Factors Affecting Patient Selection for Prostate Brachytherapy: What Nurses Should Know

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Prostate brachytherapy is a proven treatment for clinically localized prostate cancer; however, many clinicians have multiple misconceptions regarding patient selection criteria. Although most patients are candidates for the procedure, contraindications do exist. This article examines criteria for patient selection and the need for adjuvant therapies, proposes management philosophies, and discusses the impact of each on treatment decisions. Nurses’ role in the decision-making process and how they can facilitate patients and families in making informed choices also are discussed. Clinical studies seek to further define patient selection criteria and examine optimal choices for adjuvant treatment and isotope preference. Expanding the knowledge base of nurses helps enhance patient care.

Prostate Factors

Size

Traditionally, patients with large prostates (i.e., volume > 50 cm³) have not been considered to be candidates for prostate brachytherapy because of the possibility of increased postoperative urinary symptoms, such as urinary retention, dysuria, and urgency. These complications are caused by the higher number of seeds required to be inserted into a larger prostate. Prostate size is determined via transrectal ultrasound, which visualizes and measures the prostate gland. The technical difficulty of seeding a large-volume prostate puts patients at higher risk for acute and long-term urinary difficulties. Before brachytherapy can be considered, patients with large-volume prostates are offered androgen deprivation therapy to shrink the prostate. This cytoreduction usually takes three months and allows for an overall improved implant. Patients who present with small-volume prostate glands (i.e., < 20 cm³) have shown no difference in urinary morbidity in several studies (Merrick, Butler, Dorsey, & Lief, 2001; Merrick, Butler, Lief, & Dorsey, 2000; Merrick, Butler, Wallner, Galbreath, & Lief, 2003). In addition, studies have shown that patients with larger prostate glands can be implanted safely without subsequently experiencing an overabundance of urinary dysfunction (Merrick et al., 2000; Merrick, Butler, Wallner, Galbreath, et al., 2003;
The size of the median lobe of the prostate also is noted during transrectal ultrasound of the prostate. In patients with median lobe hyperplasia (i.e., protrusion of hypertrophied prostate tissue into the bladder), prostate brachytherapy is discouraged because of the technical difficulty involved in implanting intravesical tissue as well as the subsequent postoperative increase in urinary dysfunction (Merrick et al., 2003d).

A bladder scan to measure postvoid residual, or the amount of urine left in the bladder after urination, is performed during patients’ initial visit and, ideally, should be zero. If any increase in prostate size occurs, urinary retention will be evident with a bladder scan. For patients who are retaining urine, an alpha 1-blocker will relax the smooth muscle of the urinary sphincter and improve urine flow (Abel et al., 1999). Tamsulosin hydrochloride is the drug of choice because of its anatomic closeness to the prostatic urethra (Merrick, Butler, Galbreath, Lief, & Donzella, 2001). The transition zone index, which is calculated by dividing the transition zone volume by the prostate gland volume, has a direct relationship to postoperative urinary symptoms (Merrick, Butler, Galbreath, et al.). Transition zone volume is determined during transrectal ultrasound of the prostate. The larger the transition zone preoperatively, the higher the likelihood of urinary dysfunction postoperatively (Thomas et al., 2000).

The size of the transition zone of the prostate (see Figure 1) may be more closely related to lower urinary tract symptoms and urinary flow than the central or peripheral zones because of its anatomic closeness to the prostatic urethra (Merrick, Butler, Galbreath, Lief, & Donzella, 2001). The transition zone index, which is calculated by dividing the transition zone volume by the prostate gland volume, has a direct relationship to postoperative urinary symptoms (Merrick, Butler, Galbreath, et al.). Transition zone volume is determined during transrectal ultrasound of the prostate. The larger the transition zone preoperatively, the higher the likelihood of urinary dysfunction postoperatively (Thomas et al., 2000).

The skeletal design of the pelvis also is important for or against prostate brachytherapy. Traditionally, prostatitis also has been a contraindication for prostate brachytherapy because of the potential worsening of urinary symptoms in patients with already compromised urinary status. However, one study has indicated that no correlation exists between preoperative prostatitis and postoperative urinary morbidity (Hughes, Wallner, Merrick, Miller, & True, 2001).

A patient’s urinary status always must be assessed before brachytherapy is performed. The American Urological Association (AUA) Symptom Index can be used to assess urinary habits and is completed prior to implant (see Table 1). Then, the same questionnaire is administered to patients at intervals after implant to assess urinary morbidity (Abel et al., 2000). By comparing a patient’s responses, nurses can gauge the extent of irritative symptoms a patient is experiencing. With the understanding that urinary symptoms most likely will not improve quickly postoperatively, nurses can implement appropriate teaching interventions regarding activity, diet, and medication changes as warranted (Abel et al., 2000). For patients with increased nocturia, ceasing fluid intake after 7 pm and taking a hot bath 30 minutes before bedtime may help alleviate symptoms. Curbing caffeine and alcohol intake also may be beneficial. Some irritative symptoms may be relieved by increasing dosages of tamsulosin hydrochloride or administering an anti-inflammatory or corticosteroid. Daily activity—ideally a 30-
The use of spasmolytics may further aggravate urinary obstructive symptoms. However, caution must be used because spasmolytics may further aggravate urinary retention, which has a higher incidence postimplant (Spratto & Woods, 2004).

**Previous Transurethral Resection of the Prostate**

Historically, patients who underwent a TURP prior to prostate brachytherapy generally were considered to be at higher risk for developing urinary incontinence postimplant approximately 50% of the time (Merrick et al., 2003c). Nurses must make a point of knowing whether patients have undergone TURP when having conversations with them postbrachytherapy to determine whether medical intervention by a physician is warranted. A technique using a peripheral source loading approach with a limitation of the radiation dose to 110% of the prescription dose to the TURP defect of the preoperatively resected area decreases the risk of incontinence to 6% (Wallner, Lee, Wasserman, & Dattoli, 1997). Some studies have shown that patients who have undergone TURP preimplant have a quality of life (QOL) approaching that of brachytherapy patients who have not undergone the procedure (Merrick, Butler, Wallner, & Galbreath, 2004). The use of spasmolytics may be indicated to resolve symptoms in patients who complain of urgency and incontinence. However, caution must be used because spasmolytics may further aggravate urinary retention, which has a higher incidence postimplant (Spratto & Woods, 2004).

**Age**

Age may be a stronger predictor of cancer curability than differences in preimplant prostate-specific antigen (PSA) levels (Carter, Epstein, & Partin, 1999). Physicians have been reluctant to recommend brachytherapy for younger patients even though outstanding biochemical outcomes, as shown by postoperative median PSAs of < 0.1 ng/ml, have been reported for hormone-naïve men 62 years of age or younger undergoing brachytherapy (Merrick, Butler, Lief, & Galbreath, 2001; Merrick, Butler, Wallner, & Galbreath, 2004). Conversely, physicians have been hesitant to recommend brachytherapy for older patients because older men may be at an increased risk for extracapsular extension, have higher Gleason scores, and show a greater propensity for distant metastatic disease (Carter et al.). Research has shown that older patients tolerate brachytherapy as well as younger men (Merrick et al., 2000); therefore, age alone should not influence treatment decisions. However, prostate brachytherapy generally is not recommended for patients 80 years of age and older because of the risks involved with general anesthesia. Age also can be a predictor of increased side effects. One of the most reliable predictors of impotence is age (Wallner, 2000). This knowledge can assist in determining when drugs or devices for erectile dysfunction should be implemented.

**Obesity**

Obesity can present substantial procedural and technical difficulties for radical prostatectomy and external beam radiation therapy but poses only minor challenges for prostate brachytherapy (Merrick et al., 2002). For patients with grade II (i.e., body mass index [BMI] = 30.0–34.9 kg/m²) and grade III (i.e., BMI > 35.0 kg/m²) obesity who undergo brachytherapy, favorable dosimetric, biochemical, and QOL outcomes have been demonstrated (Merrick et al., 2002).

From a nursing standpoint, obesity as a risk factor postoperatively is related to airway clearance, respiratory dysfunction, cardiovascular insufficiency, thromboembolic events, and delayed wound healing (Merrick et al., 2002). Obesity also is a preoperative consideration when determining risks for anesthesia.

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**Table 1. The American Urological Association Symptom Index**

<table>
<thead>
<tr>
<th>Question</th>
<th>NOT AT ALL</th>
<th>LESS THAN 1 TIME IN 5</th>
<th>LESS THAN HALF THE TIME</th>
<th>ABOUT HALF THE TIME</th>
<th>MORE THAN HALF THE TIME</th>
<th>ALMOST ALWAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Over the last month or so, how often have you had a sensation of not emptying your bladder completely after you finished urinating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. During the last month or so, how often have you had to urinate again less than 2 hours after you finished urinating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. During the last month or so, how often have you found you stopped and started again several times when you urinated?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. During the last month or so, how often have you found it difficult to postpone urination?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. During the last month or so, how often have you had a weak urinary stream?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. During the last month or so, how often have you had to push or strain to begin urination?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. During the last month, how many times did you most typically get up to urinate from the time you went to bed until the time you got up in the morning?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Note. American Urological Association symptom score = sum of questions 1–7.

Tobacco

Tobacco use has been associated with aggressive prostate cancer, prostate cancer-related death, and a trend for poorer biochemical progression-free survival following permanent prostate brachytherapy (Merrick, Butler, Wallner, Galbreath, Lief, et al., 2004). Adverse late urinary QOL changes and diminished late rectal function also have been associated with tobacco use. Tobacco use possibly decreases cure rates also have been associated with tobacco use. Diabetes is also a significant risk factor for brachytherapy-related erectile dysfunction, with a 100% incidence as measured by the International Index of Erectile Function (IIEF) (Merrick et al., 2003a), as shown in Table 2. The IIEF is a validated, self-administered questionnaire that is used to assess sexual function. Because corticosteroids also are used postbrachytherapy, close monitoring of blood glucose levels in patients with diabetes is necessary.

Rectal function can be assessed before and after surgery by using the self-administered Rectal Function Study Questionnaire (see Figure 2). The extent of rectal function can be assessed by comparing pre- and postsurgical responses. Generally, inflammatory bowel disease, ulcerative colitis, and regional enteritis (i.e., Crohn disease) are contraindications to external beam radiation therapy because of the increased risk of gastrointestinal and rectal complications. However, Grann and Wallner (1998) found no increased risk of gastrointestinal morbidity in this patient population when prostate brachytherapy was used to treat the disease. Nurses must teach patients extensively pre- and postoperatively regarding bowel function. If the rectal mucosa becomes too distended (e.g., from constipation), the rectum is pushed against the prostate gland postoperatively and causes an increased risk for radiation exposure to the rectal wall, which makes the area more prone to postimplant complications, such as inflammation and bleeding. Patients must have regular daily bowel movements to avoid this situation. A high-fiber diet and/or bulk-forming laxatives may be implemented if a patient is prone to constipation.

Appropriate preimplant assessment is essential for patients undergoing permanent prostate brachytherapy. The AUA Symptom Index, IIEF, Rectal Function Study Questionnaire, and a thorough patient history are valuable tools in determining postoperative needs assessment, teaching, and implementation.

Comorbid Conditions

Diabetes mellitus and inflammatory bowel disease are two conditions to consider prior to prostate brachytherapy. These diseases can increase sexual, urinary, and rectal morbidity significantly for patients considering treatment for prostate cancer. Patients must be informed of the possible implications. Referrals to assist each individual with the cessation of tobacco use must be made appropriately.

Prostatic Acid Phosphatase

Prostatic acid phosphatase is a simple laboratory test that has been reported to be the strongest predictor of freedom from prostate cancer.

Table 2. Individual Items of International Index of Erectile Function Questionnaire and Response Options (U.S. Version)

<table>
<thead>
<tr>
<th>Question*</th>
<th>Response Options</th>
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</table>
| **01:** How often were you able to get an erection during sexual activity? | 0 = No sexual activity  
1 = Almost never/never  
2 = A few times (much less than half the time)  
3 = Sometimes (about half the time)  
4 = Most times (much more than half the time)  
5 = Almost always/always |
| **02:** When you had erections with sexual stimulation, how often were your erections hard enough for penetration? | 0 = Did not attempt intercourse  
1 = Almost never/never  
2 = A few times (much less than half the time)  
3 = Sometimes (about half the time)  
4 = Most times (much more than half the time)  
5 = Almost always/always |
| **03:** When you attempted sexual intercourse, how often were you able to penetrate (enter) your partner? | 0 = Did not attempt intercourse  
1 = Almost never/never  
2 = A few times (much less than half the time)  
3 = Sometimes (about half the time)  
4 = Most times (much more than half the time)  
5 = Almost always/always |
| **04:** During sexual intercourse, how often were you able to maintain your erection after you had penetrated (entered) your partner? | 0 = Did not attempt intercourse  
1 = Extremely difficult  
2 = Very difficult  
3 = Difficult  
4 = Slightly difficult  
5 = Not difficult |
| **05:** During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse? | 0 = No attempts  
1 = One to two attempts  
2 = Three to four attempts  
3 = Five to six attempts  
4 = Seven to ten attempts  
5 = Eleven+ attempts |

*All questions are preceded by the phrase, “Over the past four weeks.”

biochemical progression for intermediate- and high-risk brachytherapy patients (Dat-toli, Wallner, True, Cash, & Sorace, 2003). The test also is predictive of biochemical outcome and disease-specific survival following potentially curative radical prostatectomy (Han, Demel, et al., 2001; Han, Piantadosi, et al., 2001; Moul, Connelly, Perahia, & McLeod, 1998; Roach et al., 1999). Normal prostatic acid phosphatase levels may obviate the need for radiographic staging in patients as well as negate the need for androgen deprivation therapy. Elevated prostatic acid phosphatase may predispose patients to subclinical distant metastatic disease. These patients probably would benefit from hormonal manipulation (Merrick et al., 2003c).

### Isotope

No definitive data exist to determine which isotope—iodine or palladium—offers a more optimal cure for prostate cancer (Wallner et al., 2003). One prospective, randomized trial reported that scores on the AUA Symptom Index as well as bowel dysfunction improve more quickly with palladium-103, which has a shorter half-life (Wallner et al., 2002). With this study in mind, palladium would be the optimal choice. In patients receiving iodine, which has a longer half-life, postoperative symptoms may be prolonged.

Knowing which isotope is used can assist nurses with forming a plan of care. A more intense and lengthy follow-up may be necessary for patients receiving iodine.

### Supplemental Therapies

In patients with adverse pathologic and biochemical features, supplemental hormone therapy and external beam radiation therapy are accepted forms of neoadjuvant treatment when combined with brachytherapy. However, monotherapeutic brachytherapy has been shown to have favorable
biochemical outcomes, especially for lower clinical stages (i.e., T1–T2a, PSA ≤ 10 ng/ml, Gleason score ≤ 6). High-quality implantation with generous periprostatic margins may be the only therapy needed for low-, intermediate-, and selected high-risk patients (Blasko et al., 2000; Merrick, Butler, Wallner, Burden, et al., 2003). Patients receiving supplemental external beam radiation therapy and brachytherapy are at a greater risk for side effects, including hematuria, compromised late urinary function, compromised late rectal function, and erectile dysfunction. Ongoing prospective randomized trials at the University of Washington and the Schiffer Cancer Center in Wheeling, WV, are being conducted that will further define the role of external beam radiation therapy in patients with high-risk features.

Hormone therapy, although implicated in brachytherapy-related morbidity, has produced conflicting results in the areas of urinary, rectal, and sexual dysfunction. In a large, retrospective, matched-pair analysis, no benefit for hormonal manipulation with brachytherapy was found for any risk group, Gleason score, pretreatment PSA, or clinical stage (Potters, Tore, Ashley, & Leibel, 2000).

The use of supplemental therapies alerts nurses to expect potential increased side effects in patients who undergo external beam radiation therapy or hormonal deprivation therapy. Patients who have an increase in urinary dysfunction after receiving external beam radiation therapy may experience it to a greater degree post-implant. Patients may become fatigued more easily or have more frequent bowel movements. Those undergoing hormone deprivation will experience an increase in sexual dysfunction, and the need may arise to initiate an erectile dysfunction drug such as sildenafil citrate (Stipe et al., 2002). When nurses are aware, they can ask the right questions, make accurate assessments, and make recommendations tailored to fit individual patients. In the end, patients and their families can be assured of a higher quality of nursing care.

**Conclusion**

Multiple factors should be taken into consideration before the decision is made to perform prostatic brachytherapy implantation. Improved intraoperative techniques and physician experience are essential components to overcoming patients’ anatomy. Age,
obesity, and comorbid conditions always are considered before brachytherapy is performed; however, alone, they should not be a deterrent to the procedure. Increased Gleason scores, perineural invasion, and tumor extension in the biopsy specimen are factors that appear to be controlled by the use of an aggressive locoregional approach. Supplemental therapies, although readily used at present, may be found after further study to be an unnecessary component of treatment. The goal continues to be that patients remain disease free with minimal morbidity and improved QOL. Further investigation is necessary to provide the knowledge base necessary to accomplish this goal.

Accurate nursing assessment has become an integral part of patient care. The increasing body of knowledge attained by physicians who perform permanent prostate brachytherapy must be examined by nurses caring for brachytherapy patients. Knowledge relayed from nurses to patients facilitates the decision-making process and helps alleviate patient and family fears. Side effects often are remedied in a timely manner as a result of thorough assessments that are relayed to physicians. The mutual goal of physicians and nurses is for patients to undergo successful implantations with as few side effects as possible and, ultimately, to undergo successful implantations with as few side effects as possible and, ultimately, to cure the disease.

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References


Factors Affecting Patient Selection for Prostate Brachytherapy: What Nurses Should Know

- For patients who undergo prostate brachytherapy, many factors are taken into consideration for patient selection, the most common of which are prostate size, patient anatomy, preexisting urinary signs and symptoms, previous transurethral resection of the prostate, age, comorbid conditions, obesity, tobacco use, adverse pathologic features, and elevated prostatic acid phosphatase.

- Elements that are solely patient dependent, although always considered, have not been found to increase postoperative morbidity significantly in those who undergo prostate brachytherapy.

- Controversy exists regarding whether iodine or palladium is more effective, the need for supplemental therapies, and the roles of both in patient morbidity and mortality.

- Isotope selection and adjuvant treatment therapies warrant continued study to evaluate their necessity and impact on postoperative morbidity and mortality in patients who undergo permanent prostate brachytherapy.

- Nursing care that has a solid knowledge base in prostate brachytherapy assists patients and their families with decision-making challenges, the brachytherapy procedure, and patients’ changing needs for weeks, months, and years postimplant.


