

## Carcinoma of the Prostate with Aggressive Rectal Invasion

To the Editor:

With a reported prevalence as low as 0.56 per cent, the diagnosis of prostatic carcinoma with rectal invasion may not be immediately obvious or even suspected.

We report a case of highly aggressive prostatic carcinoma with widespread local and rectal invasion in a patient who then underwent a total pelvic exenteration to control symptoms. He is presently disease free.

A 60-year-old man presented in June 2006 with a 1-year history of a 20-pound weight loss and nocturia of three to four times. A urologist performed a right-sided prostate core biopsy. The tissue was 100 per cent replaced with carcinoma, having a Gleason score of 8. The prostate-specific antigen (PSA) was 80.4. A bone scan was negative for metastatic disease.

He was treated with Lupron Depot® (TAP Pharmaceuticals, Lake Forest, IL) and Casodex® (AstraZeneca, Boston, MA). Flomax® (Astellas Pharma Technologies, Norman, OK) was eventually added in an attempt to ameliorate a weak urine stream with urine straining. His PSA decreased to 10.6 in November 2006. However, in February 2007, his PSA was 97.

A CT scan of the pelvis was obtained. It showed a 9 cm × 9.5 cm × 9.5-cm mass arising from the prostate gland, extending to the right pelvic sidewall with invasion into and compression of the distal rectum (Fig. 1). The mass extended into the right ischiorectal fossa. No evidence of distant metastatic disease was noted. An MRI showed tumor extension into the bladder neck with invasion into the upper anal canal and puborectalis.

His PSA was now 149. In June 2007, external beam irradiation was administered.

Because of the continued rapid growth of his tumor and progression of his symptoms, including progressive obstructing voiding symptoms and difficulty defecating, a decision was made to divert his urinary and fecal tracts. Because further tumor growth and impending pelvic pain seemed likely, the patient was also consented for possible extirpative surgery of the entire pelvic mass. Colonoscopy was performed and demonstrated a bulging anterior anorectal wall with mucosal ulceration (Fig. 2).

In June 2007, the patient underwent a laparotomy and was found to have tumor extending from the prostate into the right pelvic sidewall. The tissue

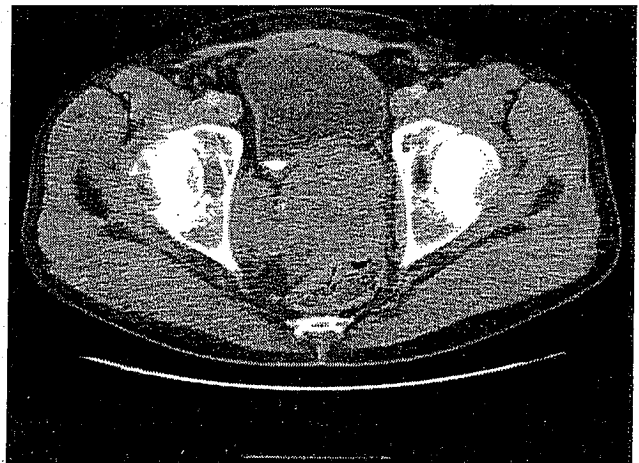


FIG. 1. CT scan of the pelvis showing a mass emanating from the prostate to the right pelvic sidewall and compressing the rectum.

planes were completely obliterated. Dissection was started on the left side and the pelvic floor musculature was dissected off of the prostate. The distal colon and rectum were mobilized to the levator ani. Dissection was carried along the right pelvic sidewall sparing the obturator nerve. A perineal resection was performed concomitantly. The specimen was removed en bloc (Fig. 3). Frozen sections of the surgical margins were free of tumor. An ileal urinary conduit and a colostomy were fashioned. Vicryl® mesh was placed for pelvic isolation. The patient recovered smoothly.

The pelvic exenteration specimen revealed a high-grade prostatic carcinoma, Gleason grade  $4 + 5 = 9/10$ , centered in the prostate gland. The carcinoma extended through the prostatic capsule to invade the anterior rectum, seminal vesicles, periprostatic adipose tissue, and the muscularis propria of the bladder.

At the time of last follow up, in March 2009, the patient's PSA was undetectable. No interval development of local or distant disease has been noted.

Carcinoma of the prostate with rectal invasion is rare with few cases being reported. In our patient, all of the major layers of the rectum were invaded by the tumor. Invasion was also extensive into other surrounding structures.

On an anatomic level, the prostate is surrounded by a dense fibrous capsule, which divides it into five lobes. Surrounding the prostatic capsule is the visceral layer of the pelvic fascia. This forms a fibrous sheath that is thin anteriorly and thick posteriorly. It blends posteriorly with the rectovesical septum. Anterolaterally, this sheath blends with the puboprostatic ligaments. Inferiorly, the levator ani muscles support the prostate. It is theorized that these anatomic structures as well as Denonvilliers



FIG. 2. Colonoscopic image revealing a bulging anterior anorectal wall.



FIG. 3. Photograph of the gross surgical specimen demonstrating the tumor mass emanating from the prostate with spread into the bladder anteriorly and into the rectum posteriorly.

fascia may form a physical barrier to invasion of prostatic cancer; especially posteriorly near the rectum.

Other than the prostatic capsule and Denonvilliers fascia, there are no other anatomic barriers inhibiting the invasion of cancer into surrounding structures. The prostatic capsule seems to offer some degree of protection against the local spread of carcinoma. In support of this theory of anatomic inhibition, the prostatic plexus of nerves is incorporated into the prostatic capsule. However, because these nerves penetrate the capsule, there is a greater incidence of perineural spread. It appears that growth and invasion of a prostatic tumor along a nerve is associated with a neuron's natural inability to inhibit apoptosis of cancerous cells. Commonly, this allows for tumor spread along perineural anatomic routes.<sup>1</sup>

However, anatomic factors alone do not explain the rarity of local invasion. In fact, superiorly, the prostate lacks physical obstructions to the invasion of cancer and yet, local invasion is rare. Other inhibitory factors must be involved.

On a microscopic and molecular level, spread of prostatic carcinoma appears to be an imbalance between inhibitory factors and those factors promoting invasiveness. It has been hypothesized that a cell undergoes active cytoskeletal modifications and a complex set of interactions with surrounding tissue to achieve active detachment, spread, and reattachment of its cellular membrane to the surrounding extracellular matrix.<sup>2</sup> An imbalance in cellular detachment and reattachment may explain aggressive local spread.<sup>1, 3</sup>

Most surgeons will not have seen such local invasion during their training years and thus should be aware of the potential for invasive local growth with rectal invasion by prostatic carcinoma and the ensuing complications that may be associated with this rare event. In selected cases, total pelvic exenteration may be curative.

Jordan R. H. Hoffman, B.A.

*Tulane University School of Medicine  
New Orleans, Louisiana*

Eiman Firoozmand, M.D.

Daniel J. Luthringer, M.D.

Kiarash Michel, M.D.

Gary H. Hoffman, M.D.

*Cedars Sinai Medical Center  
UCLA David Geffen School of Medicine  
Los Angeles, California*

#### REFERENCES

1. Yang G, Wheeler TM, Kattan MW, et al. Perineural invasion of prostate carcinoma cells is associated with reduced apoptotic index. *Cancer* 1996;78:1267-71.
2. Sheng S, Carey J, Seftor EA, et al. Maspin acts at the cell membrane to inhibit invasion and motility of mammary and prostatic cancer cells. *Proc Natl Acad Sci U S A* 1996;93:11669-74.
3. Valicenti RK, Gomella LG, Ismail M, et al. Pathologic seminal vesicle invasion after radical prostatectomy for patients with prostate carcinoma. *Cancer* 1998;82:1909-14.