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Malignant Mesothelioma of the Tunica Vaginalis Testis: A Rare, Enigmatic Tumor

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ABSTRACT

Malignant mesothelioma of the tunica vaginalis is a rare urologic tumor with fewer than 100 cases reported in the literature. Patients can present at any age with nonspecific symptoms. A typical sonographic appearance of paratesticular papillary excrescence or nodularity typically leads to a preoperative diagnosis of hydrocele or testicular tumor. Following diagnostic intraoperative frozen sample analysis, radical orchiectomy is recommended. Recent advances in Doppler sonography allow hypovascularity or hypervascularity of paratesticular nodules to be identified. These characteristics are suspicious for malignant mesothelioma, which potentially assists in preoperative diagnosis. The current case depicts a 37-year-old male with a 1-week history of subtle testicular enlargement. He was diagnosed with malignant mesothelioma of the tunica vaginalis following scrotal excisional biopsy. Literature is discussed relative to patient demographics, diagnostic and management issues, prognosis, and follow-up guidelines.

INTRODUCTION

Since the initial description of malignant mesothelioma of the tunica vaginalis by Bárbera and Rubino [1] in 1957, fewer than 100 cases have been reported in the literature. Mesotheliomas traditionally arise from the thoracic pleura and occasionally from the abdominal peritoneum. Less than 1% of the time mesotheliomas originate from the tunica vaginalis [2], an embryonic evagination of the abdominal peritoneum residing in the scrotum. In concordance with thoracic mesothelioma, risk factors for malignant mesothelioma include a history of asbestos exposure or a family member with a history of asbestos exposure [3-4].

Patients with malignant mesothelioma of the tunica vaginalis can present at any age, although the highest incidence (47.1%) is between 55-75 years [4]. The majority of patients present to their primary care physician or urologist with a scrotum that has been enlarging over the course of several months [5]. They typically receive a preoperative diagnosis of hydrocele or testicular tumor [4]. Intraoperative or postoperative diagnosis of malignant mesothelioma of the tunica vaginalis most commonly results in inguinal orchiectomy, orchiectomy, or hydrocele wall excision of the tumor [4].

We present a case of malignant mesothelioma of the tunica vaginalis in a 37-year-old male with no history of exposure to asbestos. He underwent radical inguinal orchiectomy. Additionally, we review the literature pertaining to malignant

KEYWORDS: Asbestos; Doppler sonography; Mesothelioma; Radical orchiectomy; Tunica vaginalis

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Abbreviations and Acronyms

CT = computed tomography
EMA = epithelial membrane antigen

mesothelioma of the tunica vaginalis, focusing on patient demographics, imaging modalities for preoperative diagnosis, clinical symptomatology, therapy, and overall prognosis.

CASE REPORT

A 37-year-old male presented with a 1-week history of subtle left testicular enlargement with no associated trauma or lower urinary tract symptoms. The patient's medical and urological history was noncontributory and the patient reported no history of asbestos exposure to himself or his immediate family members. Ultrasound examination of the left scrotum revealed a solid supratesticular mass measuring 2.8 cm x 2.1 cm x 1.3 cm (Figure 1a; Figure 1b). The mass was not attached to the testicle or the associated hydrocele. Preoperatively, the consensus was that the lesion was a benign process. Therefore, tumor markers or computed tomography (CT) scan was not completed. A scrotal excisional biopsy was performed. Following pathological diagnosis of multifocal paratesticular malignant mesothelioma of the tunica vaginalis, a CT scan of the abdomen and pelvis was performed (negative) as part of a metastatic workup.

Subsequently, the patient underwent a radical inguinal orchiectomy with excision of the previous scrotal scar. Surgical margins of the radical inguinal orchiectomy specimen were negative. Histologically, the lesion extended from the mesothelium to the surrounding subtunical soft tissue and was predominantly epithelioid (Figure 2). Immunohistochemical stains of the specimen included: calretinin (4+), vimentin (4+), epithelial membrane antigen (EMA) (-) and CK7 (4+). The procedure was done on an outpatient basis and the patient reported no complications in the immediate postoperative period. A 6-month follow-up CT scan of the abdomen and pelvis was negative for recurrent disease.

DISCUSSION

Malignant mesothelioma of the tunica vaginalis is a rare disease. Typically, the highest incidence of disease is noted in the 6th and 7th decades of life, although 1/3 of cases have been reported in patients less than 44 years of age [4]. Asbestos is a significant risk factor for disease in the tunica vaginalis, although previous studies [4,6] (including the present case) have reported no asbestos exposure in more than 60% of patients. Trauma and long-standing hydrocele have been reported as possible etiological factors [7,8]. Lack of identifiable risk factors has lead to genetic studies analyzing chromosomal abnormalities for potential susceptibility to mesothelioma, including genetic

Figure 1a. Preoperative Transscrotal Ultrasonography Showing an Uncompromised Left Testicle Adjacent to a Mass.
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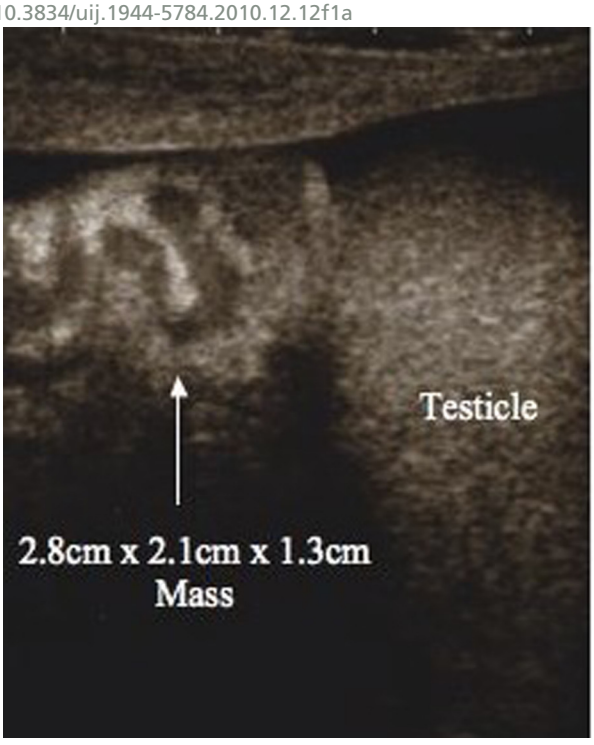

Figure 1b. Preoperative Transscrotal Ultrasonography Showing the Left Testicle With an Associated Hydrocele.
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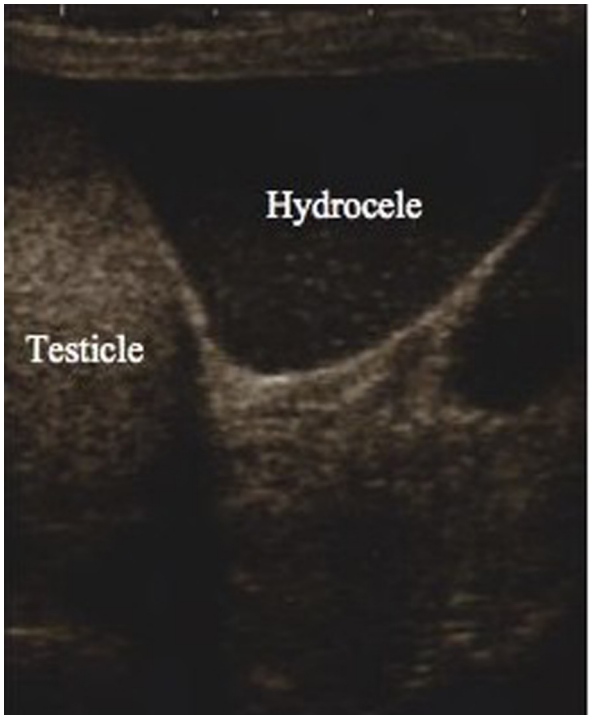

Figure 2. Malignant Mesothelioma of the Tunica Vaginalis (Hematoxylin and Eosin Stain, 40x).
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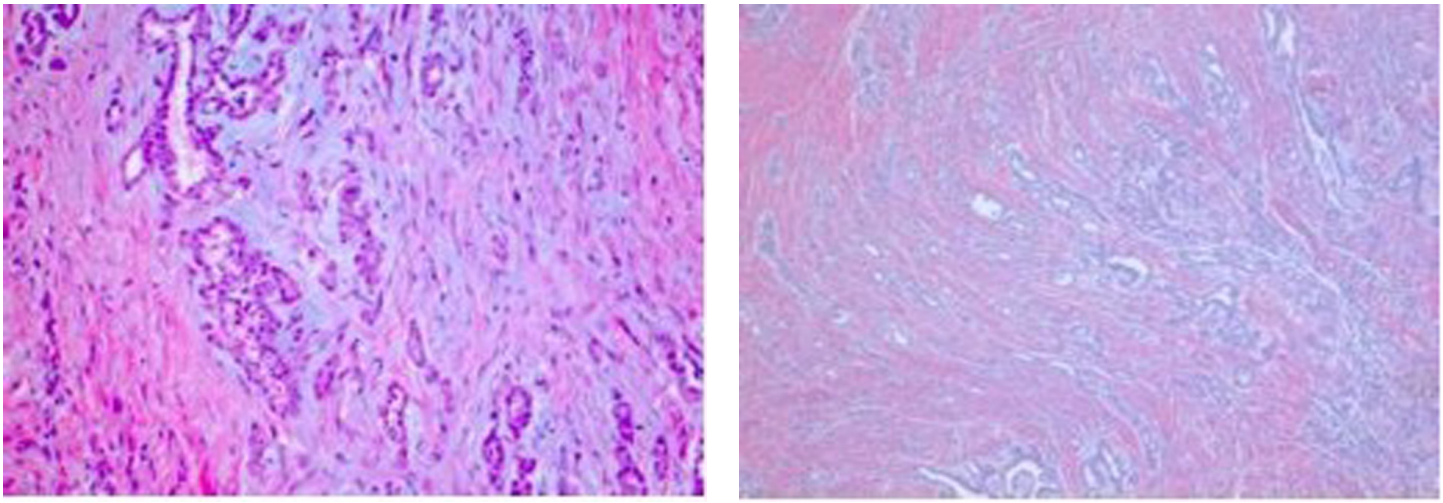

The lesion is predominantly epithelioid, which is the most common histological type for this neoplasm.

losses at 1p, 3p, 6q, 9q, and monosomy 22 [9].

Diagnosis

The patient in the current case was 37-years-old (youngest quartile). He presented with a persistent scrotal enlargement, which is the most common presenting sign for this malignancy [4]. Correct preoperative diagnosis of malignant mesothelioma is rare (2 of 73 cases [4]) because patients often present with nonspecific symptoms. Initial misdiagnosis continues to present a challenge in managing these patients. Typical sonographic appearance of malignant mesothelioma is a paratesticular papillary excrescence or nodularity that is occasionally associated with hydrocele [10], although these findings are relatively nonspecific. In most instances, the preoperative diagnosis is a hydrocele or testicular tumor; the true nature of the tumor is elucidated following intraoperative frozen sample analysis. The differential diagnosis should also include other paratesticular masses that are both benign (eg, spermatocele, encapsulated hematoma, lipoma, hemangioma, fibrous pseudotumor) and malignant (eg, rhabdomyosarcoma, angiosarcoma, liposarcoma, fibrosarcoma, carcinomas of the epididymis, metastatic tumor).

Recently, color Doppler sonography has emerged as a possible imaging modality for preoperative diagnosis. Initial studies [11-13] documented an intratesticular mass that was hypovascular in comparison to surrounding testicular tissue, and 2 recent cases [10,14] report hypervascularity within a paratesticular nodule or stalk arising from the tunica vaginalis. Thus, discrepancies in color Doppler sonography, whether hypovascularity or hypervascularity of paratesticular nodules, may increase preoperative diagnosis of malignant mesotheliomas of the tunica vaginalis.

Management and Histopathologic Analysis

Extensive surgical resection was performed for our patient in the form of a radical inguinal orchiectomy. Historically, this has been the most common primary therapy for malignant mesothelioma of the tunica vaginalis [4-5], with orchiectomy and resection of the hydrocele wall also used as alternative surgical treatment. The efficacy of chemotherapy and radiotherapy has not been clearly determined. In their review of 73 patients, Plas et al [4] reported that patients undergoing chemotherapy for disseminated disease had a 20% reduction in tumor volume, although 80% of patients still died following chemotherapy. Similarly, Plas et al reported that in a small sample of patients (n=10) receiving radiotherapy for disseminated disease, 50% experienced complete remission for 12 months and 40% died due to disease progression following radiotherapy [4]. The patient in the current case may be a candidate for adjuvant radiotherapy to the inguinal region and surgical field due to scrotal violation. However, the efficacy of adjuvant radiotherapy is still undetermined due to a small number of treated patients for whom radiotherapy has been used for disseminated disease [4].

Macroscopic analysis of malignant mesothelioma of the tunica vaginalis typically reveals multiple firm nodules on the internal surface of the hydrocele sac that range in size from a few millimeters to centimeters [6,10,15]. The patient in the present

case had a mass distinct from the testicle and accompanying hydrocele, with invasion of the tumor into the subtunical connective tissue. This is the most common site (25.8%) for local invasion; other common sites include the testis, scrotal skin, epididymis, and vascular infiltration [4]. Histological analysis classifies these tumors as epithelial, biphasic, and sarcomatoid in nature. The present case was epithelial which, along with the bipashic type, is most commonly encountered (60-75% and 25-37%, respectively) [4,16]; a pure sarcomatoid type is exceedingly rare (1 case) [17]. A large immunohistochemical profile by Winstanley et al [18] facilitated the association of specific factors to disease of the tunica vaginalis as an alternative to extrapolating data from thoracic studies. The authors studied 18 cases from the UK between 1959 and 2004. They found that all cases were positive for calretinin and EMA, 16 (89%) were positive for thrombomodulin, 15 (83%) were positive for CK7, 13 (72%) were positive for CK5-CK6, and all cases were negative for CK20 and carcinoembryonic antigen (CEA). The immunohistochemical analysis in our study [calretinin (4+), vimentin (4+), EMA (-) and CK7 (4+)] is congruent with the panel elucidated by these authors.

Recurrence and Follow-up Guidelines

Because of the aggressive nature of malignant mesothelioma of the tunica vaginalis, local and distant recurrence rates are of particular importance. Plas et al [4] reported an overall recurrence rate of 52.5% with most occurring in the first 2 years. This figure included local recurrence in 35.7% of patients who had resection of the hydrocele wall, 10.5% of patients undergoing scrotal orchiectomy, and 11.5% of patients undergoing inguinal orchiectomy. Furthermore, Jones et al [6] concluded that primary treatment modality had no effect on overall survival (mean follow-up of 4.3 years); 53% of patients treated with radical orchiectomy died, 25% had no evidence of disease, and 9% were alive with disease.

Distant metastases are present in 15% of patients at the time of diagnosis. Common sites of distant spread include the retroperitoneal, inguinal, and iliac lymph nodes and less frequently the lungs, liver, and bone [4,6,19-20]. The presence of positive lymph nodes was correlated with shorter patient survival [4], and distant metastasis has been reported to shorten mean survival to only 6 months [5]. Due to the chemoresistant nature of this tumor [21], local or distant metastasis is an ominous sign and suspected dissemination should be treated with local lymph node dissection and a staging thoracoabdominal CT scan.

Presently, there are no established follow-up guidelines for malignant mesothelioma of the tunica vaginalis. Plas et al [4] suggest clinical examinations and CT scan or retroperitoneal ultrasound every 3 months for the first 2 years, followed by yearly observation for the subsequent 3 years. With the possibility of recurrence up to 15 years after primary therapy [6], there is an argument that surveillance visits are necessary for the duration of the patient's life. When analyzing parameters for prognostic analysis, Plas et al [4] reported that patient age > 60 years and metastatic disease at the time of diagnosis were significantly adverse parameters leading to shorter survival. The overall median survival was 23 months and in cases of recurrence the median survival was 14 months. Because the patient in the present case is < 60 years of age and without local or distant metastasis, he has an optimistic prognosis.

CONCLUSIONS

Malignant mesothelioma of the tunica vaginalis is a rare, enigmatic tumor with a grave prognosis. Although a nonspecific presentation with no concrete age distribution is the norm, the advent of color Doppler sonography will potentially increase the rate of correct preoperative diagnosis and allow for the appropriate primary surgical approach (radical orchiectomy) to be performed [10-14]. When presented with a patient with malignant mesothelioma of the tunica vaginalis either preoperatively or intraoperatively, we feel that aggressive surgical management in combination with judicious postoperative surveillance is the optimal approach to treatment.

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