Prostate Cancer: Treatments and Case Study

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Abstract

Prostate cancer affected 192,280 men in the United States in 2009, and the incidence of prostate cancer has risen in the last twenty years. Prostate cancer mostly affects men over 50 years-old, and the chance of incidence rises the older a man gets. There are several different types of therapies in the treatment of prostate cancer such as; brachytherapy, chemotherapy, hormone therapy, prostatectomy, and external beam radiation therapy.
**Introduction**

Prostate cancer is the most diagnosed cancer for men, and is a disease that all men should be educated about. There is a larger aging population now, and the incidence of prostate cancer is rising and accounts for 29% of new cancer diagnoses in men in the United States. Even though there is a rise in the incidence of prostate cancer, the mortality rates have not changed significantly due to better screening for earlier diagnosis and treatment (Drudge-Coates & Turner, 2012). There are several ways of treating prostate cancer such as; brachytherapy, prostatectomy, external beam radiation therapy, hormone treatments, and chemotherapy. Risk factors and severity of the prostate cancer determine the chance of survival for the patient.

**Literature Review**

**Risk Factors**

Risk factors associated with prostate cancer are age, family history, and race. Age is the most prominent risk factor with a 10% incidence rate of men in their fifties to a 90% incidence rate of men in their nineties. Family history also plays a role in incidence rates, with men who have a first degree relative with prostate cancer have a two times higher chance of contracting it. African-American men have the highest risk followed by Caucasians, and Asian men have the lowest incidence of cancer. Other factors such as diet, sexual behavior, alcohol consumption, weight, and occupational exposure have been suggested, but are still under investigation. Prostate cancer does not occur in males castrated before puberty, because the presence of testosterone is needed (Turner & Drudge-Coates, 2010).

Prostate cancer is classified into three stages: localized prostate cancer, locally advanced, and metastatic disease. Localized prostate cancer has no evidence of spreading and is localized to the prostate. Locally advanced prostate cancer has spread locally to the seminal vesicles or
outside the prostate capsule to the prostate bed or lymph nodes. And metastatic disease is when the cancer has spread to other parts of the body. Prostate cancer is usually asymptomatic, and is found using patient history, physical exam, prostate biopsy, and using a prostatic-specific antigen (PSA) test. Using a PSA test is not always accurate, because the antigen shows up in benign and cancerous conditions and can cause a false positive test (Drudge-Coates & Turner, 2012). PSA can detect asymptomatic prostate cancer and Moyer (2012) writes that there is “convincing evidence that a substantial percentage of men who have asymptomatic cancer detected by PSA screening have a tumor that either will not progress or will progress so slowly that it would have remained asymptomatic for the man’s lifetime” (p. 120). Another procedure to test for prostate cancer is a digital rectal exam (DRE). During a DRE exam, a man should be checked for enlargement, tenderness, and irregularities. If the patient has these symptoms they may be referred for a transrectal ultrasound and prostate biopsy (Turner & Drudge-Coates, 2010).

**Treatments**

There are several treatment options available for men with prostate cancer such as; prostatectomy, brachytherapy, external beam radiation therapy, or chemotherapy. The therapy or combination of therapies depends on the type of prostate cancer a man has and how advanced it is. Francis (2012) discusses two therapies used for treating metastatic castration-resistant prostate cancer (mCRPC). The first therapy is using a chemotherapy drug called cabazitaxel, which can be effective when the patient has developed a resistance to other chemotherapy drugs. In a clinical trial done of 700 men taking cabazitaxel, there was an improved overall survival rate with longer progression-free survival, and improved PSA and tumor response. The main side effects for cabazitaxel were febrile neutropenia and diarrhea. Another therapy is hormonal therapy, and it uses an androgen inhibitor to prevent the conversion of adrenal androgens to...
testosterone. A clinical trial, using a hormone called abiraterone and a placebo, was done using 1,195 men. The results were that there was an improved survival of 14.8 months with the drug, and only 10.9 months with a placebo. The main side effects for abiraterone were hypertension, fluid retention, and hypocalcaemia.

Prostate brachytherapy is another alternative for treating prostate cancer. Many men are referred to and choose brachytherapy because it is a quicker and easier treatment that has a more favorable toxicity profile for bowel and sexual function than external beam therapy or surgery. Brachytherapy is the placement of radioactive sources within or near the tumor, and can be permanent or temporary. Brachytherapy started in the early 1900s with the discovery of radium, with a radium source inserted through a urethral catheter. It fell out of favor with new radiation safety issues, and the crude implantation technique. It came back in the 1960s where seeds were placed with a retropubic approach. Today, the treatment is the placement of sealed sources of radioactive material within the prostate. The sources can be permanent seeds implanted or temporary catheters and radioactive strands housed in a remote afterloader (Waring & Gosselin, 2009).

Brachytherapy uses a variety of medical professionals in the treatment of prostate cancer such as; medical oncology, nursing, anesthesiology, radiation oncology, nuclear medicine, and diagnostic imaging. Eligibility criteria for brachytherapy is extensive and involves looking at; prostate volume, pubic arch interference, current obstructive urinary symptoms, age, obesity, inflammatory bowel disease, comorbid diseases such as diabetes mellitus, and patient desire. If the patient meets the requirements, he is then set up for the procedure. During the procedure the patient is given anesthesia and placed in a dorsal lithotomy potion. An ultrasound probe is then inserted in the rectum. The purpose of the ultrasound probe is to obtain imaging for inserting the
needles. (See Figure 1) The needles are replaced with catheters, and the placement is checked. The catheters are then attached to a high dose rate (HDR) machine, and the dose is given. The most common side effects of the procedure are irritative or obstructive urinary symptoms (Waring & Gosselin, 2009). Moradi et al. (2012) has also written an article about using ultrasound in brachytherapy, and they say that “accurate seed localization based on ultrasound has proven to be a very difficult task due to clutter from other highly reflecting objects such as calcifications resulting in false positive appearances” (p. 2558). Up to 25% of the seeds can be hidden using only ultrasound, and therefore C-arm fluoroscopy can be used to assess seed placement. The prostate cannot be seen with fluoroscopy, and needs to be combined with the ultrasound for effective images. After initial treatment the patient comes back for an x-ray image to see if the seeds are still correctly placed and have not moved. (See Figure 2)

Another option for the treatment of prostate cancer is prostatectomy surgery. Prostatectomy surgery is the removal of the prostate, seminal vesicles, and adjacent tissue. There are 3 types of prostatectomy, and they are; traditional open surgery, laparoscopic (keyhole) surgery, and robot-assisted surgery. The recommended treatment for patients with intermediate-risk prostate cancer and a life expectancy of more than 10 years is radical prostatectomy. Erectile dysfunction and urinary problems are the most common side effects from the procedure (Drudge-Coates & Turner, 2012). There is a 0.5% chance that men will die within a month after radical prostatectomy surgery, and that 3% to 7% will have serious complications. Additionally, 20% to 30% of men could have erectile dysfunction or urinary incontinence after surgery (Moyer, 2012). A study done at the University of Sao Paolo Medical School compared the outcomes of robotic and open surgical radical prostatectomy. Both surgeries were performed by a very experienced surgeon. The use of robotic surgery found that there was less blood loss, less
variability of hospital stay, better sexual function, and less postoperative complications. The downfall of using robotic surgery was longer operating times and higher costs. The robotic surgery was found to be superior in this study if patients can afford the extra cost. Another study done at Weill Cornell Medical College, and it was done on more than 100,000 robotic, laparoscopic, and open surgical radical prostatectomies. The results were the same in that the robotic surgery showed less blood loss and fewer complications in comparison to the open or laparoscopic surgeries. Another benefit to using robotic surgery was that it was better for less experienced surgeons to use. It is suggested that the robotic approach is best if it is affordable to the patient (Wolf, 2011). In the United States, it is estimated that 60,000 men undergo prostatectomies every year. Again the most common side effect for prostatectomy is erectile dysfunction, and this can cause emotional distress for the patients and their families. For men who had normal erectile function before their prostatectomy the incidence of erectile dysfunction ranges from 24% to 82%. Other side effects for sexual function after surgery are absence of ejaculation, orgasmic dysfunction, and penile length shortening. Erectile dysfunction is caused by perioperative neuropraxia, partial or complete nerve resection. Some erectile dysfunctions are only temporary, and this is because of tissue stretching and muscle damage. There are different types of penile rehabilitation drug therapies that patients can use to help alleviate penile dysfunction symptoms (Glina, 2011).

The last type of treatment for prostate cancer is external beam radiation therapy (ERBT). Computed tomography (CT) and magnetic resonance imaging (MRI) is used to pinpoint the target areas for the radiation to be administered. ERBT is usually administered 5 days a week for 6 to 7 weeks depending on severity of the cancer. Many times hormone therapy is also given concurrently with ERBT, and the hormone that is usually given is luteinizing hormone-releasing
hormone. The potential side effects are genitourinary, gastrointestinal toxicity, or erectile dysfunction, and there is also an increased risk of developing malignancies of the rectum and bladder following ERBT (Drudge-Coates & Turner, 2012).

Case Report

Case report 1

Garai & Pandey (2010) wrote a case report involving an 84-year-old man who had disseminated prostate cancer. The patients’ prostate cancer was diagnosed primarily with endobronchial biopsy. After the patient presented with weight loss and hemoptysis a bronchoscopy was done, which showed he had a mucosal irregularity and possible tumor in his right intermediate bronchus. The patient had a previous right hemicolecotomy and adjuvant chemotherapy done from a cecal carcinoma. A chest radiograph was taken and showed a right hilar mass with scattered nodules in both lungs. A bronchial biopsy revealed a differentiated adenocarcinoma similar to a prostate adenocarcinoma. (See Figure 3) The tumor cells were combined with PSA and confirmed it was a metastasis from the prostate. The patient had no symptoms to suggest prostate cancer and underwent a digital rectal exam where his prostate was hard. The patient was diagnosed with prostate cancer, with a prostate biopsy deemed unnecessary, and underwent hormone therapy and bilateral subcapular orchidectomy.

Prostate carcinoma rarely presents as an endobronchial metastasis, with only 8 incidences of it happening, this case was the third known of the 8. This case is unique in that is needed immunohistochemistry done to confirm it was prostate cancer, and that the patient present with symptoms, hemoptysis and weight loss, that simulate a primary neoplasm. Because of the patients previous history of colorectal cancer he was originally thought to have metastatic
colorectal cancer and primary bronchogenic carcinoma. This case shows how important it is to get a full histological confirmation before any treatment plan is implemented and also the importance of prostate screening. Histopathologists need to be aware of the possibility of endobronchial metastases from an asymptomatic extrepulmanary tumor.

Case Report 2

Talvitie, et al. (2011) wrote about two cases involving a solitary fibrous tumor (SFT) that is usually found in the pleura. The first case presents with a 66-year-old man who has lower urinary tract symptoms. The patient had nocturnal radiating pain from the groin towards the scrotum and micturition difficulties. His PSA was slightly elevated and an ultrasound exam showed a mass in the posterior prostate. A transurethral resection of the prostate (TUR-P) was performed and a series of transrectal needle biopsies were taken and showed several of the samples had a mesenchymal neoplasia with storiform growth patterns consistent with SFT. The patient underwent MRI scans, which showed a tumor growing between the prostate and rectum. The tumor was 4.2 x 3.0 x 5.0 cm, and there was no gross infiltration of into the rectal wall. The patients’ treatment was an en bloc excision of the tumor, seminal vesicles, prostate, and rectum. The patient suffered from urosepis after the surgery, and was successfully treated with antibiotics. Surgeons could not tell if the tumor originated from the prostate or from connective tissue between prostate and rectum.

The second case involved a 69-year-old man who presented with lower urinary tract symptoms, urine retention, and hematuria. The hematuria was treated with TUR-P, and it showed that the entire specimen was infiltrated with a mesenchymal tumor diagnosed as SFT. Nine months after the diagnosis a second TUR-P was performed, because of gross hematuria, where a small tissue remnant was taken and biopsied revealed SFT. The tumor that was resected was 5
cm in diameter, and well-circumscribed. After 2 more years the patient had a
cystoprostatectomy performed. There have been no relapses in either case. SFT is a spindle cell
tumor that is rare and usually found in the pleura. These two cases are the 26th and 27th reported
cases to involve the prostate.

**Discussion**

Prostate cancer is a disease that many men have to be aware of and educated about. There
is rise in prostate cancer incidences in the last 20 years and 192,280 new cases of prostate cancer
in the United States in 2009. Prostate cancer is the most common cancer in men that is not skin
cancer related. Many men are unaware they have prostate cancer because they rarely have any
symptoms associated with prostate cancer. Many men are afraid of the invasive nature of getting
a rectal prostate exam, and do not get checked out. Another test that can check for the possibility
of prostate cancer is a prostate specific antigen serum test, but these are not always accurate and
can produce a false positive result. Age is the biggest risk factor for prostate cancer, and the
older a man is the higher the chances are that he can develop prostate cancer. There are a variety
of treatment plans that men can choose from, and they should discuss with their physician the
best treatment plan that would work for them. Treatment plans include; brachytherapy, hormone
therapy, chemotherapy, prostatectomy, and external beam radiation therapy. There are several
different scopes of professions that are involved in the treatment of prostate cancer such as;
urology, medical oncology, nursing, nuclear medicine, and diagnostic imaging, and all are well
trained for prostate cancer treatment. It is important for men to think about their prostate health
and get screened for prostate cancer on a regular basis.
Figures

**Figure 1.** Ultrasound image of brachytherapy seed implantation of an 82 year-old male patient during surgery.

**Figure 2.** X-ray of same patient after surgery to check if seeds are still in correct position.
Figure 3. Tumor cells stained with prostate specific antigen, showing prostate adenocarcinoma.

References


