Imaging Studies for Germ Cell Tumors

S.A. Sohaib, MRCP, FRCR[a,*], G. Cook, FRCP, FRCR[b], Dow-Mu Koh, MRCP, FRCR[a]

KEYWORDS

• Testicular cancer • CT • MRI • PET

In the management of patients with testicular germ cell tumors (TGCT), imaging plays a pivotal role. Although sonography of the testes is useful for the identification of a testicular mass, the definitive diagnosis of a testicular tumor is usually reliant on a biopsy or orchidectomy. Once the diagnosis of a testicular neoplasm is established, imaging is crucial for defining the presence and extent of metastatic disease, assessing disease response to treatment, evaluating the suitability of residual masses after chemotherapy for surgery, and detecting sites of relapse. Computed tomography (CT) remains the main radiologic technique for disease evaluation. However, other imaging techniques, such as chest radiography, MRI, positron emission tomography using 18-fluoro-2-deoxyglucose (FDG-PET), and ultrasound all have specific roles in the clinical management of these patients.

DIAGNOSIS

The diagnosis of GCT tumors is usually made on biopsy or at orchidectomy. TGCT most commonly presents as a painless palpable mass but occasionally may present with nonspecific symptoms, such as dull scrotal ache, pain, or acute fever. In patients with retroperitoneal metastases or disseminated disease, backache, malaise, lethargy, gynecomastia, and other systemic features may be the presenting symptoms.

Testicular ultrasound (which should be performed using a high-resolution 7.5-MHz probe) is used for the primary assessment of the testes to confirm the presence of a testicular mass (**Fig. 1**); to distinguish these from other scrotal abnormalities; and to screen for associated abnormalities, such as microlithiasis. Testicular ultrasound is also helpful for assessment in young male patients who present with metastatic disease, in whom an occult primary tumor of the testis is suspected. Ultrasound is

[a] Department of Diagnostic Radiology, Royal Marsden Hospital, Down Road, Sutton, Surrey SM2 5PT, England, UK
[b] Department of Nuclear Medicine, Royal Marsden Hospital, Down Road, Sutton, Surrey SM2 5PT, England, UK
* Corresponding author.

Hematol Oncol Clin N Am 25 (2011) 487–502
doi:10.1016/j.hoc.2011.03.014 **hemonc.theclinics.com**
0889-8588/11/$ – see front matter

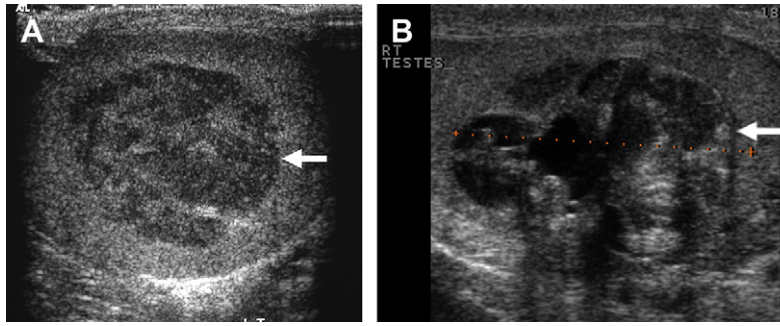

Fig. 1. TGCT tumors on ultrasound. Ultrasound images through the testes in two different patients showing mass lesion (*arrow*) in the testes. At pathology (*A*) seminoma and (*B*) nonseminomatous germ cell tumors were found.

also used to examine the contralateral testis of a patient confirmed to have testicular tumor, to identify the small number of patients who may present with bilateral synchronous tumors.

Sonographically, testicular tumors are usually well-defined and hypoechoic relative to the normal testicle, although some may display heterogeneous echo-texture, calcification, or cystic change.[1] Tumors may display increased vascularity on color and power Doppler with respect to surrounding normal testicular tissue but this is not specific and may not be demonstrable in small tumors. Ultrasound cannot reliably differentiate between tumor types, and for this purpose MRI may be useful.

MRI has been reported to be able to distinguish between seminoma and nonseminomatous GCT (NSGCT).[2] However, this may be of little practical value because appropriate management dictates orchidectomy to obtain detailed histopathology of the tumor, which is mandatory for primary treatment. Nevertheless, MRI of the scrotum may be useful if clinical and sonographic assessment cannot differentiate between an intratesticular or extratesticular mass.[3] A further role for MRI of the scrotum is the preoperative evaluation of the local extent of malignant testicular tumors in patients for whom testis-sparing surgery is planned, such as those with bilateral GCTs or tumor in a solitary testis.[4]

STAGING

Before initiating therapy, assessment of disease extent must be performed. Guidelines from the National Comprehensive Cancer Network and the European Germ Cell Cancer Consensus Group recommend that TNM staging be used (**Table 1**) and that patients with metastatic disease are further categorized using the International Germ Cell Cancer Collaborative Group classification, which stratifies patients into good, intermediate, and poor prognostic groups.[5–8] This latter classification is based on histology, location of primary tumor and metastases, and levels of serum markers (**Box 1**).[5] These guidelines also state that patients should have initial staging with a chest radiograph and CT of the abdomen and pelvis.[6,7] A CT of the chest is performed if the chest radiograph is abnormal or abdominopelvic CT shows metastatic disease.

PATTERN OF SPREAD

Knowledge of the spread of TGCT tumor is important to accurately stage these tumors.