feasible and deserves credit for bringing to our attention that such a procedure can be carried out successfully. When a diagnosis of tumor in a solitary kidney has been made the prognosis is grave, and often, under such circumstances, with the thought that nephrectomy alone is adequate in dealing with a neoplasm, the opinion is given that any surgical procedure is contraindicated. It is

*Read before the Section on Urology, Southern Medical Association, Forty-Eighth Annual Meeting, St. Louis, Mo., November 8-11, 1954.

true that in most instances of tumor arising in a solitary kidney, surgical exploration will reveal an inoperable condition, especially when the neoplasm is cortical in origin. Yet an occasional case will be encountered in which local excision of the neoplasm may be surgically practicable, and gratifying palliation at least may be obtained in an individual otherwise condemned to die.

In 1948, Ferris and Daut[2] reported the following case: A diagnosis of papillary tumor of the pelvis of the right kidney was made in a 61 year old man in whom the left kidney was absent. At exploration "a papillary epithelioma could be seen arising from the posterosuperior aspect of the renal pelvis and extending 1 cm. into the upper infundibulum. The greater portion of the tumor was excised along with a small segment of the site of origin. The pathologist reported this tumor to be a papillary squamous cell epithelioma, grade 2 (Broders' method), with no obvious infiltration of the renal pelvis." The remaining portion of the tumor was thoroughly destroyed by electrocoagulation. There were no postoperative complications, but the blood urea concentration on discharge was 64 mg. per 100 cc. The patient remained well "until June, 1953, at which time he developed hematuria and hydronephrosis" and death, presumably from uremia, ensued.

In this interesting case excellent palliation was obtained for five years in a patient who, had operative exploration been denied, would surely have succumbed in a short time.

Gibson[3] has reported a patient 86 years of age who had profuse hematuria of 24 hours duration. He had had a right nephrectomy 14 years previously for papillary carcinoma of the renal pelvis. Diagnostic studies showed a large filling defect in his remaining kidney with secondary hydronephrosis due to partial obstruction at the ureteropelvic junction by tumor. At operation a pedunculated tumor the size of a walnut was excised together with a generous margin of pelvic wall around the origin. The ureteropelvic junction was restored by a pyeloplasty with polyethylene splinting and nephrostomy drainage. The pathological specimen showed papillary carcinoma, grade I. A postoperative pyelogram made before discharge showed no evidence of filling defect and the ureteropelvic junction showed no evidence of obstruction. The patient remained in good health and free from symptoms six months after operation.

Vermooten[4] reported in 1950, the case of a 52 year old woman with a diagnosis of tumor of the left kidney. At operation a tumor 10 by 7 cm. in size was found occupying the midportion of the kidney and apparently well encapsulated. The tumor was completely excised with a 1 cm. border of normal tissue, hemorrhage being controlled by a rubber-shod clamp placed on the vascular pedicle. Study of the excised tumor showed that it had been completely removed with a 1 cm. margin of normal kidney tissue. The diagnosis of clear cell carcinoma was made from the sections prepared for microscopic study. Fifteen months later the pyelogram was normal except for obliteration of the middle calyces, and there was no clinical evidence of recurrence and the patient was sympton-free. Two years and four months later chest x-ray showed three metastatic nodules in the left lung. These were excised with uneventful recovery. A left retrograde pyelogram at this time showed the kidney normal with normal function. Death occurred 8 months later from pulmonary metastases.

Case Reports

Our first case bears some resemblance to Gibson's patient. However, certain features of our patient's history and clinical course are so unique that they will be reported in detail.

Case I. A 57 year old, housewife was first admitted on August 21, 1950, because of intermittent painless hematuria of five months duration.

In 1943, an abdominal hysterectomy had been done elsewhere for fibroids. Apparently the right ureter was injured and a ureterovaginal fistula drained for about four months. After the vaginal drainage of urine ceased, excretory urograms revealed no function of the right kidney; the left kidney was considered normal. The patient had no flank pain except for one episode of "right pyelitis" shortly after the hysterectomy. Until March, 1950, the patient was in good general health. At that time, she had an episode of painless hematuria lasting about eight hours.

A retrograde pyelogram at the left side revealed a filling defect in the lower portion of the renal pelvis. Five subsequent episodes of hematuria followed the initial one. Retrograde studies were repeated, revealing an apparent increase in the size of the filling defect. The patient was then referred for evaluation and therapy.

Physical examination on admission to The Johns Hopkins Hospital was essentially normal. The left kidney was palpable but nontender. The right kidney could not be felt. The hemogram and blood chemical

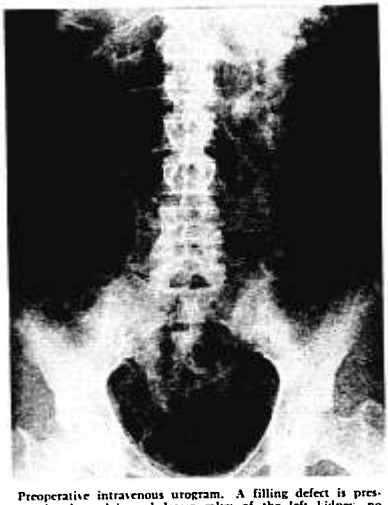
studies were normal. An occasional white cell and one to two red cells were seen in the centrifuged urine specimen. A trace of albumin was also noted. An intravenous urogram showed a filling defect in the lowermost portion of the pelvis and the lower calyx of the left kidney (Fig. 1). There was no function on the right side.

Operation. On August 23, 1950, through a left flank incision, a pelviotomy was performed and a raspberry-like sessile tumor was found. Cephalad to this tumor, a smaller pedunculated tumor was noted. Both tumors were excised with the cutting current. The bases were then thoroughly destroyed with the coagulating current. A 25 per cent solution of podophyllin on cotton swabs was then applied to the tumor-bearing area. The bleeding was well controlled and the pelvic incision was closed with a continuous suture of 4-0 chromic catgut. Two Penrose drains were placed at the pelviotomy site; closure was routine. The patient tolerated the procedure well.

The postoperative course was uncomplicated, except that the flank wound drained urine for four days. The patient then started voiding in good quantities. There were no significant changes in the blood chemical examination. She was discharged on the twelfth postoperative day in excellent condition, the incision firmly healed.

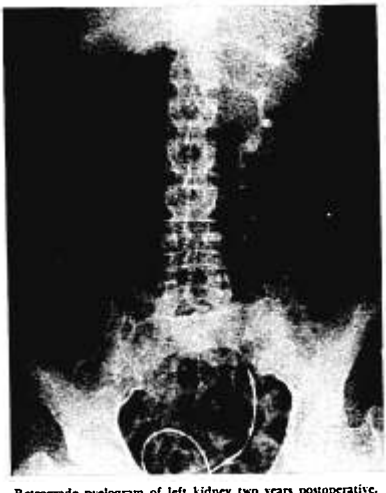
Pathologic Examination. Histologic examinatoin of the tissue removed revealed a papillary tumor composed of rather uniform, large cells arranged in sheets with scant cytoplasm and vesicular nuclei. Some of the fragments contain a few strands of smooth muscle

FIG. 1, CASE 1



Preoperative intravenous urogram. A filling defect is present in the pelvis and lower calyx of the left kidney, no secretion of the dye on the right side.

FIG. 2, CASE 1



Retrograde pyelogram of left kidney two years postoperative. The pelvis and upper calyces are well delineated without evidence of filling defect. The middle and lower calyces are faintly outlined; the calyces are cup-shaped, with no evidence of filling defect. Delayed filling of the lower and middle calyces is probably due to postoperative stenosis of the infundibula of the middle and lower calyces.

and connective tissue in which tumor cells are seen to grow. The final diagnosis was *papillary carcinoma* of the renal pelvis.

Clinical Course. Her subsequent course was followed closely by retrograde pyelograms. The films revealed no evidence of recurrence of the tumor. Some narrowing of the infundibulum of the inferior major calyx was noted shortly after operation, but this has remained unchanged in subsequent films (Fig. 2).

The patient returned on November 27, 1953, complaining of a mass in the right side of the abdomen which she had noted first three weeks previously. She was admitted to the hospital. The general physical examination was essentially normal. The left kidney was not palpable or tender. In the right upper quadrant, and extending to just below the umbilicus on the right, was a large, smooth, freely movable, nontender mass, about 12 cm. in length and 8 cm. wide.

The blood chemical studies and hemogram were entirely normal. The urine contained 15 to 20 red blood cells per high power field (after cystoscopy) and one plus albumin. Extensive radiologic studies were done which indicated that the mass was extrinsic to the bowel, stomach and duodenum, and did not involve the gallbladder. It was felt that the mass was most probably a large right hydronephrosis.

Operation. On December 12, 1953, an exploratory laparotomy was carried out through a right rectus incision. A brownish-blue retroperitoneal cystic mass

was immediately noted. Minimal dissection revealed that this was a hydronephrotic kidney with a greatly dilated tortuous ureter. The mass was aspirated and about 200 cc. of thick brownish fluid was removed. Nephrectomy and partial ureterectomy were carried out without incident. There was no evidence of intra- or retroperitoneal metastases. The left kidney felt normal. The patient tolerated the procedure well and had a benign postoperative course. She was discharged on the tenth postoperative day in excellent condition.

Pathologic Examination. The specimen consisted of a large hydronephrotic sac containing chocolate brown fluid, with virtually no remaining renal parenchyma. At the infundibulum of the superior calyx, there was a 2 by 2 cm. papillary tumor.

The histologic section shows a kidney pelvis in which there is chronic inflammation and thickening. Over a broad surface of the pelvis there is a papillary tumor, composed of fairly well differentiated cells piled up on slender connective tissue stalks. There is no direct invasion of the pelvis seen, although in a very superficial part of the mucosa directly beneath the tumor there are tumor cells within what appears to be a lymphatic. The capsule of the kidney appears normal, but the renal parenchyma is only one high power field in thickness. The final pathologic diagnosis was *hydronephrosis* with *papillary transitional cell carcinoma* with no direct invasion seen.

Comment. The first tumor of the renal pelvis in this patient was manifested by total gross painless hematuria. Routine urologic diagnostic technics completed the diagnosis. Since the kidney involved in tumor was the only one functioning, electroresection was used to remove the tumor. The invasion of the muscle seen in this tumor indicates it was a papillary carcinoma rather than a "benign papilloma."

The nonfunctioning right kidney was asymptomatic and not palpable for many years. Its sudden increase in size was alarming, but in retrospect probably represented hemorrhage from the tumor. If the tumor had not produced bleeding, its discovery certainly would have been greatly delayed. Since no invasion of muscle was seen in this second tumor, the diagnosis of papillary carcinoma is equivocal. The finding of tumor cells in a lymphatic, however, strongly suggests that the tumor is a carcinoma.

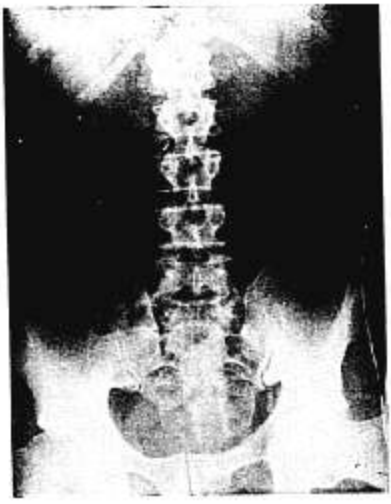
Case 2. H. R. N., a 46 year old man, entered the hospital August 26, 1947, with the complaint of hematuria.

Seven months previously he had sudden severe pain in the right lumbar region. Cystoscopic examination was done and he was told that he had an injury of his right kidney and that the left kidney was not functioning. A month later hematuria began to occur intermittently, and three months later the bladder filled with clots and became temporarily obstructed. Intermittent bleeding continued and two weeks before admission cystoscopic examination and retrograde studies were repeated. He was told that a tumor or a soft stone was present in the right kidney and that the left kidney was not functioning.

Physical Examination. On admission the patient was well developed and well nourished but appeared chronically ill. Blood pressure was 142/88. The examination was essentially normal except that the right kidney was easily palpable, seemed somewhat larger than normal, but was not tender. The prostate was normal. *Blood studies.* Hgb. 8.8 Gm. (60 per cent), white blood cells 6650, N.P.N. 48 mg. for 100 cc. The urine showed albumin 1+, sugar 0; the sediment was loaded with red cells, an occasional white and epithelial cell were found, but no casts nor organisms.

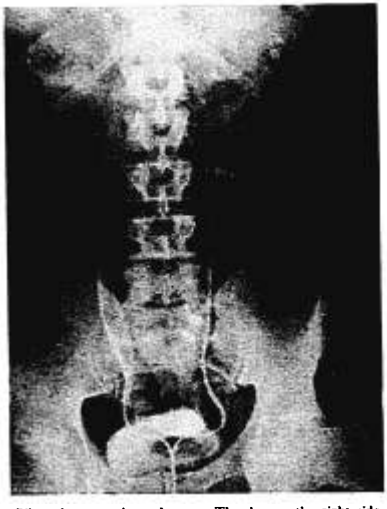
Urography. Intravenous urogram showed delayed excretion on the right side with marked hydronephrosis, and no excretion on left (Fig. 3). *Retrograde studies.* Catheters introduced into each ureter ascended easily to each kidney region. From the right there was profuse bleeding; the left was functionless. Retrograde pyelograms (Fig. 4). The right pelvis was not visualized, the opaque medium returning to the bladder without passing the ureteropelvic junction. On the left side there was a small, irregular deposit of the medium lateral to the upper end of the ureter which was visualized, but there was no evidence of pelvic or calyceal structures. Following this procedure, the temperature rose to 102.8° and the P.S.P. excretion was 25 per cent in 2 hours.

FIG. 3, CASE 2



Intravenous urogram, preoperative. Delayed function and marked hydronephrosis are present in the right kidney; excretion is insufficient to demonstrate any filling defect. There is no secretion on the left side.

FIG. 4, CASE 2



Bilateral retrograde pyelogram. The dye on the right side will not enter the pelvis of the kidney, flowing back along the catheter into the bladder. On the left side there is a small irregular collection of the medium at the upper end of the ureter, without evidence of pelvic or calyceal structures.

Operations. On September 3, under spinal anesthesia, the left lumbar region was explored in the faint hope that some condition, such as obstruction at the ureteropelvic junction, would be found and that by some plastic procedure the function of the left kidney might be restored. The ureter was exposed and followed up to a small mass of fibrous tissue at its upper end at which point the lumen became obliterated. No evidence of a kidney could be found and microscopic examination of the tissue at the upper extremity of the ureter showed fibrous tissue with a few ill-defined and poorly developed tubular structures.

On September 10, under spinal anesthesia, the right kidney was exposed through the usual lumbar approach in the hope that a pedunculated tumor of the pelvis might be found which could be destroyed through a wide pyelotomy incision. The kidney was found to be moderately enlarged, but its surface was smooth and no nodules were apparent. After isolating the ureter the pelvis was exposed and found moderately dilated and a soft mass could be felt. The pelvis was opened widely and a large amount of necrotic material, in some areas yellowish in color, extruded and was removed. The finger in the pelvis enucleated a large tumor apparently arising in the upper calyx. In most places it was necrotic; no definite pedicle was demonstrable. After all the palpable tumor tissue had been removed, the wall of the upper calyx, which was considerably dilated, felt smooth. Bleeding, which had been brisk, diminished markedly. The pelvis was irrigated with ether followed by salt solution in the hope that any remaining tumor tissue would be destroyed. A mushroom catheter was placed in the pelvis and the wound closed in layers in the usual manner.

The patient was returned to his room in good condition. There had been moderate shock during the bleeding which accompanied the enucleation of the tumor, but his blood pressure level was restored by transfusion of whole blood.

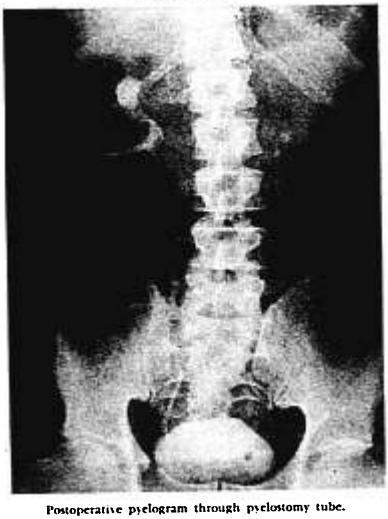
Pathologic Examination. Microscopic examination of the tissue showed *clear cell adenocarcinoma* (hypernephroma).

Clinical Course. There were no postoperative complications and the patient's general condition rapidly improved. The N.P.N. which had risen to 95 mg. fell to 27 mg. per 100 cc. and the P.S.P. excretion rose to 55 per cent in 2 hours. The pyelostomy tube was removed on the twentieth postoperative day and the wound healed promptly with no subsequent urinary drainage.

The nature of the tumor predicted a hopeless ultimate prognosis, because it would seem impossible to destroy a cortical tumor through a pyelotomy incision. For two months the patient continued to gain weight and strength, and was free from pain. The wound then became inflamed, urinary drainage began at the site of the tube, and the patient's condition deteriorated steadily until his death approximately four and a half months after operation.

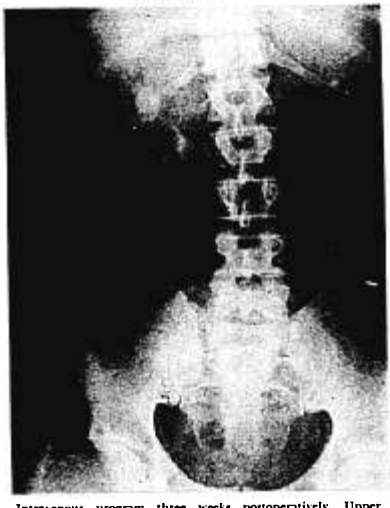
Comment. In view of the nature of the tumor this patient's prognosis was absolutely

FIG. 5, CASE 2



Postoperative pyelogram through pyelostomy tube.

FIG. 6, CASE 2



Intravenous urogram three weeks postoperatively. Upper calyces are markedly dilated; middle and lower calyx do not fill, and there is a filling defect in the upper part of the pelvis.

hopeless. But exploration of the left kidney was considered justifiable for the reasons stated, and when the absence of any secretory renal tissue had been demonstrated, exploration of the right kidney was considered indicated because the nature of the tumor was not known. The operation was undertaken in the faint hope that a pedunculated papillary growth of the pelvis might be found and be destroyed by electrocoagulation.

Summary

Three cases have been recorded in the literature, in each of which a tumor was removed from the kidney. Two additional cases are reported, in both of which operation was performed for a tumor occurring in a single kidney. The result in one of these cases, in which a papillary carcinoma involving the pelvis and one calyx was excised, has been most satisfactory to date. The patient has been well for four and a half years without evidence of recurrence clinically or on radiologic studies. This successful result emphasizes the fact that patients having a single kidney which is suspected of harboring a neoplasm should be explored surgically, in the hope that a localized tumor, suitable for complete excision, may be found.

Bibliography

1. Lattimer, J. K.: Partial Resection of Kidney for Tuberculosis, Tr. Am. A. Genito-Urin. Surgeons 46:121, 1954.
2. Ferris, D. O., and Daut, R. V.: Epithelioma of the Pelvis of a Solitary Kidney Treated by Electrocoagulation, J. Urol. 59:577, 1948.
3. Gibson, T. E.: Operation on Neoplasm of Solitary Kidney, Urologists' Correspondence Club, March 17, 1955.
4. Vermooten, V.: Indications for Conservative Surgery in Certain Renal Tumors: A Study Based on the Growth Pattern of the Clear Cell Carcinoma, J. Urol. 64:200, 1950.

Discussion (Abstract)

Dr. Edwin P. Alyea, Durham, N. C. Dr. Colston's subject brings to my mind three main points: (1) Operation on a solitary kidney; (2) resection or destruction of a malignant tumor in any kidney; and (3) resection or destruction of a tumor in a solitary kidney. As to the first point, operation on a solitary kidney,—these kidneys are of three kinds: (a) Congenital solitary kidney; (b) surgical solitary kidney; and (c) a normal kidney with a contralateral functionless kidney.

Not included in this discussion are surgical emergencies such as a stone blocking the ureter at the ureteropelvic junction of a solitary kidney. Operation then is a necessity, and such patients usually do extremely well. Our discussion considers what we might call "optional operations" on solitary kidneys.

At Duke Hospital in the past 20 years we have had 64 patients with a solitary kidney,—38 of them were congenital and 26 surgical. Of the 38 congenital solitary kidneys, only 2 were operated upon. Both had stricture at the ureteropelvic junction and Foley Y-plasties were successfully carried out. Of the 26 solitary kidneys because of surgical removal, 2 had optional operations. One was for a staghorn calculus in the middle and lower calyx, and the second for a group of stones in a dilated lower calyx. Each patient had a successful heminephrectomy and did well. These operations were carried out with the idea of preserving all possible renal function in the only kidney. We can expect equally as good convalescence from operations on a solitary kidney as in the patient with two kidneys, provided the kidney does not become anuric. That has not occurred in our few experiences. As to the second point, resection or destruction of malignant tumors in any kidney, is a moot question at the present time. Careful search was made in the Index Medicus for the last 8 years and the Journal of Urology since its beginning. Only two reports were found in the foreign literature of heminephrectomy for a renal tumor, with a normal kidney on the other side; one in "Archivos espanotes de urologia," 1951, and one report in the German literature of the same year. Dr. Colston mentions two other reported cases. In the Journal of Urology in 1950, Vermooten reported the removal of a well encapsulated hypernephroma. He believes that under certain conditions, namely a clear cell tumor which is well confined to a definite capsule, as hypernephromas usually are, and as distinguished from the infiltrating granular cell tumor of the medulla, tumors may be resected locally even though the other kidney is normal. I most emphatically do not subscribe to this since I am a pessimist

when it comes to malignant renal tumors. I have seen a small clear cell tumor of only 2 cm. in diameter, already metastasized. Admitting that renal tumors are fickle and unpredictable in their behavior, I firmly believe that nephrectomy is still the operation of choice. As to the third point in this paper, the resection or destruction of a tumor in a solitary kidney is an entirely different matter. Here, we are justified in an attempted removal or destruction of a tumor, if it is at all possible surgically. I might recommend this even if there is a solitary metastasis, for such have been known to regress after removal of the primary tumor. Heminephrectomy is the operation of choice, if the tumor is in a position favorable for such a surgical procedure. We must remember that one needs only one-fourth of a normal kidney for life.

As to the case presently under discussion, Dr. Colston is to be congratulated for his success in this undertaking, and also for bringing this procedure before the profession, as a possible aid in adding comfortable years to such a patient's life. Dr. Colston, of course, does not suggest that this patient is cured. From the type of tumor that it was, a papillary tumor of the pelvis, it is quite probable that it will be true to form and reappear elsewhere in the urinary tract. I cannot forget the patient who came to us with the kidney already removed because of such a tumor. During the next 5 years we have chased that tumor down to the ureter; later to the bladder, still later to the prostatic urethra, and finally to the bulbous urethra.

Thank you for asking me to discuss this paper for I consider it a distinct pleasure to discuss any paper of my past and present teacher, whom I hold in such high regard.

Dr. Charles Rieser, Atlanta, Ga. I want to cite a case that was presented at a recent meeting of the Georgia Urologic Association by Dr. Prince of Savannah. He had a lady with a solitary kidney, and the pyelogram showed a very typical deformity of a cortical type of tumor. This was four years ago. He did not operate upon the patient. He did yearly pyelograms and one could see that the tumor was growing, but the woman was up and about, taking care of her daily duties, had no metastases, and apparently was getting along well. That is just another way of looking at a solitary kidney with a cortical tumor.

The other thing I want to say, and changing the subject, is that it was 25 years ago at this meeting of the Southern Medical Association that Dr. Davis, of North Carolina, presented his work on the resectoscope.

Dr. A. Keller Doss, Fort Worth, Tex. About six years ago I had the opportunity to see a patient who came in because of a story of gross hematuria. Upon making an x-ray examination it was evident that he had a large staghorn stone in his right kidney with three large calculi in the right ureter, each about the size of one's thumb. There was a non-functioning kidney on the right and apparently a normal appearing kidney on the left in the excretion urogram. The patient was not bleeding at the time that he was seen in the office. Without going into further detail at the time or waiting for him to bleed again, we put him in the hospital rather promptly, feeling that this was one person to whom we could offer a cure.

A right nephrectomy was accomplished, the stones were pushed up into the ureter so they could be engaged easily and removed. The patient did well for a period of ten days, and then began to bleed freely. I felt and hoped that he had a granulomatous lesion in the lower third of his ureter, which was bleeding owing to the presence of these stones which had been present in the ureter for years.

Sure enough, when we had an opportunity to do a cystoscopy, after he got over his immediate postoperative course, the blood was not coming from his ureteral stump, as had been hoped, but was coming from the left kidney.

We followed the course of the patient through the next two years most carefully. Repeated efforts were made to determine whether or not tumor cells could be found in the urine. None were found on careful examination by an excellent pathologist.

Retrograde polyureterograms or excretion urograms were made every three months. Finally, I had the idea that possibly the patient had a pyelonephritis aggravated by vesical neck obstruction and possibly resection would help. So in desperation I did a transurethral resection which accomplished nothing except that he was able to void better, doing away with the moderate residual urine he had had.

He continued to bleed. About 18 months to two years after the initial nephrectomy I thought I saw a small area of calcification in the lower calyx of his left and only remaining kidney.

Three months later we did another excretion urogram or retrograde polygram, I do not recall which, and the thing was gone. KUB film showed no evidence of it, but there was at that time a questioned filling defect. The man was 68 years of age at this time. The N.P.N. was normal.

At operation there was demonstrated a dimpling in the lower pole of the solitary kidney. A partial nephrectomy was done. Fortunately, we happened to get proximal to the lesion. The tumor was a papillary epithelioma, grade II, arising in the lower calyx of the solitary kidney. A tumor thrombus was milked up from the ureter, through the pelvis and out through the incision.

The patient did fairly well. His N.P.N. went up to about 95 mg., and he was confused for a few days, but we finally managed to get him up and about. He lived happily for some two or two and a half years thereafter. He began to complain of pain shortly before death, apparently due to metastases to the cervical vertebra. At postmortem examination it was shown that the remaining half kidney was completely free of neoplasm, and there was no perirenal neoplastic tissue. However, there was evidence of metastasis up and down along the aorta, and metastasis to the cervical vertebra.

The interesting point about this case is that before we could establish a diagnosis of the cause of hematuria, the lesion had already obviously metastasized. We did effect a cure in that particular kidney, but had we been more fortunate earlier, we might have prolonged the patient's life. However, he lived some two years after a partial heminephrectomy. I thought you would be interested to know of a similar case.

Dr. Lytle Atherton, Louisville, Ky. How long will a

patient live after a tumor is identified in the kidney? Of course, we all know that the sooner a kidney is removed after the diagnosis is made, the more likely we are to obtain a cure. By the same token, I should like to mention briefly the case of a man who was first seen, about four or five years ago, because of hematuria. He was 68 years old when first seen. Twenty-nine years before he was kicked in the side by a mule. He had a little hematuria at that time which cleared up within a few days time. Within six months, he began to notice a mass in his left side, the side which had been kicked. This mass continued to grow until it became about the size of a large grapefruit. He paid little or no attention to it because it caused him no pain.

He went on for 29 years and then had profuse hematuria. He was going into the hospital when I saw him, and pyelograms were made, which showed that he had a large filling defect of a portion of the renal pelvis, which suggested a tumor. At nephrectomy he was found to have a clear cell carcinoma. He recovered from his operation quite satisfactorily, and within six months had multiple bone metastases.

The question that comes up is, how long after a tumor first becomes manifest will the patient live without any surgical intervention?

Dr. Otto J. Wilhelmi, St. Louis, Mo. I would like to ask Dr. Colston a question which has been annoying me for some time. Why is it that upon primary examination in some of these cases there is apparently only unilateral function without compensatory function in the good kidney, and yet upon a second examination, maybe a year or six months later, function is present in the supposedly functionless kidney? Is this a physiological dysfunction? I have never been able to explain this. I have had two such cases.

Dr. Colston (closing). I want to thank the discussants very much for taking so much interest in this case.

In regard to Dr. O'Brien's question, this woman was rather thin. We did resect the last rib and had as much exposure as possible. We opened the pelvis, which was dilated by a blood clot I suppose, and were able to see the tumor. I think it arose in the infundibulum and not in the calyx. I must say that we could not see a definite pedicle. I felt that. After all obvious tumor had been removed we coagulated what we thought was the pedicle.

I appreciate Dr. Alyea's summary of the situation. I would like to say that, of course, had there been a good kidney on the other side, I would have done a nephro-ureterectomy. That is the procedure of choice in dealing with papillary tumors of the renal pelvis, including, of course, a cuff of the mucous membrane of bladder wall around the ureteral orifice.

Dr. Wilhelmi, I have seen one case of what you describe. I cannot explain it. One instance we explained by reflex anuria, if there is such a thing, because the day following a retrograde pyelography there was no excretion on what afterward proved to be the good kidney.

I want to again express my appreciation especially of Dr. Doss's very interesting case. It certainly supports the idea I had in reporting this case, and that is when a diagnosis of tumor in a solitary kidney has been made, exploration is justified. This is time even though in a high percentage of cases the results of exploration will probably be disappointing.