The recent publication of Courvoisier, Wolff, Socin and Burckhardt, and Albarran and Hallé, have furnished a considerable stimulus to the study of cancer of the prostate, but although the disease has been shown to be much more frequent than was formerly supposed, and the pathological aspects have been well elucidated, practically nothing has been suggested in recent years as a routine operation for its radical cure.

Albarran's startling announcement that in 100 specimens of supposed benign hypertrophy he found more or less pronounced invasion of carcinoma in 14, seems not to have suggested the necessity of a radical excision, and even at this late date we find Pousson and Hawley advocating a mere enucleating prostatectomy, leaving behind the prostatic capsule, urethra, anterior commissure, the adjacent vesical mucosa and the seminal vesicles—structures which are manifestly in intimate contact with cancerous lobes.

The need of early diagnosis and radical methods of removal has been brought forcibly to the writer's attention in the past two years by the sad results arising from his failure to recognize, and to operate radically in six cases of early carcinoma of the prostate—several of which ought certainly to have been cured by the operation which he has since carried out in four cases. The object of this paper is to give in detail:

- The six cases of early carcinoma in which the malignant nature of the disease was not recognized and a partial operation performed.
- A radical operation, proposed as a routine for cases of cancer of the prostate, with histories of four operated cases.
- A clinical and pathological study of 40 cases of carcinoma of the prostate.
- A comparison with cases in the literature in which operations for carcinoma of the prostate were performed.
- Conclusions as to the practicability of early diagnosis and the radical cure of the disease.

---

**CASES OF UNRECOGNIZED EARLY CARCINOMA WITH PARTIAL OPERATION**

**Case 1**

Male, aged 67. Admitted May 9, 1901.
Duration of symptoms two years and four months. Uses a catheter, has had no hematuria and very little pain. Prostate much enlarged in left lateral lobe which is soft. Right lateral lobe not enlarged but indurated. Cystoscope shows enlargement of left lateral lobe and a small median bar. Diagnosis: benign prostatic hypertrophy. Bottini operation. Excellent result; maintained for two and a-half years. Returned three years after operation complaining of pain in bladder and urethra, frequent urination. Prostate much enlarged and indurated in both lateral lobes; seminal vesicles also involved. Cystoscope showed large irregular villous outgrowth in region of left lateral lobe which involved also the bladder. Death three months later. Autopsy showed the bladder invaded almost everywhere by malignant neoplasm, involving also the prostate. Microscope shows carcinoma.

Case II
E.G.W., aged 67. Admitted November, 1901. Difficulty of urination two and a-half years duration. Catheterism for one year. Severe pain in bladder of late. Prostate considerably enlarged, smooth but very hard. Seminal vesicles not indurated. Residual urine 70 cc. Cystoscope shows large irregular calculus. Slight enlargement of lateral and median portions of prostate. Operation. Suprapubic lithotomy and complete prostatectomy. Recovery. Cure, maintained for three years and 10 months. Six months ago began to have pain in region of left kidney. Can now hold his urine for five hours, voids easily, no residual urine, bladder large, no pain in that region. Examination shows a large irregular mass beneath the left kidney. Liver enlarged and nodular. In region of prostate a very hard irregular mass. Cystoscope shows no intravesical obstruction or enlargement. Examination of specimen removed at first operation shows carcinoma of the prostate.

Case III
W.H., aged 56 years. Admitted May, 1902. Duration of symptoms two years. Now voids urine 30 times a day. No hematuria, no pain on urination, but severe pain is present in the region of the sacrum. Prostate enlarged and indurated in both lateral lobes. Left seminal vesicle also indurated. Cystoscope shows very little intravesicle enlargement of prostate. Bottini operation. Five months later patient reported he had no difficulty in urination, but had pain in his spine and down his legs; this gradually grew worse and patient died six months later, evidently from carcinoma of prostate.

Case IV
J.S., aged 68 years. Admitted August, 1902. Frequency and difficulty of urination for two years. Very little pain—no hematuria. Prostate much enlarged, large indurated nodule at upper end of each lobe. Residual urine 450 cc. Bottini operation, with good results for 20 months. Then return of difficulty; had to use a catheter. December, 1904; cannot void naturally, uses a catheter, has no pain. General glandular enlargement present. Prostate and seminal vesicles involved in a large irregular indurated mass. Cystoscope shows intravesical tumor.

Case V
A.F., aged 60 years. Admitted September, 1902. Frequency of urination for three years. No pain, no hematuria. Prostate enlarged and indurated in both lobes. Left seminal vesicle also indurated. Cystoscope shows a slight hypertrophy of median and lateral lobes. Bottini operation. Excellent result maintained until January, 1904. After that difficulty and frequency of urination, pain and hematuria. Examination April, 1904. Prostate very
large, hard, nodular. Seminal vesicles involved on both sides. Cystoscope shows considerable outgrowth into the bladder. Patient died eight months later.

Case VI

J.J.S., aged 75. Admitted September 18, 1903. Frequency and difficulty of urination for three years. Pain in bladder, perineum and urethra—no hematuria. Uses catheter six times a day. Prostate considerably enlarged, very hard, slightly irregular, not tender. Seminal vesicles not palpable. Cystoscopic examination shows slight intravesical enlargement of prostate. Perineal prostatectomy, enucleation difficult owing to induration and adhesions. Immediate result good, and maintained for nine months. Examination 10 months after operation. Difficulty of urination has returned. Residual urine 500 cc. Large irregular indurated mass involving prostate and seminal vesicle. Cystoscope showed marked increase in intravesical enlargement. Bottini operation. Improved. Death two months later. Tissue removed at prostatectomy showed adenocarcinoma.

Remarks

In none of the foregoing six cases were the classical symptoms of prostatic carcinoma, as usually given, present. Pain was present only in the case with calculus and none had hematuria. The clinical picture of nearly all of the cases was that of the so-called sclerotic prostatic hypertrophy. Induration was a common finding in all the cases and the cystoscope showed very little intravesical hypertrophy. The failure to recognize the malignant nature of the enlargement in these cases caused the writer to be more careful, and to be suspicious of marked induration associated with little intravesical hypertrophy.

II. FOUR CASES OF CARCINOMA OF THE PROSTATE RECOGNIZED EARLY AND OPERATED UPON RADICALLY

In March, 1904, patient aged 70, who had suffered from frequency and difficulty of urination for one year, which had been unimproved by a Bottini operation three months before, presented himself. The prostate was hard, slightly nodular, induration extending into the region of the left seminal vesicle. The cystoscope showed only a slight intravesical prostatic enlargement. Pain had been slight and hematuria absent, but diagnosis of carcinoma was made because of the induration, and absence of intravesical enlargement. The patient gave his consent to a radical operation and the entire prostate, with the urethra and capsule, a cuff of an adjacent portion of the bladder including most of the trigone and the seminal vesicles, was removed in one piece. The operation was performed as follows with the kind assistance of Dr. Halsted:

An inverted V cutaneous incision was made in the perineum as in the operation employed by me for simple hypertrophy of the prostate—each branch of the incision being about two inches long. By blunt dissection the end of the bulb and central tendon were exposed, and the latter divided, exposing in turn the recto-urethralis muscle, the division of which gave free access to the membranous urethra behind the triangular ligament. Urethrotomy upon a grooved staff, was followed by introduction of the prostatic tractor, which was opened out after it reached the bladder. While traction was made upon this instrument the rectum was carefully separated from the prostatic capsule by blunt dissection until the entire posterior surface of the prostate was brought into view. Up to this point the operator proceeded exactly as in the usual prostatectomy.
operation with the exception that the tissues around the prostate were more hemorrhagic and the wall of the rectum more closely adherent to the capsule of the prostate than usual. Examination of the prostate then showed much greater induration than I have ever encountered in the benign prostate. The rectum and periprostatic tissues were free from invasion. Complete excision was therefore decided upon, and carried out as follows: The handle of the tractor was depressed, thus exposing the membranous urethra anterior to it at a point where it was easily divided transversely with a scalpel, leaving a small stump of the membranous urethra protruding from the surface of the triangular ligament. By further depressing the handle of the tractor the pubo-prostatic ligament was exposed, and being very tautly drawn, easily divided by scissors, thus completely severing the prostate from all important attachments (except posteriorly). The lateral attachments, which are slight, were easily separated by the finger. During these manipulations a moderate amount of hemorrhage was encountered (coming from the prostatic veins, particularly those just behind the triangular ligament in front of the prostate) but it was easily controlled by clamping several bleeding points, and applying pressure with gauze by means of an anterior deep retractor.

The posterior surface of the seminal vesicles were then freed by blunt dissection, the now mobile prostate being well out of the wound. In this exposure of the posterior surface of the vesicles I was careful not to break through the fascia of Denonvilliers which covers not only the posterior surface of the prostate but also of the seminal vesicles, and forms I believe an important barrier to the backward growth of the disease.

The next step was to expose the anterior surface of the bladder, which was easily done by depressing the tractor and making strong traction. By this procedure, the bladder was drawn down so close to the skin wound that it was easily incised at a point in the middle line about one cm. behind the prostatovesical juncture.

By means of scissors the division was continued on each side until the trigone was exposed. After swabbing away the blood and urine the ureters were easily found and the line of incision carried across the trigone with a scalpel so as to pass about one cm. in front of the ureteral orifices.

While still making traction upon the prostate, the base of the bladder was pushed upward with the handle of the scalpel, thus exposing the anterior surface of the seminal vesicles and the adjacent vasa deferentia, all of which were carefully freed by blunt dissection with the finger as high as possible, so as to remove with the vesicles much circumjacent fat and areolar tissues on account of the lymphatics which they contained. The vasa deferentia after being drawn well down were picked up on a small blunt hook and divided with scissors as high up as possible, care being taken to see that the ureters were not in danger. After division of the vasa, the seminal vesicles were found to come down more readily, the deep adhesions were finally divided and the mass was removed. A portion of the membranous urethra, the entire prostate with its capsule intact, the seminal vesicles, four cm. of the vasa deferentia, and a cuff of the bladder one cm. wide along the anterior and lateral surfaces and two cm. wide in the region of the trigone were removed in one piece.

There now remained a large defect to be repaired. The vesicle opening was about eight cm. in diameter and had sunk far back into the depths. The stump of the membranous urethra had
been obliterated by the compression of the anterior retractor so that it was necessary to insert a soft rubber catheter through the urethra from the meatus to discover it. The anterior wall of the vesicle opening was then caught with forceps, and with no great traction I was surprised to find how easily it could be drawn down to the membranous urethra, where an anastomosis was readily made. The first suture was placed by inserting the needle into the triangular ligament above the urethra and out through the anterior wall of the membranous urethra, then through the anterior wall of the bladder in the median line, from within out, care being taken to include only the submucosa and muscle. When this suture was tied, the median line of the anterior wall of the bladder was drawn to meet the median line of the roof of the remaining membranous urethra, the knot outside, and the thread left long.

Lateral sutures, similarly placed (including the periurethral muscular structures below), and two posterior sutures completed the anastomosis of the membranous urethra with a small ring into which the anterior portion of the margin of the vesical wound had been fashioned by the tying of the sutures. The remainder of the vesical wound now presented as a longitudinal opening which was easily closed by sutures, thus completely closing the defect and replacing the prostatic urethra with a funnel-shaped process made from the bladder wall. The sutures used were silk, one end of each being left long and brought out of the wound so that they could be extracted later (since then I have found alternate sutures of catgut and silk-worm gut, also left long, the best). After light gauze packing had been placed in various portions of the wound, the levator ani muscles were drawn together with catgut (two sutures) in front of the rectum and the skin wound closed on each side with interrupted catgut sutures leaving only a small portion open at the angle in front for exit of the gauze drainage. The rubber catheter (which was of considerable service in making the anastomosis of the urethra and bladder) was fastened in place, by adhesive plaster around the penis, and the patient was returned to the ward. During the operation he received 1000 cc. salt solution infusion beneath the breast, and his condition throughout was good, pulse varying from 65 to 92, and 80 at the end of the operation which required two hours.

A study of the specimen removed showed adenocarcinoma involving the entire prostate, the region between the seminal vesicles and the inferior surface of the excised trigone and the vasa deferentia. The capsule of the prostate and the bladder at upper limit of excision were free, but along the left vas deferens the disease extended to the upper limit of the incision four cm. above the prostate.

Convalescence

Patient convalesced well. Left the hospital May 30, 1904. Perineal wound healed tight; no difficulty in urination; able to hold his urine for three or four hours at night; incontinence in the day.

December 22, 1904. Condition of patient excellent until two months ago when he began to suffer pain in the urethra. Examination shows three calculi in the bladder. Operation, litholapaxy. One calculus was found attached to a silk ligature and in removing this the mucous membrane of the bladder was torn. This was followed by perineal abscess, extravasation of urine and death four weeks later. Autopsy showed excellent union between bladder and urethra. No recurrence in bladder, but behind bladder along left vas deferens was a small area of carcinoma. No carcinomatous glands present.
Case VIII
W. R., No. 16,675. Admitted September 14, 1904, aged 64. Frequency and difficulty of urination for three years. Has to use catheter now. No hematuria, no pain. Prostate moderately enlarged, smooth, very hard but not nodular. Between the two seminal vesicles an indurated plateau continuous with the prostate below. No indurated glands or lymphatics. Cystoscopy showed slight intravesical enlargement of median portion. Diagnosis: carcinoma of the prostate. Operation September 23, 1904. Total excision of prostate, seminal vesicles, portion of the vasa deferentia, cuff of the bladder, the entire trigone including the ureteral orifices. The excision was carried above the ureteral orifices because the bladder wall there felt indurated and the operator thought it was involved. Examination of the tissue removed, however, showed that this was a mistake, and that only the anterior part of the trigone was invaded by the disease. Transplantation of the ureters was not necessary because the intramural portion had not been completely removed. Anastomosis of anterior wall of bladder and urethra was made as in case VII. The patient convalesced badly, early showed symptoms of pyelitis and died November 8, 1904.

Autopsy showed ascending infection of both kidneys and besides that chronic endocarditis, perihepatitis, splenitis, pancreatitis. Careful examination showed that the carcinoma had been entirely removed at operation. No metastatic glands present. The patient would almost certainly have been cured had the operator not excised the ureteral papillae.

Case IX
S. R. B., aged 65. Admitted February 4, 1905. Frequency and difficulty of urination for four years. Now voids every few minutes. Intermittent pain in left hip and thigh for two years. Dull pain in back, bladder, perineum, and rectum. Has never had hematuria. Examination: No glandular enlargements. Prostate considerably enlarged, smooth but very hard. Induration involving the lower end of the seminal vesicle on each side with a narrow plateau between them above the prostate. Cystoscope shows very slight enlargement of the median portion of the prostate. Diagnosis of carcinoma of the prostate made upon the induration involving also the seminal vesicles and the area between them, and the absence of intravesical prostatic enlargement.

February 16, 1905. Radical operation was carried out as in case VII. Patient made an excellent recovery. Was entirely relieved of pain. Perineal wound healed tight. Urine comes entirely through the urethra.

Examination June 24. Condition excellent. Voids urine about every two hours. Has no incontinence at night, but in the day urination is imperative when desire comes on. Examination shows no evidence of recurrence.

Study of the tissue removed at operation shows adenocarcinoma involving the prostate, both seminal vesicles, vasa deferentia and the tissues between them and the excised portions of the bladder.

Case X
J. E. D., aged 64. Admitted May 12, 1905. Difficulty and frequency of urination for one year. For two months has had to use a catheter. No pain in region of bladder, rectum, back or legs. Has not lost weight. No hematuria. Healthy looking man. No glandular enlargement. Prostate considerably enlarged, particularly left lateral lobe which is very hard and tender. The seminal vesicle is indurated on this side. The seminal vesicle is indurated on this side. Residual urine about 400 cc. Cystoscope shows small enlarge-
ment of the median portion of the prostate. Diagnosis of carcinoma made on induration, extending into the region of the seminal vesicle and the absence of marked intra-vesical enlargement.

May 16, 1905. Radical operation carried out as in Case VII. The patient made an excellent convalescence. Perineal wound healed in five weeks. Discharged from hospital in six weeks. General condition excellent. Suffers no pain, urine passes entirely through the urethra. Rectal examination negative. Patient feels well, but as yet has no control over urine.

Examination of tissues removed at operation showed adenocarcinoma of prostate, of a portion of the seminal vesicle, and of lower portions of vasa deferentia. One excised gland was also carcinomatous. The trigone, the capsule of the prostate and perivesicular fat were free from disease.

CONCLUSIONS

The following conclusions may be drawn from this study. Carcinoma of the prostate is more frequent than is usually supposed—occurring in about 10 percent of the cases of prostatic enlargement, as shown also by Albarran. It may begin as an isolated nodule in an otherwise benign hypertrophy or a prostatic enlargement which has for many years furnished the symptoms, and signs of benign hypertrophy may suddenly become evidently malignant.

Marked induration, if only an intralobar nodule in one or both lobes of the prostate in men past 50 years of age should be viewed with suspicion, especially if the cystoscope shows little intravesicular prostatic outgrowth, and pain and tenderness are present.

The posterior surface of the prostate should be exposed as for an ordinary prostatectomy, and if the operator is unable to make a positive diagnosis of malignancy, longitudinal incisions should be made on each side of the urethra (as in prostatectomy) and a piece of tissue excised for frozen sections, which can be prepared in about six minutes and examined by the operator at once. If the disease is malignant the incisions may be cauterized and closed and the radical operation performed.

Cancer of the prostate remains for a long time within the confines of the lobes, the urethra, bladder and especially the posterior capsule of the prostate resting inviolate for a considerable period. Extraprostatic invasion nearly always occurs first along the ejaculatory ducts into the space immediately above the prostate between the seminal vesicles and the bladder and beneath the fascia of Denonvilliers. Thence the disease gradually invades the inferior surface of the trigone and the lymphatics leading toward the lateral walls of the pelvis, but involvement of the pelvic glands occurs late and often the disease metastasizes into the osseous system without first invading the glands.

Cure can be expected only by radical measures and the routine removal of the seminal vesicles, vasa deferentia and most of the vesical trigone with the entire prostate as carried out in four cases by the writer is shown to be necessary by the 40 cases, including eight autopsies and 10 operations, reported above.

The four cases in which the radical operation was done demonstrated its simplicity, effectiveness and the remarkably satisfactory functional results furnished.