Robotic Prostatectomy for Prostate Cancer: Is it for you?

By Ketan Badani, M.D. and Philippa Cheetham, M.D.

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Introduction

We are at the height of interest and controversy regarding whether we should screen for prostate cancer, and if diagnosed, WHO and WHEN do we treat, if we treat at all. Finally, HOW do we treat a particular man diagnosed with prostate cancer, given all the options available today. As urologic oncologists, we know that we have to take each individual man’s age, overall health status, and particular prostate cancer characteristics into consideration before recommendations are made. This process is one of the most anxiety-provoking decisions a man will make regarding his own health care.

Robotic prostate cancer surgery has become the most dominant form of surgery for the treatment of prostate cancer. In a mere 9 years, robotic prostatectomy will constitute over 75% of all radical prostatectomy procedures performed in the United States. This book was written in an effort to address the most common questions and concerns patients and their families express during our meetings with them. This book was not meant to answer the above questions regarding how to choose between treatment options: active surveillance, radical prostatectomy, external beam radiation, seed implantation, hormone therapy, and cryotherapy.

This patient-focused guide will take you chronologically through all aspects of robotic prostatectomy starting from the initial visit, pre-operative process, the operation itself, hospital stay and recovery. We have included appropriate questions and discussion points to ask your doctor so that you are well prepared at the time of your visit. We would like to thank all our patients for providing us the motivation to write this guide, you all have been wonderful. We would also like to thank our mentor, Dr. Mani Menon, who brought robotic surgery to mainstream clinical care and allow us to practice our highly specialized craft.

Good luck to you, we hope you find this guide helpful during your journey through this treatment decision making process. As always, our door is always open to provide advice and get feedback from patients and their families.

Sincerely,

Drs. Ketan K. Badani and Philippa J. Cheetham
The authors would like to acknowledge the incredible assistance that was given by the nurses and technicians in the robot operating room at Columbia University Medical Center, New York. The following people have been part of our robot “A” team and their hard work, time and dedicated service has been greatly appreciated:

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We also wish to say a big thank you to our secretary Sandy Torres for her continued loyalty to both of us, for guiding our patients through the preoperative paperwork and manning the telephone enquiry hot line for patients calling the office after surgery. In addition great thanks are extended to Laheri Mehta and Roy Cheetham for excellent, thorough critique of our first draft of the book, to Eion Dinneen for his valuable input on the chapter on the history of robotics, our residents and anesthetic colleagues who have provided excellent care and anesthesia for our patients, to the nurses in the recovery area and on the wards and to Dr. Mitchell Benson, Chairman of our department, who continues to be a great supporter of robotic surgery as well as providing guidance through the years. Finally we are very grateful to our close friend and fantastic colleague Dr. Aaron Katz, Vice Chairman and Professor of Urology at Columbia Medical Center who first gave us the idea to write this book for our patients, after he had written his book *Living a Better Life After Prostate Cancer—A Survivors Guide to Cryotherapy* which was so well received by his own patients trying to make sense of their diagnosis of prostate cancer. Without his initial suggestion and continued enthusiastic support our book may still not have been written.
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THE PROSTATE—WHERE IS IT AND WHAT DOES IT DO?

The prostate is normally a small gland about the size of a walnut. It is a key part of the male reproductive system and is linked closely with the urinary system. The prostate secretes much of the liquid portion of semen, the milky fluid that transports sperm through the penis during ejaculation. The prostate is located just below the bladder and in front of the rectum (figure 1). Like a donut the prostate encircles a tube called the urethra, which carries urine from the bladder out through the penis. The

Figure 1 The prostate in relation to the bladder and urinary tract
urethra also carries semen during ejaculation, which is secreted by the prostate through small pores of the urethral walls. Semen is a combination of sperm plus fluid that the prostate adds. The prostate is made up of a number of lobes encased in an outer covering or capsule (figure 2). It is flanked on either side by the seminal vesicles, a pair of pouch-like glands that contribute secretions to the semen. Next to the seminal vesicles run the two vas deferens tubes (one from each side) that carry sperm from the testicles. The testicles, in addition to manufacturing sperm, produce the male sex hormone testosterone that controls the prostate’s growth and function. As one of a man’s sex glands the prostate is affected by testosterone, which stimulates the activity of the prostate for its growth and development.

**WHAT ARE PROSTATE PROBLEMS?**

For men under 50, the most common prostate problem is prostatitis. For men over 50, the most common prostate problem is prostate enlargement. This condition is also called benign prostatic hyperplasia or BPH. Another major prostate problem is prostate cancer which is the most common solid organ malignancy diagnosed in men. Fortunately, it is much less common than BPH.
What is Prostatitis?
Prostatitis means that the prostate is inflamed. Some kinds of prostatitis are caused by bacteria. If you have bacterial prostatitis, your doctor can look through a microscope and find bacteria in a sample of your urine. Your doctor can then give you an antibiotic to fight the bacteria. Most of the time, though, doctors do not find any bacteria in men with prostatitis. If no other causes are found, the doctor may decide that you have a condition called non-bacterial prostatitis. Antibiotics will not help non-bacterial prostatitis and no single solution works for everyone with this condition. All of these forms of prostatitis may elevate your prostate specific antigen (PSA) level.

What is Prostate enlargement or BPH?
If you are a man over 50 and have started having problems urinating, the reason could be an enlarged prostate or BPH. As men get older, their prostate (which encircles the urethra) keeps growing and it squeezes the urethra, causing compression of the lumen (the channel where urine passes) as shown in figure 3. Since urine travels from the bladder through the urethra, the pressure from the enlarged prostate may affect bladder control. If you have BPH, you may have one or more of these problems:

Figure 3  A normal prostate compared to an enlarged prostate
1. A frequent and urgent need to urinate. You may get up several times a night to go to the bathroom.
2. Trouble starting a urine stream. Even though you feel you have to rush to get to the bathroom, you find it hard to start urinating.
3. A weak stream of urine
4. A small amount of urine each time you go.
5. The feeling that you still have to go, even when you have just finished urinating.
6. Leaking or dribbling
7. Small amounts of blood in your urine.

You may barely notice that you have one or more of these symptoms, or you may feel as though urination problems have taken over your life.

**Is BPH a sign of cancer?**

No, BPH is not a sign of cancer. It is true that some men with prostate cancer also have BPH, but the converse is not necessarily true. The two conditions are not always linked. Most men with BPH do not develop prostate cancer. However, because the early symptoms are the same for both conditions, you should see a doctor to evaluate these symptoms.

**Is BPH a serious disease?**

By itself, BPH is not a serious condition unless the symptoms are so bothersome that you cannot enjoy life. BPH can lead to serious problems. One problem is urinary tract infections and if recurrent, can result in bladder stones. If you can’t urinate at all, you should get medical help right away as you may need to have a catheter inserted to drain the bladder. In rare case, BPH and its constant urination problems can lead to kidney damage due to back pressure on the kidneys from a bladder that is unable to drain.
TESTS YOUR DOCTOR MAY ORDER TO IDENTIFY PROSTATE PROBLEMS

Several tests help the doctor identify the problem and decide on the best treatment;

1. Digital Rectal Exam (DRE)
This exam is usually the first test done. The doctor inserts a gloved finger into the rectum and feels the part of the prostate that sits next to it (figure 4). This exam (done with the patient lying on their side on the examination couch or stood up leaning forward) gives the doctor a general idea of the size and condition of the prostate.

2. PSA Blood test
The doctor may want to test a sample of your blood to look for the level of prostate-specific antigen or PSA. If your PSA is high, it may be a sign that you have prostate cancer. But this test is not perfect. Many men with high
PSA scores do not have prostate cancer. The converse is also true, in that it is also possible to have prostate cancer and have a normal PSA blood test reading. Another important factor beyond the absolute number of PSA is the rate at which it rises. This is called PSA velocity. This is an equally useful parameter used by doctors to suspect abnormal PSA values. PSA must be interpreted with your doctor to determine whether the absolute number or velocity warrants further investigation.

3. Urine Flow Study
You may be asked to urinate into a special device that measures how quickly urine is flowing. A reduced flow may mean that you have BPH.

4. Urinalysis and culture
This simple urine test can identify if bacteria and / or blood is present. If blood is found in the urine (either clearly visible to the naked eye or on inspection under the microscope) this should be investigated with further tests as there are many different causes to account for this condition. Sometimes the urine can be contaminated by bacteria. This is harmless and does not mean infection is present. However if the patient has symptoms of infection and the urine culture identifies bacteria, we can then determine which antibiotic would be most suitable to treat the infection.

5. Imaging
The doctor may want to get a picture of your prostate using ultrasound. A rectal ultrasound or sonogram uses a probe, inserted into the rectum, to bounce sound waves off the prostate. It is also used as a guide when performing a prostate biopsy, discussed in further detail in Chapter 3.

6. Cystoscopy
Another way to see a problem from the inside is with a cystoscope, which is a thin tube with lenses like a microscope. The tube is inserted into the bladder through the urethra while the doctor looks through the cystoscope (figure 6).
Is TURP the same as removing the prostate?

No. TURP stands for transurethral resection of the prostate. A TURP (a “core out” or “bore out” of the prostate) and other procedures for BPH remove only enough tissue to relieve urine blockage. The prostate tissue is removed using an instrument called a resectoscope (figure 7). In a few cases the prostate may continue to grow and urinary problems return. You should continue to have your prostate checked once a year even after surgery to make sure that BPH or prostate cancer has not developed. A total prostate removal or what is medically termed a radical prostatectomy is usually done only to treat prostate cancer, not BPH. This is major pelvic surgery and is a very different operation to a TURP. At present, there are
three different approaches for radical prostatectomy; an open operation, laparoscopic key hole procedure and robotic assisted surgery. This is discussed in more detail later.

Figure 7
The resectoscope instrument used to perform a TURP
FIRST OF ALL, WHAT IS CANCER AND HOW DOES IT DEVELOP?

Cancer is much more than a single disease. It is actually a group of many different diseases, but all of them have a few important things in common. Finding cures for cancer is an excruciatingly tough task because of the ways in which different cancers develop and progress. One drug won’t work the way another drug might, and one drug might work initially for a patient and then stop working as the cancer transforms into a newer, more virulent form.

The best thing to do is prevent it. If we can’t do that, we need to catch cancer as early as possible and (1) get rid of it with the most advanced methods in our possession, and then (2) do all we can to try to prevent a recurrence. In order to understand what cancer is, let’s look at the life cycle of healthy, non-cancerous cells. Normal cells grow and divide, producing new, healthy cells as the body needs them. Old, “used-up” cells are destroyed and broken down to make way for new ones. The balance between the formation of new cells and the elimination of old cells maintains the body in its healthy state.

Sometimes, cells keep dividing despite the fact that no more new cells are needed, and the excess cells end up forming a mass called a tumor. Some tumors are benign, which means they are not cancerous and will not spread to other areas of the body (metastasis). Malignant tumors are cancerous and can spread, which is what makes them life-threatening. The origin of the word cancer is credited to the Greek physician Hippocrates (460-370 BC), considered the “Father of Medicine.” He named the disease karkinos, Greek for “crab,” because he noticed that the blood vessels around a malignant tumor looked like the claws of a crab. Celsus (28 BC-50 AD), a Roman doctor,
translated the Latin adaptation of the Greek word *carcinos* into the Latin word *cancer*. The word eventually worked its way into Old English and this is the word we continue to use today.

What is the insult that sparks the formation of cancer? What causes the malignant cells to grow and spread instead of being attacked and eliminated by the immune system? These are enormous questions that in the “War against Cancer” we are still struggling to answer. In later chapters we will tell you more about what is known about risk factors for prostate cancer, and about what you can do to better manage your risk. But first, let’s finish our lesson on the basics of cancer.

Cancerous tissue forms when the cells that comprise it divide in an out-of-control fashion. They invade and destroy healthy tissue in the immediate vicinity. Cancer cells may also break off from the tumor, which can then enter and travel in either the circulatory or lymphatic systems. Both of these systems can transport malignant cells to other parts of the body, where they form new tumors. These new tumors which are distant from the site of the primary tumor are called metastases. They show up in the lymph nodes, bone, bladder, rectum or other organs. Even when a cancer has spread, it is named according to the cell or organ in which it originated. For example, if prostate cancer has spread to the bones it is called metastatic prostate cancer as we can still identify prostate cancer cells in the bone.

**PROSTATE CANCER—HOW COMMON IS IT AND WHOM DOES IT AFFECT?**

Lung cancer used to be the commonest cancer to afflict men in the United States. However, this is no longer the case, with prostate cancer now being the most common solid organ cancer in men. Each year in the U.S nearly 31,000 men die of prostate cancer. Race appears to influence prostate cancer risk. If you are of African American descent, you have an especially high risk of developing prostate cancer, which can be a more aggressive form.

Age is another major factor. The average age at which prostate cancer is diagnosed is 72 years. However, widespread PSA testing indicates that we are now seeing more young men diagnosed with the disease than in previous years. We have successfully treated a large number of men in their early
40s and 50s who had no symptoms, but were diagnosed with early-stage prostate cancer following a PSA blood test.

While race and age appear to influence prostate cancer risk, environmental factors and where you live are important, too. When a man of a lower-risk race moves to a part of the world where the risk of prostate cancer is higher, the risk to that individual tends to rise too. We know that men of Asian descent have the lowest rates of prostate cancer diagnosis and mortality. If you are Asian and live in your home country, your risk remains low. However, you have a higher risk of prostate cancer if you are an Asian living in the U.S. Although prostate cancer rates for Asian men living in the U.S are not as high as those for native white Americans living in the U.S, they are still much higher than Asian men still living, say, in Japan. This observation supports the fact that both environmental and dietary factors play an important role in the development and progression of prostate cancer.

Tests that now allow for very early detection of cancer, along with significant medical advances in the treatments available, help doctors treat cancer at a much earlier stage than before. The rate at which prostate cancer is diagnosed has risen 67% since the middle of the twentieth century. Unfortunately, despite this increase in cancer detection rate, the number of men dying from prostate cancer (the mortality rate) has not really changed much in recent years. Between 1990 and 1998, prostate cancer deaths in white men fell only 2.8% per year (roughly 500 fewer deaths in 1998 than 1990). For black men during this same time period there was reduction of only 1.5% per year, with less than 300 fewer prostate cancer deaths in 1998 than 1990.

According to the Centers for Disease Control and Prevention 2003 Fact Sheet on prostate cancer:

- Among all racial and ethnic groups, prostate cancer death rates were lower in 1999 than they were in 1990.
- Decreases in prostate cancer death rates during 1990 to 1999 were almost twice as great for whites and Asian/Pacific Islanders as they were for African Americans, American Indian/Alaska Natives, and Hispanics.

We are making headway, but we still have a lot of work to do for men who are at risk.
RISK FACTORS FOR PROSTATE CANCER

When you hear the term “risk factor,” you can bet that you’re going to hear information that is just specific enough to scare you, but not specific enough to give you any exact idea of how to protect yourself. To make matters worse some risk factors are simply out of your control, such as age, race, and family history of prostate cancer. However it is important to keep this all in perspective and bear in mind that risk factors are identified by looking at large populations of people and determining the incidence of the disease in question. The researchers who are involved in these studies then go backwards to see whether any dietary habits, environmental influences, or lifestyle patterns can be associated with the incidence of that disease. When we can find a trend among populations, and we find similar association in two or more different populations, the end result is that we are fairly sure we’ve got another risk factor on our hands.

Having one or more of the following risk factors does not mean you will definitely develop prostate cancer, and neither is the absence of these risk factors a guarantee of protection. When we identify risk factors, what we are really doing is trying to identify groups of people who would be best served by increased vigilance. In the case of prostate cancer, for example, men who are in higher-risk groups should have PSA tests early, and the doctor might be more inclined to perform a prostate biopsy at the earliest sign of an abnormal result.

The identification of risk factors is also important for research purposes. Once we have an idea what puts certain groups of people at increased risk of a particular disease, we can then begin to address how we might treat or even prevent that disease through dietary change or medical means. So…with all of that in mind, here are the risk factors for prostate cancer:

Family History

If you have a relative who has had prostate cancer, be sure you are regularly assessed to detect it early. Having a first-degree male relative (a father or brother) with the disease doubles the risk of you developing prostate
cancer. Your risk is greater if several of your relatives have been diagnosed, especially if they were diagnosed at a young age (under 50). Younger men with prostate cancer are also more likely to have an aggressive form of the disease.

**Age**

It is clear that both prostate size and the risk of prostate cancer increase with age. Several autopsy studies have shown that men in their 80s who died of unrelated causes also had prostate cancer found in the gland. In fact, if we were to biopsy all men in their 80s, over 80% of them would have cancer in the biopsy but only a tiny percentage of these are life-threatening and have any bearing on life expectancy. With this in mind, Urologists and primary care physicians are still debating whether PSA screening is beneficial to men over the age of 75.

**Geography and Race**

Prostate cancer incidence is highest in North America and Western Europe. Denmark has the highest rate in the world. Asians, native Africans, and Central and South Americans have lower risk, but their risk rises if they move to other parts of the world where risk is higher. African-American men with the highest rate of prostate cancer in the world are also more likely to develop more aggressive forms of the disease. Recent studies have shown that the further away you live from the equator, the greater the risk of developing prostate cancer. This may be related to sunlight exposure and vitamin D. Many researchers are therefore now suggesting that it may be useful to look at vitamin D blood levels to assess risk and even consider supplementing those who have low vitamin D blood levels.

**Saturated Animal Fat**

Countries where the diet is rich in animal fat tend to have higher rates of prostate cancer. Case-control studies show that men who have prostate cancer have consumed a diet rich in more animal fat than their counterparts
who are cancer-free. It is not currently known whether this relationship is due to the physiological effects of fat in the diet, or to fatty foods replacing fruit and vegetables. However, several recent studies reported that heavier men with a higher body mass index are more likely found to have a worse cancer. Furthermore, these men are also more likely to have a rise in PSA after surgery, indicating recurrence of the disease. Several studies are currently underway to determine the true risk factor of body fat on prostate cancer.

**Low Antioxidant Intake**

Some studies have shown that a diet high in lycopenes (a chemical found in tomatoes and other fruit and vegetables), vitamin E and selenium (found in whole grains) may be protective against prostate cancer. There is also increasing evidence that diets low in antioxidants may increase the risk of prostate cancer.

**Vasectomy**

Although not regarded as a true risk factor, some research suggests a link between vasectomy and prostate cancer with up to a 50% increased risk. The jury is still out on this. However, if there is a relationship, it doesn’t appear to be a strong one.

**Sexual activity, Venereal disease**

Studies have found that men with prostate cancer have histories of greater sexual activity and more bouts of venereal disease than men who don’t have prostate cancer. This suggests a possible role for a sexually transmitted agent.

**BPH and Postatitis**

Some studies suggest that having a non-cancerous condition of the prostate may increase the risk of developing prostate cancer at a later date. These include the inflammatory disease called prostatitis. At the time of biopsy many men are found to have low levels of inflammatory cells that may be
an early warning sign of cancer development. In addition to inflammation, abnormal cells which are termed by the pathologist as either PIN (prostate intraepithelial neoplasia) or ASAP (atypical small acinar proliferation) may be found. In these circumstances the chance of a man developing prostate cancer is increased and a repeat biopsy is strongly advised in some instances.

**Obesity**

Obesity has been associated with many cancers, particularly those that are related to hormone levels. Extra body fat doesn’t just sit there, taking up space; it is metabolically active and can alter hormone production and their actions. Men who carry around a lot of extra fat make extra amounts of the female hormone estrogen, which is linked with increased prostate cancer risk. One research group also found a strong link between childhood obesity and adult risk of prostate cancer.

**Physical Inactivity**

In a nationwide Swedish study, researchers investigated the effects of occupational physical activity on relative risk for prostate cancer. They used census data to divide roughly one-and-a-half-million men into three groups, each with different levels of physical activity at work (having also accounted for changes in physical activity levels over the ten year study period). They found that those men that were more active at work had a lower risk of developing prostate cancer. Men who were sedentary had about a 111% risk of getting prostate cancer in comparison to men who were active. Other studies have suggested the same, but more research is needed to elucidate the couch potato-prostate cancer connection.

**Pesticide Exposure**

Farmers are at higher risk of developing prostate cancer. This could be due to pesticide chemicals they come into contact with, or to some other unidentified factor. In a National Cancer Institute study, researchers followed 55,332 Iowa and North Carolina farm or plant-nursery workers who had regular
contact with pesticides at work. During the six year study period (1993 to 1999), there were 566 new prostate cancers diagnosed in this group of men, which was higher than the predicted 495 cancers for this group. Men who applied pesticides (including methyl bromide, lorpypirifos, coumaphos, fonofos, phorate, permethrin, and butylate) at work were 14% more likely to get prostate cancer than the general population. Interestingly, only methyl bromide pesticide increased risk for all men who used it; the others only appeared to raise risk in men with a family history of the disease.

**Cadmium Exposure; Rubber Industry work.**
Men who work in iron or steel boundaries, rubber factories and other types of manufacturing plants have a slightly increased risk of prostate cancer. Workers exposed to cadmium during welding, electroplating, or making batteries may also have an increased risk.

**Agent Orange exposure**
Men who were exposed to a chemical called Agent Orange, used during the Vietnam War, have been found to have higher rates of prostate cancer. These men were at least twice as likely to develop cancer as unexposed men. Not only was prostate cancer more common among men exposed to Agent Orange, but they also developed prostate cancer at an earlier age. Furthermore the exposed veterans with prostate cancer were more than 3 times as likely to have cancer spread outside the prostate at time of diagnosis when compared to those men not exposed to Agent Orange. When researchers evaluated all other known risks factors for prostate cancer present in these two groups of men, only their history of Agent Orange exposure seemed to explain the striking differences in the incidence and severity of prostate cancer.

**The Role of Testosterone and Other Hormones**
The inter-relationships between hormones and risk of prostate cancer are complex and still not well understood. Without the male hormone
testosterone, the prostate cannot develop or function normally. It has also been known for some time that testosterone is one of the main driving forces for prostate cancer. Hormonal manipulation can also be used to treat prostate cancer. Lowering testosterone levels and manipulating its metabolism are important treatments for existing prostate cancer, especially when the cancer has spread outside the gland.

A number of factors can influence our hormone levels, including diet, lifestyle, medication and underlying medical conditions. Men considering taking testosterone replacement (i.e. as a treatment for erectile dysfunction) should have urological evaluation including a prostate exam and PSA blood test before starting treatment.

**SYMPTOMS OF PROSTATE CANCER**

Early prostate cancer usually causes no symptoms. Therefore, if you are diagnosed with prostate cancer, it may have come as a complete shock. The first you may hear from your doctor that you may have prostate cancer is when he or she informs you that your PSA blood test came back high or the rectal exam was in some way suspicious. Some men with prostate cancer do experience symptoms but this is less common. Prostate symptoms do not always imply prostate cancer as discussed in chapter 1, where we discussed non-cancerous conditions such as BPH and/or prostatitis. Symptoms of prostate cancer may include very similar symptoms to these non-cancer conditions. We therefore cannot emphasize enough the importance that men with any of the symptoms below should promptly see a Urologist.

- A need to urinate frequently, especially at night;
- Difficulty starting urination or holding back urine;
- Inability to urinate;
- Weak or interrupted flow of urine;
- Painful or burning urination;
- Painful ejaculation;
- Blood in urine or semen;
- Frequent pain or stiffness in the lower back, hips, or upper thighs.
A lot of men try to shrug off or ignore symptoms, or they dig their heels in and refuse to see a doctor because they are, deep down, afraid of what they might be told. But generally, when it comes to prostate cancer, the earlier we detect it, the higher the likelihood of being cured. If it turns out not to be cancer but a benign condition such as BPH or prostatitis, we are also able to improve your urinary tract health with a combination of alternative therapies.