Adenocarcinoma of the Prostate: The Rationale and Role for Radiotherapy in its Management

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Until recently the treatment of carcinoma of the prostate was limited either to radical prostatectomy by the perineal or retropubic route, or to hormonal manipulation. Approximately 5% of all patients with this disease are suitable candidates for radical surgery. Hormonal manipulation is palliative in nature and is generally used when there is evidence of metastatic disease (in about 50% of patients). There thus remains a group of patients (40% to 45%) in whom the disease is localized, yet too extensive for surgical treatment, for whom definitive radiotherapy can play a major role.

Pre-treatment Evaluation

Once the histological diagnosis of carcinoma of the prostate has been made it is desirable to delineate the exact extent of disease in order to provide certain guidelines for optimal management and for predicting prognosis. In an attempt to evaluate the various diagnostic procedures, we at the Medical College of Virginia are conducting an ongoing study where all patients with clinically localized prostatic carcinoma undergo the following work-up:

1. Laboratory Studies
   a) WBC, hematocrit, platelets
   b) Total and prostatic fraction of acid phosphatase (blood is obtained either prior to or at least 24 hours after rectal examination).
   c) Alkaline phosphatase and BUN.
   d) Bone marrow biopsy for histological examination, and radioimmunoassay for prostatic acid phosphatase.
2. Radiological Studies
   a) Chest x-ray
   b) Intravenous pyelography
   c) Bipedal lymphangiogram
   d) ^{99}m Tc Labeled di-phosphate bone scan

Radiation Therapy

Although the use of ionizing radiation in the treatment of carcinoma of the prostate was first reported in 1911 by Pasteau,[1] the majority of reports have appeared within the last ten years. In a recent comprehensive review of the subject Ray and his colleagues[2] have documented clinical studies which collectively report on 880 cases in which external beam irradiation was the primary mode of treatment. They have concluded "that potentially tumoricidal dosage of irradiation can be delivered to the prostate with relative safety and in general the initial response of the local tumor to irradiation in survival rates at five years were encouraging."

Results

Local. In general, the reports of various authors support our experience that 70% to 80% of patients show marked resolution of the disease within six months on clinical examination. We do not, at the present, recommend post-treatment prostatic biopsies as a routine procedure.

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Survival. On reviewing the results of various investigators dealing with the definitive treatment of adenocarcinoma of the prostate with megavoltage irradiation therapy, one finds that the five-year survival rate varies from 60% to 70% and the ten-year survival rate varies from 30% to 40%. Ray and his colleagues[3] from Stanford University have reported the results of treatment for two clinical groups of patients based upon the extent of the disease as determined by digital examination. In one group of patients the disease was limited to the prostate and this group of patients had a 71% and 41% survival rate at five and ten years respectively. In the other group of patients the disease had extracapsular extension and this group of patients had 41% and 31% survival rates at five and ten years respectively. Hillaris and his colleagues[4] from Memorial Hospital have reported that all patients with intracapsular disease (T_1, T_2, and T_3) and negative lymph nodes were alive and free of disease at five years while disease-free survival decreased to 70% in patients with extracapsular disease and negative nodes or in patients with intracapsular disease with positive nodes. Only 50% of patients with extensive local disease (T_3 and T_4) and positive nodes were alive without evidence of disease at five years. It has been my experience that dissemination of disease is more frequent in patients with a large primary tumor, with a high-grade tumor, and in the presence of histologically positive lymph nodes. In addition, there is rapid systemic dissemination of the disease once the para-aortic lymph nodes are involved.

Present Area of Clinical Investigation

The major cause of failure of definitive radiotherapy in carcinoma of the prostate is the spread of tumor, outside the high dose of radiation field, either to the lymph nodes or to the bones. It is generally accepted that young patients (below 65 years), patients with a high-grade tumor and with diffuse involvement of the prostate gland (multiple chips involved, post-transurethral resection of the prostate) have a poor survival rate even when they present with early (stage A) disease. It remains to be seen whether definitive radiation therapy in this select group of patients with stage A carcinoma of the prostate will alter the natural history and provide an improved survival rate.

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