Testicular Cancer

Epidemiology, Diagnosis, and Management

Zachary L. Smith, MD*, Ryan P. Werntz, MD, Scott E. Eggener, MD

KEYWORDS

• Testicular cancer • Germ cell tumors • Seminoma • Nonseminoma • Chemotherapy • Radiation therapy • Orchiectomy • Retroperitoneal lymph node dissection

KEY POINTS

- Testicular cancer (TC) is a rare malignancy, generally occurring in younger men.
- Substantial treatment advances have been made in recent decades that have made TC the most curable solid malignancy.
- Survivorship is an important consideration because TC management can impact fertility, quality of life, and long-term health for many decades.
- An individualized approach must be taken with patients based on their clinical and pathologic findings, with counseling on the risks and benefits of each method.

INTRODUCTION AND EPIDEMIOLOGY

In 2016, there were an estimated 8700 new cases of testicular cancer (TC) in the United States and 380 deaths.[1] Although TC is a rare disease, accounting for only approximately 1% of all male tumors,[1] the incidence has been steadily increasing from 5.7 per 100,000 in 1992 to 6.8 per 100,000 in 2009.[2] Fortunately, substantial advances in the management of TC have occurred over the last few decades. The 5-year relative survival rates have improved from 83% in 1975 to 1977 to 97% in 2005 to 2011.[1]

CAUSE AND RISK FACTORS

There are several environmental risk factors independently associated with TC. The most common include cryptorchidism (odds ratio [OR] 4.3, 95% confidence interval

Disclosure Statement: The authors have nothing to disclose.
Section of Urology, Department of Surgery, The University of Chicago Medicine, 5841 South Maryland Avenue, MC 6038, Chicago, IL 60637, USA
* Corresponding author.
E-mail address: zachary.smith@uchospitals.edu

Med Clin N Am ■ (2017) ■–■
https://doi.org/10.1016/j.mcna.2017.10.003 **medical.theclinics.com**

[CI] 3.6–5.1), low birth weight (OR 1.3, 95% CI 1.1–1.7), short gestational age (OR 1.3, 95% CI 1.1–1.6), and twinning (OR 1.2, 95% CI 1.0–1.4).[3]

Cryptorchidism increases the risk of both ipsilateral and contralateral TC. Historically, it was thought that the primary benefit of surgical correction (orchiopexy) was to allow for the examination of the testis for TC screening, and that it does not necessarily decrease the risk of TC development.[4]

Testicular microlithiasis (calcifications in the seminiferous tubules) is an incidental finding on ultrasound (US) characterized by multiple small echogenic foci within the testicular parenchyma. It is present in approximately 5% of men aged 18 to 35 years.[5] There is no definitive evidence microlithiasis is a premalignant condition, although it often coexists in the setting of malignancy.[6] Prospective studies have suggested incidentally detected microlithiasis is not a risk factor for developing TC.[7] However, there are some data to suggest an association between testicular microlithiasis and carcinoma in situ (CIS) in patients with a history of TC.[8] Based on the available data, routine testicular self-examination is a reasonable surveillance strategy for individuals with microlithiasis[8] and surveillance US are probably unnecessary.

There are also genetic factors that play a role in the development of TC, though less than 5% of all men diagnosed with TC are thought to have a hereditary cause. Having a brother or a father with TC increases one's risk by 8 to 10 or 4 to 6 fold, respectively.[9] Additionally, genetic disorders, such as Down syndrome and testicular dysgenesis syndrome, are also associated with increased risks of TC.[10]

SYMPTOMS AND PRESENTATION

Most patients with TC present with a painless testicular mass. Cryptorchidism is more commonly right sided, thus, so is TC. Occasionally, patients with a testicular tumor may develop a reactive hydrocele. However, if this is associated with painful testicular swelling, it is more likely to represent an infectious cause. Testicular masses are often noticed following local trauma. Regardless of the described mechanism of injury, any palpable nodule in the testicle should be treated as TC until proven otherwise.

If patients have metastatic disease at the time of diagnosis, they may present with symptoms pursuant to the location of disease. Although most metastatic locations will not be palpable, if patients have metastasis to the supraclavicular lymph nodes, they may feel a mass in the left neck. Pulmonary metastases may present with symptoms of shortness of breath or, rarely, hemoptysis. If patients have extensive retroperitoneal disease, they may experience symptoms of compression of surrounding organs (ie, flank pain from obstructive uropathy) or back pain. Lastly, although rare, brain metastasis may present with a variety of neurologic symptoms.

DIAGNOSTIC TESTS

With suspicion of a testicular mass, the first test ordered is generally a scrotal US. This test should be ordered expeditiously, as TCs often exhibit a rapid growth rate. When the US confirms a concerning intratesticular lesion, patients should have a prompt referral to a urologist for evaluation and management. For detection of a testicular malignancy, US carries a sensitivity and specificity of 92% to 98% and 95% to 99%, respectively.[11] A biopsy of a testicular lesion should *never* be performed. Serum tumor markers (STMs), beta-human chorionic gonadotropin (hCG), alpha-fetoprotein (AFP), and lactate dehydrogenase (LDH) should be ordered before orchiectomy. Although hCG and AFP may provide information on the histology of the tumor, LDH is a nonspecific marker that may be representative of a global tumor burden.