A 22-year-old man presents to the emergency department with a 2-week history of a worsening nonproductive, irritating dry cough and exertional dyspnea. The patient has been otherwise healthy. He denies fever, rigors, night sweats, hemoptysis, chest pain, palpitations, orthopnea, paroxysmal nocturnal dyspnea, ankle edema, and lymphadenopathy. History. The patient has lost about 30 lb in the last 3 months. He has had no sick contacts, is not sexually active, and does not smoke or use illicit drugs. There is no history of recent travel. Examination. This moderately well-built and well-nourished young man is not in acute distress; he coughs intermittently. Temperature is 37.2°C (99°F); heart rate, 120 beats per minute and regular; respiration rate, 24 breaths per minute; blood pressure (right upper limb), 130/88 mm Hg; weight, 120 lb; height, 66 in. There is no evidence of adenopathy, clubbing, cyanosis, or ankle edema. Chest examination reveals poor movement of the left chest with impaired note on percussion on the left side; trachea is deviated to the right side. Breath sounds are absent over the entire left lung field. Jugular vein pulse is normal. Heart sounds are normal with no murmur or gallop. Abdominal examination reveals no organomegaly or tenderness. Neurologic examination is normal. Laboratory studies. White blood cell count, 5600/L, with 68% polymorphonuclear leukocytes, 24% lymphocytes, 4% monocytes, and 4% eosinophils; hemoglobin, 11.8 g/dL; platelet count, 186,000/L; erythrocyte sedimentation rate, 90 mm/h. Urinalysis reveals no red blood cells or casts. Serum sodium, 138 mEq/L; potassium, 4 mEq/L. Blood urea nitrogen level, 26 mg/dL; serum creatinine, 1 mg/dL; albumin, 3.2 g/dL. Total bilirubin, 1 mg/dL; aspartate aminotransferase, 26 IU/L; alanine aminotransferase, 22 IU/L. Alkaline phosphatase, 116 IU/L; lactate dehydrogenase, 825 IU/L. HIV test is negative. An ECG reveals sinus tachycardia. The chest film is shown here. In view of the clinical, laboratory, and radiographic findings, which of the following is the most appropriate next step?
A. Emergent echocardiogram
B. Bronchoscopy
C. Careful examination of the testicles
D. Sputum examination for acid-fast bacilli
E. Rectal examination with stool test for occult blood

WHAT'S WRONG: The chest radiograph shows a large mass in the left lung that shifts the cardiac silhouette and mediastinum to the right. The finding of a dense lung infiltrate in a young man mandates a careful examination of the testicles, C. Testicular cancers are common in this age group, and they metastasize rapidly to the lung. Although the patient did not voluntarily provide a relevant history, the brother who accompanied him mentioned having been told by the patient that his right testicle had been enlarging during the past 3 months (Figure 1). Examination confirms a large, firm mass in the right testis. Hospital course. Ultrasonography reveals that the mass measures 9.2 x 9.8 x 7.7 cm and is located in the upper anterior part of the testicle. -Fetoprotein level is 14,073 ng/mL; human chorionic gonadotropin (hCG) level is 23 IU/mL (normal, less than 5 U/mL). A chest CT shows a solid mass in the left lung (Figure 2). A fine-needle aspiration of the mass demonstrates embryonal nonseminomatous germ cell carcinoma. A brain CT shows a 7-cm mass and surrounding edema in the frontal lobe (Figure 3). An abdominal CT shows a 5.7 x 6.3 x 5.5-cm mass in the spleen. Results of a lung biopsy reveal metastatic disease. Based on the results of these studies, the disease is classified as stage III. The patient undergoes radical inguinal orchectomy, and chemotherapy (cisplatin, vinblastine, and bleomycin) and radiation therapy are started. He will be followed up regularly in the oncology clinic. \textbf{TESTICULAR CANCER: OVERVIEW AND EPIDEMIOLOGY}

Testicular cancer is the most common solid malignancy in men; it accounts for 1% of all cancers in men. Malignant testicular tumors, which comprise 95% of cancers that develop in the testis, arise from primordial germ cells. Germ cell tumor is the most common solid tumor in men between the ages of 15 and 34 years. Approximately 7000 new cases are reported in the United States annually. The highest incidence is found in the Scandinavian countries, Germany, and New Zealand; the lowest
is in Asia and Africa. Germ cell tumors occur 5 times more frequently in white than in black men. Familial clusters have been reported, particularly among siblings. Predisposing factors for testicular germ cell tumors include cryptorchidism and Klinefelter syndrome. These tumors are also more likely to occur in patients with HIV infection. **HISTOLOGIC CLASSIFICATION**

Malignant testicular tumors include seminomas and nonseminomatous tumors, embryonal carcinoma, teratomas, choriocarcinoma, and yolk sac carcinoma cell types. Embryonal carcinoma is the most undifferentiated cell type and may produce elevated serum concentration of -fetoprotein, hCG, or both. **CLINICAL MANIFESTATIONS**

Patients with germ cell tumors present initially with reports of a mass or, less frequently, with signs and symptoms of metastasis, in which case examination of the testicles becomes critical. These signs and symptoms include:

- Neck mass (supraclavicular lymph node metastasis).
- Cough or dyspnea (pulmonary metastasis).
- Anorexia, nausea, vomiting, or GI hemorrhage (retroduodenal metastasis).
- Lumbar pain (bulky retroperitoneal disease involving the psoas muscle or nerve roots).
- Bone pain (skeletal metastasis).
- Seizures, paresthesias, weakness, bladder or bowel dysfunction (central or peripheral nervous system--cerebral, spinal cord, or peripheral root involvement).
- Unilateral or bilateral lower extremity swelling (iliac or caval venous obstruction).

A painless testicular mass is considered virtually pathognomonic of a primary testicular tumor, but it occurs in only a small number of patients. More commonly, patients complain of diffuse testicular pain, swelling, firmness, or a combination of these findings. Because infectious epididymitis is more common than tumor, an initial trial of antibiotic therapy is often undertaken. If testicular pain and other symptoms do not improve within 2 to 6 weeks, testicular ultrasonography is warranted. If a testicular tumor is present, the image usually shows single or multiple intratesticular hypoechoic masses or diffuse abnormalities with microcalcifications. Bilateral tumors are rare. In 2% of patients, a second primary tumor develops in the contralateral testis. Gynecomastia is seen in 5% of men with germ cell tumor. A radical inguinal orchiectomy with ligation of the spermatic cord at the inguinal ring is the recommended treatment for all patients with testicular tumor. Histologic evaluation identifies the specific tumor type. **SERUM TUMOR MARKERS**

-fetoprotein levels are elevated in 40% to 60% of patients with metastases. They may also be elevated in patients with liver damage secondary to infection or drug or alcohol use; hepatocellular carcinoma; and other GI cancers. Increased serum concentrations of hCG are observed in 15% to 20% of patients with seminomas and 40% to 60% of those with metastatic nonseminomatous tumors. An elevated level of lactate dehydrogenase is a nonspecific marker found in 60% of patients with nonseminomatous tumors and in 80% of those who have seminomas. The concentrations of tumor markers should decrease after surgery and chemotherapy. Persistence of elevated levels indicates active residual disease. **PATTERN OF METASTASIS**

Germ cell tumors are rapidly growing neoplasms; 60% to 70% have metastasized by the time of diagnosis. The first site of metastasis, via the lymphatic channels, is the retroperitoneal lymph nodes, below the renal vessels. The lungs are almost always the first site of hematogenous spread. Left supraclavicular adenopathy and pulmonary nodules occur with or without retroperitoneal disease. The liver, bone, or brain is rarely the sole site of metastasis. In 40% of patients, the tumor is limited to the testis; 40% have retroperitoneal involvement and the remaining 20% have supradiaphragmatic involvement or visceral organ spread. **RADIOPHIC EVALUATIONS**

Required imaging studies include chest radiography and CT of the abdomen and pelvis. A CT scan of the chest is ordered if mediastinal, hilar, or lung parenchymal disease is suspected. CT or MRI of the brain is performed in patients with neurologic signs and symptoms. **CLASSIFICATION OF DISEASE STAGES**

Germ cell tumors are classified as follows:

- **Stage I:** Disease is limited to the testis, epididymis, or spermatic cord.
- **Stage II:** Disease is limited to the retroperitoneal lymph nodes.
- **Stage IIA:** Nodes are smaller than 2 cm.
- **Stage IIB:** Nodes are between 2 and 5 cm.
- **Stage IIIC:** Nodes are larger than 5 cm.
- **Stage III:** Disease is metastatic to supradiaphragmatic nodal or visceral sites.
TREATMENT
After radical inguinal orchiectomy, patients with stages I, IIA, or IIB disease are treated with radiation. In advanced disease, a chemotherapeutic regimen of cisplatin, vinblastine, and bleomycin or cisplatin with etoposide is initiated. PROGNOSIS
With combined surgery and chemotherapy, the 5-year survival rate is about 90% in patients who have seminomas or nonseminomatous tumors without metastases. In patients with stage III disease, the cure rate is 20% to 25%.

References: FOR MORE INFORMATION:


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