

METASTATIC CARCINOMA IN THE URETER*

REPORT OF ADDITIONAL CASES

BY WILLIAM JAMES CARSON, M.D.

OF MILWAUKEE, WIS.

FROM THE DEPARTMENT OF PATHOLOGY OF THE UNIVERSITY OF MARYLAND

PRIMARY tumors in the pelvic viscera frequently metastasize into the lymph-nodes along the iliac vessels and abdominal aorta, in a large number of cases metastatic nodules are found in the bones, lungs or liver as described by Langstaff,¹ Tanchau,² Gross,³ Adams,⁴ Thompson,⁵ Von Recklinghausen,⁶ Cone,⁷ Blumer,⁸ Bumpus,⁹ Kaufmann,¹⁰ Young,¹¹ and others.

Since the lymphatics of the ureters communicate with those of the bladder, it is surprising that so few reports on metastatic carcinoma in the ureter and kidney pelvis are to be found in the literature.

Garceau,¹² in 1909, was able to collect from the literature 13 cases of metastatic carcinoma in the ureter due to extension by continuity.

Giordano and Bumpus,¹³ in 1922, reported a case of carcinoma of the prostate metastasizing to the left ureter and renal pelvis, which showed no evidence of invasion of the lymphatics in the ureter, and were able to demonstrate cancer cells in the blood-vessels of the lungs and in a metastatic renal infarct.

Thomas and Regnier,¹⁴ in 1924, reported a case of carcinoma of the bladder with metastases to lymph-glands, liver, psoas muscle and right ureter, without indicating how it was transmitted.

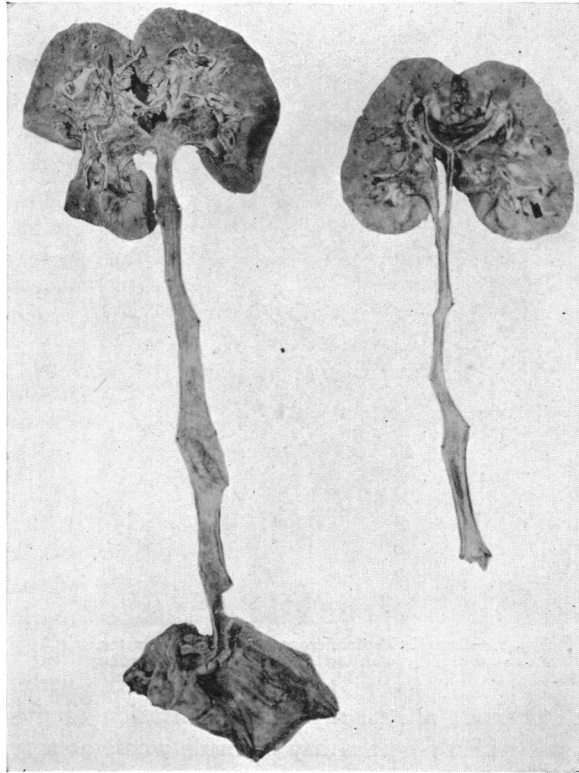


FIG. 1.—Case I. Carcinoma of the prostate with metastasis to right ureter; ureteral dilatation, bilateral; ureteritis, bilateral.

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Cullen¹⁵ has shown cancer of the cervix ulcerating through the lower end of the ureter, but makes no mention of metastatic nodules in the ureteral wall, the result of lymphatic metastasis.

Ewing¹⁶ describes papillary tumors of the bladder extending into the lumen of the ureter or invading from the vesical wall, and primary tumors of the kidney pelvis extending down the ureter. In prostatic cancer Ewing states that the ureters are invaded from the vesical wall as in bladder carcinoma, or occluded by nodules at the orifice, or compressed by enlarged lymph-nodes.

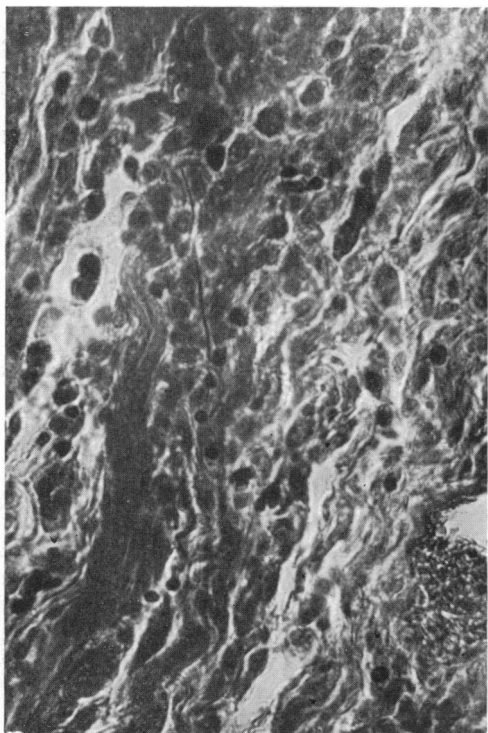


FIG. 2.—Case I. Photomicrograph of right ureter, 20 cm. above bladder, showing tumor cells in peri-vascular lymphatic.

Herger and Schreiner,¹⁷ more recently in an analysis of thirty-two autopsies on patients dying from carcinoma of the cervix, found twenty-one cases showing gross pathological changes in the urinary apparatus—viz.: stricture of left ureter with accompanying hydronephrosis, 4; stricture of right ureter with accompanying hydronephrosis, 3; ureteral stricture, bilateral with accompanying hydronephrosis, 10; pyonephrosis, 1; caseous kidney, 1; infiltration into bladder, with no hydronephrosis, 2; 16 of the cases showing hydronephrosis were accompanied by marked infiltration into the bladder. They concluded that the ureteral strictures are the result

of pressure on the ureter from invasion of the broad ligament or bladder wall, which possibly may be made worse as a result of fibrosis in the healing of these lesions, but make no mention of metastases into the ureter.

Young¹⁸ states that metastasis to the wall of the ureter may occur, usually the lower third, causing obstruction with hydro-ureter and hydro-nephrosis. The route in such cases may be lymphatic and records having seen two cases of ureteral metastases from prostatic carcinoma.

Bumpus¹⁹ in a clinical study of one thousand cases of carcinoma of the prostate found 243 cases with demonstrable metastases. In 44 per cent. it had affected the lymphatics.

Since the writer²⁰ first demonstrated cancer cells in the perivascular lymphatics of the ureter, secondary to primary carcinoma of the bladder, prostate and cervix uteri two additional cases have been found at autopsy.

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CASE REPORTS

CASE I.—J. S., white, male, age seventy-three years. Admitted to University Hospital, December 30, 1924, with acute retention of urine and died June 22, 1925.

Clinical Diagnosis.—Carcinoma of the prostate with metastases to the third, fourth, and fifth lumbar vertebra; uræmic coma. Terminal lobular pneumonia. Genito-urinary organs. (Fig. 1.)

Prostate.—The prostate is very firm and nodular on section, there are numerous irregular areas of a grayish-yellow color. In the lower portion of the tumor mass there is a cavity formation, the wall of which is of a grayish-black color, having the appearance of a radium burn. The outline between the prostate and seminal vesicles is very indistinct due to direct extension of the tumor. Lymph-nodes along the internal and common iliac arteries and abdominal aorta show metastatic deposits.

Bladder.—The bladder wall varies from 3 to 6 mm. in thickness, mucosa is of a dark red color, covered with yellowish exudate in areas. Ureteral orifices are moderately dilated 3 mm.

Ureters.—The ureters are dilated from the bladder wall to the uretero-pelvic junction varying in diameter from 10 to 20 mm., with the greatest diameter above the pelvic brim. On section their walls measure 2 mm. in thickness with the mucosa varying from bright red to dark red in color, in areas a yellowish exudate is seen on the surface of the mucosa.

Kidneys.—The pelves, major and minor calyces are moderately dilated with their mucosa of a dark red color.

The capsules strip off with resistance, leaving an irregular dark reddish surface with a few small round yellowish areas which contain a purulent exudate.

The architecture is poorly preserved.

Anatomical Diagnosis.—Adenocarcinoma of the prostate with metastases to the lymph-nodes along the iliac arteries and abdominal aorta; lumbar vertebra; seminal vesicles; bladder wall; right ureter; dilatation of ureter, bilateral; hydronephrosis, bilateral; cystitis; ureteritis, bilateral; pyelitis, bilateral; pyonephrosis, bilateral; duodenal ulcers, etc.

Microscopical Notes.—*Prostate:* Sections from each lobe show the muscle fibres and connective-tissue fibres to be well stained. The glandular acini show their lining epithelial cells to be very well stained, most of which have hyperchromatic nuclei, a moderate number show mitotic cell division. These cells are seen breaking away from their basement membrane and infiltrating through the stroma. There is a definite reduplication of prostatic glandular acini arranged in a disorderly fashion. The blood-vessels show thickening of the tunica intima.

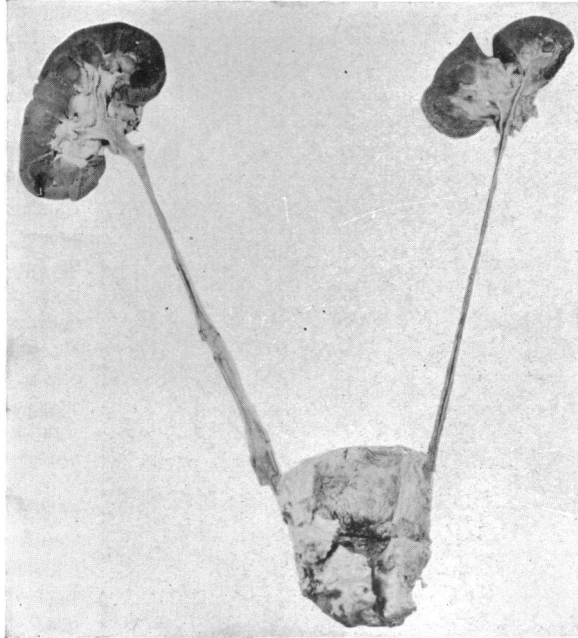


FIG. 3.—Case II. Carcinoma of prostate with metastases to the bladder, seminal vesicles, right ureter, right kidney pelvis, cystitis.

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Seminal Vesicles.—Sections show a definite infiltration of epithelial cells which have a hyperchromatic nuclei and a clear cytoplasm, a few showing mitotic cell division. In areas they are arranged as glandular acini giving the same appearance as those seen in the prostate.

Bladder.—Sections from base and lateral walls show an infiltration through the muscular layer and submucosa of epithelial cells, columnar or cuboidal in shape in areas, a large number are undifferentiated in appearance, with hyperchromatic nuclei and a clear cytoplasm, mitotic cell division is visible in areas. These cells are seen breaking away from their basement membrane in various areas.

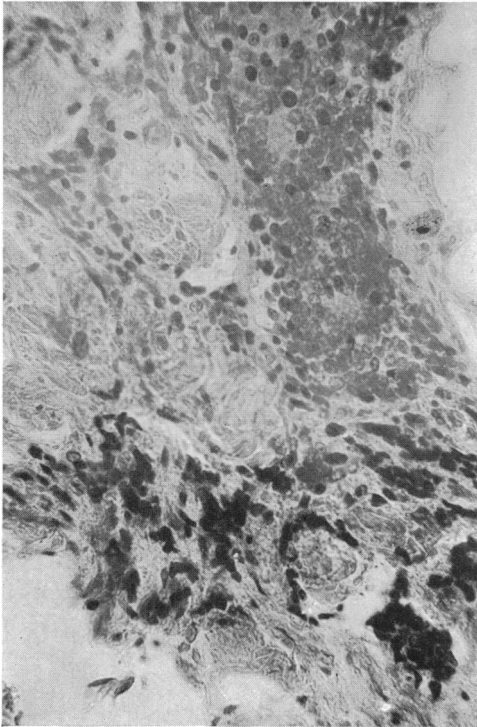


FIG. 4.—Case II. Photomicrograph right ureter 15 cm. below uretero-pelvic junction, showing tumor cells in lymphatics.

Ureters.—Right (Fig. 2). (Section from 10 cm. up and 20 cm. up.) The serous surface shows the serosa to be fairly well stained. Immediately beneath the serous cells is seen a moderate infiltration of mononuclear wandering cells and large round cells, an occasional plasma cell is noted. In the inner two-thirds of the muscular layer an infiltration of epithelial cells undifferentiated in type with hyperchromatic nuclei and a clear cytoplasm. A few show mitotic cell division. In areas they are arranged as small glandular acini. The tumor cells are visible in the perivascular lymphatics. The tunica propria shows a moderate infiltration of mononuclear wandering cells with an occasional polymorphonuclear leucocyte. Mucosa is absent for the most part, in one area the transitional epithelial cells are seen well preserved.

Left.—In the muscular layer there is a definite infiltration of mononuclear wandering cells and small round cells with a few polymorphonuclear leucocytes, they are more abundant in inner half of the muscular layer and tunica propria. Mucosa shows the transitional epithelial cells poorly stained with fibrin and poorly stained leucocytes within the lumen. Blood-vessels are filled with red blood-cells with the perivascular lymphatics visible.

CASE II.—R. McN., white, male, age seventy-five years. Admitted to University Hospital, September 25, 1925, with acute retention of urine and died September 30, 1925.

Clinical Diagnosis.—Carcinoma of the prostate; myocardial hypertrophy and insufficiency; paralysis agitans, etc. Genito-urinary organs. (Fig. 3.)

Prostate.—The prostate is enlarged, firm and nodular, on section numerous irregular yellowish-gray nodules are seen. From this tumor mass in the prostate, metastasis can be seen by continuity, infiltrating into the base of the bladder, seminal vesicles and lymph-nodes.

Bladder.—The bladder wall is markedly thickened, measuring from 8 to 14 mm. in thickness. In the muscular wall at the base, there are irregular yellowish-gray lines. Mucosa is dark red in color, ureteral orifices gaping 3 mm. in diameter

Seminal Vesicles.—Are enlarged, firm and nodular, on section numerous irregular

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yellowish-gray nodules are seen. There is no definite line of separation between the bladder and seminal vesicles.

Ureters.—*Right:* There is a moderate dilatation of the lower 15 cm. varying from 8 to 10 mm. in diameter. On section the wall measures 2 mm. in thickness with the mucosa of a dark red color. On palpation several small nodules can be felt 6 cm. below the ureteropelvic junction.

Left.—The diameter varies from 2 to 7 mm. On section the wall measures 1 to 2 mm. in thickness with the mucosa showing several areas of a dark red color.

Kidneys.—Right kidney, 10.5 by 6 by 3 cm. Left kidney, 10 by 5.4 by 4 cm.

The capsules strip off with marked resistance, leaving a finely granular reddish surface. On section the kidneys are seen to be contracted, with the architecture poorly preserved. The blood-vessels stand out prominently in the cortical portion. The mucosa of the pelvis and calyces is dark red in color.

Anatomical Diagnosis.—Carcinoma of the prostate with metastases to the bladder, seminal vesicles, right ureter, right kidney pelvis, lymph-nodes along the internal iliac arteries, abdominal and thoracic aorta, and lungs; cystitis; hypertrophy of bladder wall; chronic diffuse nephritis, arteriosclerotic type, etc.

Microscopical Notes.—*Prostate:* Sections from each lobe show the muscle fibres and the connective-tissue cells to be poorly stained. There is a marked glandular hyperplasia. There are many new-formed glandular acini lined by epithelial cells which are for the most part undifferentiated in type, with clear cytoplasm and hyperchromatic nuclei. A large number of these cells are seen breaking away from their basement membrane, and infiltrating in a disorderly fashion between the connective-tissue cells and the muscle fibres.

Bladder.—Section taken from the trigon shows a definite infiltration through the muscular layer of epithelial cells embryonic in type, mitotic cell division being visible. In the submucosa a moderate number of mononuclear wandering cells and polymorphonuclear leucocytes are seen. The mucosa is poorly stained throughout. Blood-vessels show a marked thickening of the tunica intima.

Seminal Vesicles.—Sections show the same type of tumor cells arranged as glandular acini.

Ureter.—*Right.*—(Fig. 5.) Six cm. below uretero-pelvic junction. The outer half of the muscular layer shows a definite infiltration of epithelial cells of an undifferentiated type with clear cytoplasm and hyperchromatic nuclei. A few of these cells are undergoing mitotic cell division. The perivascular lymphatics show their sinuses filled with tumor cells. In several areas the perivascular lymphatics are replaced by epithelial cells arranged as glandular acini. The tunica propria is poorly stained, with a moderate number of small round cells, mononuclear wandering cells, and polymorphonuclear leucocytes beneath the mucosa. Mucosa—shows the transitional epithelial cells intact on their basement membrane, a few of which are poorly stained.

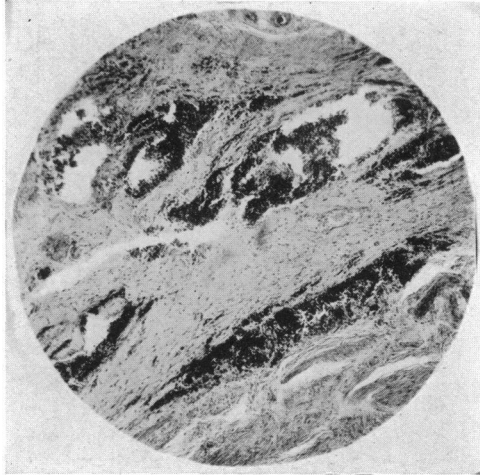


FIG. 5.—Case II. Photomicrograph right ureter, 6 cm. below uretero-pelvic junction, peri-vascular lymphatics are replaced by epithelial cells arranged as glandular acini.

Kidney Pelvis.—Right.—(Fig. 6.) The muscular layer shows the muscle fibres to be poorly stained. There is a marked increase of fibrous connective tissue separating the muscle fibres. The blood-vessels show a perivascular infiltration of epithelial cells with clear cytoplasm and a hyperchromatic nuclei, a few of which show mitotic cell division. The tunica propria shows a moderate infiltration of small round cells and mononuclear wandering cells. Mucosa shows the epithelial cells well preserved and intact on their basement membrane.

Discussion.—"The lymphatics of the ureter are more numerous in the muscular coats and adventitia than in the mucosa and submucosa. They accompany the arteries and drain in three directions, the lower portion downward in the direction of the bladder, the pelvic and abdominal portion mesially into the pelvic and lumbar lymph-glands, the upper portion in the direction of the renal lymphatics." Kelly and Burnam.²¹

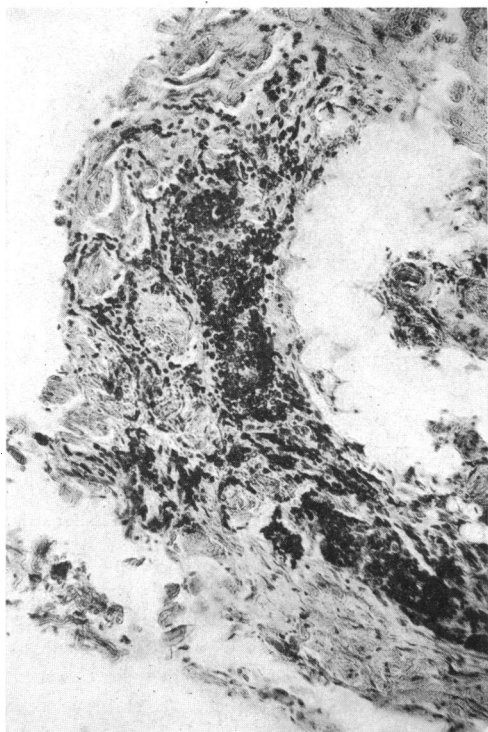


FIG. 6.—Case II. Photomicrograph right kidney pelvis, showing tumor cells in the peri-vascular lymphatics.

In 1923, Arthur Robinson²² states that little is known of the lymph-vessels of the ureter except that those of its lower extremity anastomose with the bladder and suggests that the vessels pass to the nearest lymph-glands.

While the lymphatic system is, without doubt, the earliest and most frequent site of metastatic lesions in carcinoma of the prostate,¹⁹ it would seem that the drainage of the lymph downward, in the lower portion, is the explanation for the rarity of metastases to the ureters from prostate or other pelvic viscera.

Giordano and Bumpus¹³ were the first to demonstrate carcinoma of the prostate metastasing to the renal pelvis and are of the opinion that it is carried through the blood stream.

In Case II previously reported²⁰ and Case II of this report the cancer cells were carried through the lymphatics to the renal pelvis.

Herger and Schreiner,¹⁷ in 1926, report strictured ureters, hydronephrosis and pyonephrosis occurring in cancer of the cervix, without a microscopical description. These were probably inflammatory in origin as described by Carson in 1925.²⁰

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CONCLUSIONS

(1) Two cases of primary carcinoma of the prostate extending to the ureters by lymphatics are reported.

(2) A third case of carcinoma of the prostate metastasized to the renal pelvis is reported.

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