Surgical Management of Testicular Cancer

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Testicular cancer is a rare disease and accounts for 1% of all cancers that occur in men. However, it is the most common solid tumor affecting men aged 15–35 (Poirier & Rawl, 2000). An estimated 7,600 new cases and 400 deaths from testicular cancer occurred in 2003 (Jemal et al., 2003). Worldwide, the rate of testicular cancer has increased since the 1960s, with the environment being the blamed causative factor for the increase (Huyghe, Matsuda, & Thonnear, 2003). The incidence varies geographically; the highest numbers of men diagnosed live in Scandinavia, Switzerland, Germany, and New Zealand; intermediate incidence is found in the United States and Great Britain; and the disease is almost nonexistent in Africa and Asia (Bosl & Motzer, 1997).

In the 1970s, testicular cancer accounted for 11.4% of all male deaths from cancer, with a 64% overall survival rate in men aged 25–34. Presently, the cure rate for early-stage testicular cancer is close to 100% (Steele & Richie, 1997). This improvement in survival is attributed to cisplatin-containing combination chemotherapy, surgery, advent of and improvements in computed tomography (CT) scans, and tumor markers (Sheinfeld, 2002).

The surgical management of testicular cancer is an integral component in the treatment of this disease. A radical orchiectomy will provide a pathologic diagnosis and local control. Retroperitoneal lymph node dissection (RPLND) has an important role in the management of early- and late-stage disease (Steele & Richie, 1997). This article will discuss the surgical indications for primary and postchemotherapy RPLND and the nursing management of patients receiving this treatment.

Pathology

Cancer of the testes can originate from a germ cell, stromal cell, or nongerm cell. This article will focus on a discussion of the surgical treatment of the testicular germ cell tumor. Germ cell tumors (GCTs) are classified by two histologic types: seminoma and nonseminoma (NSGCT). Patients can be diagnosed with a mixed GCT, which consists of seminoma and embryonal or choriocarcinoma. Although these tumors have a seminomatous component, they are treated like NSGCT because of the aggressiveness of the embryonal or choriocarcinoma component (see Table 1).


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Clinical Presentation and Diagnosis

Physical Examination

On physical examination, a firm testicular mass often is palpated and frequently is mistaken for a benign process such as epididymitis or orchitis. Often, a patient will present with vague diffuse testicular pain, swelling, hardness, or a combination of these symptoms. A trial of antibiotic therapy may be initiated in questionable cases. Otherwise, a testicular ultrasound is indicated. Men also may experience other symptoms that could indicate metastatic disease, such as back pain, neck mass, or shortness of breath.

Tumor Markers

Tumor markers are the most critical and sensitive indicators of testicular cancers. They can assist in the diagnosis and are used to assess response to treatment and prognosis. Human chorionic gonadotropin, alpha feta protein, and lactate dehydrogenase are the serum tumor markers that are included in the initial workup for a GCT (see Table 2). Isochromosome 12p [I(12p)] is a genetic marker that is found in 90% of GCT specimens (Bosl et al., 2001). In a 1994 study, I(12p) was found to have prognostic importance (Bosl et al., 1994). Patients found to have normal amounts or fewer than two copies of I(12p) had residual viable disease or failed first-line therapy compared to patients with more than three copies of I(12p) (Bosl et al., 1994). The benefit of routine use of this marker in management of GCTs is unclear at present, and more research is necessary. However, this genetic marker one day may help to identify patients who may not respond to conventional therapy. Tumor markers are an important diagnostic and prognostic component in testicular cancer and, in some cases, may be the only indicator of metastatic disease (Bosl & Motzer, 1997).

Radiologic Evaluation

If a testicular mass is felt during examination or if the diagnosis is unclear, a testicular ultrasound is indicated. Ultrasonography will distinguish among a hydrocele, epididymitis, or testicular tumor. When a testicular tumor is suspected or confirmed, CT scans of the abdomen and pelvis also are indicated to assess for metastatic disease, and a chest x-ray should be taken to evaluate the lungs for metastatic disease. A chest CT should be performed if the chest x-ray is abnormal or if metastatic disease to the lungs is suspected (Bosl et al., 2001).

Orchietomy

If a testicular mass is palpated on physical examination and confirmed by ultrasound, a radical inguinal orchietomy is indicated. A trans-scrotal orchietomy or testicular biopsy is contraindicated. This surgical approach would cause scrotal violation that may permit the development of alternate lymphatic drainage pathways, risking the possibility of spread to the scrotal skin or inguinal and pelvic lymph nodes (Bosl & Motzer, 1997).

Surgical Plan

GCTs are treated based on tumor-node-metastasis-marker staging, risk classifications, and histologic type. Primary RPLND is used in low-stage testicular cancer as a primary diagnostic and therapeutic procedure (see Figure 1 and Table 3). After chemotherapy, RPLND is used as an adjuvant procedure to assess chemotherapy response and resect residual disease (Baniel & Sella, 1999). Patients with stage I or II NSGCT may undergo primary RPLND. If a patient has NSGCT or seminoma (stage IIB, IIC, IIIA, IIIB, or IIIC), the patient will undergo chemotherapy and then RPLND (Bosl et al., 2001).

Until recently, all RPLNDs were performed as open surgical procedures. Recently, the role of laparoscopic RPLND in low-volume disease (stage I or II) has been investigated. In one institution’s experience with the laparoscopic procedure in a group of 125 patients, the morbidity was significantly lower, the diagnostic accuracy was comparable to the open procedure, and tumor control was not compromised (Janetschek, Hobisch, Peschel, & Bartsch, 2000). The advantages to a laparoscopic procedure are a shorter convalescence period and decreased morbidity. Because the laparoscopic RPLND is a technically complex and time-consuming procedure, it has a long and steep learning curve (Janetschek et al.). A patient who opts for the laparoscopic procedure rather than the open RPLND must present with low-volume disease, and an experienced surgeon must perform the procedure. Presently, the open procedure is still the procedure of choice but may be replaced with the laparoscopic procedure in the future, when more research is completed.

Because of the predictable spread of testicular cancer to the retroperitoneum, lungs, and mediastinum, surgical management of this disease is preferred. Lymphatic spread of testicular tumors is seen in all pathologic types of testicular cancer (embryonal, teratoma, choriocarcinoma, seminoma, and yolk sac). Pure choriocarcinoma also spreads by hematogenous routes (Sheinfeld & Herr, 1998). By understanding the natural testicular lymphatic drainage, the most likely sites of metastasis are identified and referred to as

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**Table 1. Testicular Cancer Cell Types and Characteristics**

<table>
<thead>
<tr>
<th>Type</th>
<th>Age</th>
<th>Subtypes and Percentage</th>
<th>Metastatic Disease at Presentation</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonseminoma germ cell tumors</td>
<td>Second to third generation of life</td>
<td>Embryonal (20%–25%) Yolk sac (1%–10%) Choriocarcinoma (1%–2%) Teratoma (5%–10%)</td>
<td>65%</td>
<td>Fast growing</td>
</tr>
<tr>
<td>Seminoma</td>
<td>Fourth or fifth generation of life</td>
<td>Classic (93%) Atypical (7%)</td>
<td>30%</td>
<td>Slow growing</td>
</tr>
</tbody>
</table>

**Note.** Based on information from Bosl et al., 2001; Poirier & Rawl, 2000.

**Table 2. Testicular Cancer Tumor Markers**

<table>
<thead>
<tr>
<th>Tumor Marker</th>
<th>Production Site</th>
<th>Tumor Type</th>
<th>Normal Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human chorionic gonadotropin</td>
<td>Syncytiotrophoblasts</td>
<td>Seminoma</td>
<td>&lt; 2 hg/ml or no measurable amount</td>
</tr>
<tr>
<td>Alpha feta protein</td>
<td>Liver Gastrointestinal tract Fetal yolk sac</td>
<td>Embryonal Choriocarcinoma</td>
<td>&lt; 15 hg/ml</td>
</tr>
<tr>
<td>Lactate dehydrogenase</td>
<td>–</td>
<td>Nonspecific to type</td>
<td>70–250 U/L</td>
</tr>
</tbody>
</table>

**Note.** Based on information from Fischbach, 2002; Lefever-Kee, 1999.
Primary Tumor
The extent of primary tumor is classified after radical orchiectomy, and, for this reason, a pathologic (p) stage is assigned.

pTX: Primary tumor cannot be assessed
pT0: No evidence of primary tumor (e.g., histologic scar in testis)
pTis: Intratubular germ cell neoplasia (carcinoma in situ)
pT1: Tumor limited to the testis and epididymis without lymphatic or vascular invasion; tumor may invade the tunica albuginea but not the tunica vaginalis
pT2: Tumor limited to the testis and epididymis with vascular or lymphatic invasion, or tumor extending through the tunica albuginea with involvement of the tunica vaginalis
pT3: Tumor invades the spermatic cord with or without vascular or lymphatic invasion
pT4: Tumor invades the scrotum with or without vascular or lymphatic invasion

Regional Lymph Nodes
NX: Regional lymph nodes cannot be assessed
N0: No regional lymph node metastasis
N1: Metastasis with a single lymph node mass 2 cm or less in greatest dimension, or multiple lymph nodes, none more than 2 cm in greatest dimension
N2: Metastasis with a single lymph node mass more than 2 cm but not more than 5 cm in greatest dimension, or multiple lymph nodes, none more than 5 cm in greatest dimension
N3: Metastasis with a lymph node mass more than 5 cm in greatest dimension

Distant Metastasis
MX: Presence of distant metastasis cannot be assessed
M0: No distant metastasis
M1: Distant metastasis
M1a: Nonregional nodal or pulmonary metastasis
M1b: Distant metastasis other than to nonregional lymph nodes and lungs

Serum Tumor Markers
SX: Marker studies not available or not performed
S0: Marker study levels within normal limits
S1: LDH < 1.5 X Nb, and hCG (muI/ml) < 5000, and AF(P ng/ml) < 1000
S2: LDH 1.5–10 X Nb, or hCG (muI/ml) 5000–50,000, or AF(P ng/ml) 1000–10,000
S3: LDH > 10 X Nb, or hCG (muI/ml) > 50,000, or AF(P ng/ml) > 10,000

*p Except for pTis and pT4, extent of primary tumor is classified by radical orchiectomy. TX may be used for other categories in the absence of radical orchiectomy.
*N indicates the upper limit of normal for the LDH assay.
AF—alpha feta protein; hCG—human chorionic gonadotrophin; LDH—lactate dehydrogenase

Figure 1. Tumor Nodes Metastasis Definitions for Testicular Cancer


“The primary landing zones.” The landing zones for a left testicular tumor include the presacral and para-aortic lymph nodes, whereas the interaortocaval region is the primary site of metastasis for the right testicle. In large-volume disease, metastasis to the distal iliac andinguinal lymph nodes may occur. Contralateral spread is seen more commonly in right-side than left-side tumors and is associated with bulky disease (Sheinfeld & Herr).

The surgical boundaries used for RPLND are called a “template.” In the 1950s and 1960s, a bilateral RPLND template was standard therapy. Before the development of cisplatin chemotherapy, a bilateral RPLND was the only potentially curative method available, thereby justifying the radical and extensive nature of the procedure. After a bilateral dissection, most patients (90%) had ejaculatory dysfunction, which had a great impact on their fertility. In the early 1980s, a modified template was used to minimize the contralateral dissection so that the sympathetic nerves and the hypogastric plexus, which are responsible for ejaculatory function, are not disrupted. This resulted in the spontaneous return of ejaculatory function in 51%–88% of patients who underwent modified dissection (Steele & Richie, 1997). More recently, a nerve-sparing technique has been developed in which the sympathetic chains, postsympathetic fibers, and hypogastric plexus are identified, dissected, and preserved. Following this technique, the antegrade ejaculation rate is greater than 95% (Sheinfeld & Herr, 1998). Previously, the nerve-sparing and modified dissections were reserved only for low-stage disease, but now these techniques are used after chemotherapy and for patients with extensive disease.

Nursing Care
Preoperative Care Planning

Nurses must complete a thorough assessment of patients that includes medical and surgical history, psychosocial history, and previous or present medications (including chemotherapy). Patients also may require specific blood tests and imaging studies to evaluate disease and other underlying medical problems. Lastly, nurses must educate patients about preoperative preparation and what to expect postoperatively (see Table 4).

Although these patients generally are young, they must be assessed for any medical problems that might complicate the surgical procedure, such as asthma, diabetes, hypertension, or heart disease. A thorough psychosocial assessment is important to determine how patients are coping. This disease can have a profound effect on fertility, and men may feel that the disease is a threat to their manhood. Information regarding sperm-banking options should be given to patients before they undergo chemotherapy. This can be a difficult issue to discuss with patients who have just been diagnosed. However, patients need to know that retrograde ejaculation can occur postoperatively and that chemotherapy can affect sperm production. To provide extra support, social work and psychiatry referrals should be made when necessary.

For patients who have received chemotherapy prior to RPLND, the agents used must be identified. Each agent has a different side-effect profile, which may require specific preoperative testing or considerations and aggressive postoperative management to prevent or minimize complications (Cleri & Haywood, 2002).

The preoperative phase requires attentive coordination of diagnostic testing. All patients undergo routine preoperative testing that includes complete blood count with differential, chemistry profile, liver function test, prothrombin time/partial thromboplastin time/international normalized ratio, tumor markers, urinalysis, electrocardiogram, and anesthesia evaluation. An updated CT scan of the abdomen and pelvis is required to assess disease status. In complicated post-chemotherapy RPLNDS, magnetic resonance imaging angiograms may be required to evaluate tumor location in relation to the greater vessels in the abdomen. Pulmonary function tests must be completed on all patients who have received bleomycin. Although most men diagnosed with testicular
cancer are young and have few comorbidities, a complete and thorough preoperative workup must be completed to identify potential postoperative complications and institute the necessary interventions (Donat, 1999).

### Patient Education

Patient education is an important component of the preoperative phase. Because the ages of patients with testicular cancer vary from adolescence to adulthood, patient education should be modified for the appropriate developmental stage. First, patients must be informed of preoperative preparations. As with any extensive abdominal surgery, patients undergoing RPLND must be started on a bowel preparation prior to surgery, which will vary depending on the complexity of the procedure and may include a clear liquid diet, laxatives, or enema. Patients will complete the bowel preparation at home, so nurses must inform patients to drink at least two to three quarts of fluids per day to prevent dehydration. Patients also must be instructed to avoid aspirin products 10 days prior to surgery and nonsteroidal anti-inflammatory drugs two days prior to surgery to reduce the risk of bleeding. Information regarding what patients can expect after surgery should be provided in verbal and written forms and should include the purpose of specific drainage tubes, pain management, pulmonary toilet, and potential complications. Nurses should give patients and family members the opportunity to ask questions concerning information that was presented during the patient education session. Nurses also can provide patients with a number to call for any questions or concerns that might arise. Finally, patients need information about long-term follow-up and monitoring and instruction on performing monthly testicular self-examinations on the remaining testicle.

### Postoperative Care

Patients may be hospitalized for four to seven days after RPLND (Chang et al., 2002) for thorough assessments and aggressive management, which are crucial to their care. Depending on the complexity of the disease, 5–10 hours of surgery may have taken place, resulting in potential alterations in respiratory, cardiovascular, and gastrointestinal function; nurses will need to regulate fluid volume, manage pain, and prevent infection and bleeding.

#### Respiratory

Pulmonary toilet is vital to patients’ postoperative recovery. Incentive spirometry, coughing, and deep breathing should be initiated immediately after surgery. Because of the large abdominal incision and pain, this can be difficult for patients. Ambulating also is critical to ensure that pulmonary complications do not arise. If patients are having a difficult time performing these activities, a consultation with physical or respiratory therapists for chest physical therapy may be beneficial.

If a patient has received bleomycin in the past, the risk for pulmonary complications increases. Frequent monitoring of oxygen saturation levels, fluid volume status, and oxygen requirements is essential to ensure that slight changes are addressed immediately. Oxygen saturation levels should be kept above 90%. Oxygen concentrations should be limited to reduce the risk of pulmonary toxicity resulting from the restrictive lung changes (Sheinfeld, 2002).

### Fluid Management

Aggressive fluid management has been shown to reduce the risk of pulmonary complications in the postoperative period. The pulmonary toxicities seen in patients who received bleomycin are related directly to fluid management (Donat & Levy, 1998). Fluid assessment should include weighing patients daily, monitoring urine output, and accurately calculating fluid intake. Colloid versus crystalloid fluid replacement can reduce the risk of fluid overload and pulmonary toxicity (Sheinfeld, 2002). Chemistries should be assessed daily and even more frequently for patients who have received cisplatin therapy to assess for renal function.

### Table 3. Tumor Node Metastasis Stage

<table>
<thead>
<tr>
<th>Stage</th>
<th>Tumor Node Metastasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>pTis, N0, M0, S0</td>
</tr>
<tr>
<td>Stage I</td>
<td>pT1–4, N0, M0, SX</td>
</tr>
<tr>
<td>Stage IA</td>
<td>pT1, N0, M0, S0</td>
</tr>
<tr>
<td>Stage IB</td>
<td>pT2, N0, M0, S0</td>
</tr>
<tr>
<td>Stage IS</td>
<td>Any pT/Tx, N0, M0, S1–3</td>
</tr>
<tr>
<td>Stage II</td>
<td>Any pT/Tx, any N, M1, SX</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>Any pT/Tx, any N, M1a, S0</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>Any pT/Tx, any N, M1a, S1</td>
</tr>
<tr>
<td>Stage IIIC</td>
<td>Any pT/Tx, N1–3, M0, S2</td>
</tr>
<tr>
<td>Any pT/Tx, any N, M1a, S3</td>
<td></td>
</tr>
<tr>
<td>Any pT/Tx, any N, M1b, any S</td>
<td></td>
</tr>
</tbody>
</table>


### Table 4. Pre- and Postoperative Nursing Implications for Patients With Testicular Cancer Previously Treated With Chemotherapy

<table>
<thead>
<tr>
<th>Side Effects</th>
<th>Chemotherapy</th>
<th>Preoperative Nursing Implications</th>
<th>Postoperative Nursing Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nephrotic</td>
<td>Cisplatin</td>
<td>Check renal function prior to surgery.</td>
<td>Aggressive fluid management Check renal function daily.</td>
</tr>
<tr>
<td>Neuropathies</td>
<td>Paclitaxel</td>
<td>Safety measures to prevent injuries</td>
<td>Adequate lighting Assistance with ambulation and activities of daily living Physical therapy consultation if necessary</td>
</tr>
<tr>
<td>Neutropenia</td>
<td>Cisplatin</td>
<td>Surgery three to four weeks after chemotherapy</td>
<td>Daily complete blood count Assess for signs of infection.</td>
</tr>
<tr>
<td>Myelosuppression</td>
<td>Cisplatin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myelosuppression</td>
<td>Etoposide</td>
<td>Check complete blood count prior to surgery.</td>
<td></td>
</tr>
<tr>
<td>Pulmonary toxicity</td>
<td>Bleomycin</td>
<td>Pulmonary function test prior to surgery.</td>
<td>Aggressive fluid management Administer colloidis, diuretics. Limit use of oxygen Aggressive pulmonary toilet Chest physical therapy Surgical management</td>
</tr>
</tbody>
</table>

Note: Based on information from Cleri & Haywood, 2002.
Cardiovascular

After any surgical procedure, patients are at risk for developing deep vein thrombosis. Thus, patients will wear sequential compression boots to improve circulation while in bed for the first few days after surgery. Patients will begin ambulating with assistance on postoperative day 1, three to four times per day. Pain management is crucial to ensure ease of ambulation. Subcutaneous or low-molecular-weight heparin generally is not used because of the risk for bleeding after surgery.

Gastrointestinal

The return of bowel function is dependent on the length of surgery and the complexity of the resection. Patients may or may not have a nasogastric (NG) tube for the first 24–48 hours. Patients receive nothing by mouth for the duration of NG tube placement and 24 hours after its discontinuation. Ongoing assessment for a bowel obstruction is important during the postoperative period. Then, patients will start a clear liquid diet and progress to a regular diet as tolerated. Ambulation is an important intervention to assist with the return of bowel function. Patients also will be prescribed a stool softener and will be encouraged to drink plenty of fluids (2 liters) to prevent constipation.

Because of the disruption of major retroperitoneal lymphatic pathways during RPLND, patients are at risk for developing chylous ascites. Chyle is a milk-white substance rich in triglycerides. Although rare, the occurrence of chylous ascites is a greater risk for patients who undergo an extensive node dissection or vena caval resection (Baniel, Foster, Rowland, Bihrele, & Donohue, 1995). For these patients, daily assessment should include weights and abdominal girth measurements. Paracentesis should be performed for diagnosis and comfort if a chylous ascites is suspected. Most cases of chylous ascites respond to conservative treatment that includes a medium-chain triglyceride (MCT) and a diet restricting fat intake to 5 g per day for approximately three months (Leibovich, Mor, Golomb, & Ramon, 2002). The MCT chemical composition is shorter than the long-chain fatty acids. Long-chain fatty acids are absorbed from the bowel directly into the lymphatic system and contribute to chyle flow. MCTs are absorbed directly into the bloodstream and decrease the chyle flow (Jain, Cropper, & Rutherford, 2003). They also differ from other fats because they have lower caloric content and are more rapidly absorbed and burned for energy, which is characteristic of a carbohydrate rather than a fat. If conservative treatment is not effective, other options include octreotide, surgical repair of the leak, or peritoneovenous shunt (Leibovich et al.).

Pain Management

Effective pain management is crucial to patients’ recovery after RPLND. Patients who undergo open RPLNDs will experience pain caused by a large incision extending from below the xyphoid process to the pubis symphysis, whereas patients who undergo laparoscopic RPLNDs may experience pain in the chest and shoulder because of carbon dioxide insufflation of the abdomen during the procedure. Patient-controlled opioid analgesia should be used until patients are able to take medication by mouth. This will give patients more control of medication administration prior to participating in painful activities such as ambulation or pulmonary toilet exercises.

The use of other medications, such as ketorolac, also may augment pain management (Sevarino, Sinatra, Paige, & Silverman, 1994). This also may decrease the amount of opioids required for adequate pain relief and, in turn, decrease the occurrence of opioid-related side effects such as decreased bowel function (Ferraz et al., 1995). However, ketorolac should not be prescribed for patients with renal insufficiency or those at risk for gastrointestinal bleeding because of possible volume depletion and inhibition of platelet function, respectively.

Infection or Bleeding

Following surgery, patients’ vital signs should be assessed every 4 hours for 48 hours. A fever during this time usually can be attributed to atelectasis and will require more aggressive pulmonary toilet. However, other sources of infection, such as the wound or urinary tract (from the urinary catheter), should not be excluded. Complete blood counts with differential should be performed daily to assess for infection and bleeding. Nurses must monitor the blood counts of patients who have been heavily pretreated with chemotherapy because they may require postoperative colony-stimulating factors or blood products.

Discharge Planning and Teaching

Before discharge, nurses should provide patients and their family members with all the information required for self-care, follow-up, and support services. Once again, patients’ age must be considered before the material is presented. As with any abdominal surgery, patients should notify their physicians if they experience fever, shortness of breath, calf pain, abdominal pain, nausea or vomiting, bleeding from the incision, dehydration of the wound, or signs of infection. Most patients return within one month of the procedure for a follow-up evaluation of the surgical site and tumor markers. At this time, a follow-up plan or further treatment also will be discussed. Psychosocial assessment should be ongoing to ensure that patients are coping and adjusting after treatment for cancer. Referrals to cancer support groups may be beneficial and should be offered to all patients.

Conclusion

Nursing care of patients with testicular cancer who have undergone RPLNDs can be complex and challenging. Nurses must have a good understanding of the surgical procedure, good assessment skills, and knowledge of potential complications and the necessary interventions. With these skills and knowledge, nurses can prevent and identify problems and intervene if problems arise.

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Rapid Recap

Surgical Management of Testicular Cancer

- Testicular cancer is the most common solid tumor in men aged 15–34, but it has a cure rate close to 100% if detected early.
- Primary retroperitoneal lymph node dissection (RPLND) is used in low-stage disease as a diagnostic and therapeutic pro-
cedure. After chemotherapy, RPLND can be used as adjuvant treatment to assess response to chemotherapy and
resect any residual disease.
- Newer surgical techniques have reduced the risk of retrograde ejaculation, which can impair fertility.
- Sperm banking options should be discussed with patients. All patients should be given information regarding banking
sperm prior to chemotherapy or RPLND.
- Meticulous postoperative assessment and management are essential to prevent or lessen postoperative complications
such as respiratory compromise, fluid volume overload, bleeding, thrombosis, ileus, chylous leak, and infection.

For more information on this topic, visit the following Web sites.

Testicular Cancer Resource Center
http://tcrc.acor.org

Medline Plus: Testicular Cancer
www.nlm.nih.gov/medlineplus/
testicularcancer.html

Urology Channel: Testicular Cancer
www.urologychannel.com/
testicularcancer/index.shtml

Links can be found at www.ons.org.