Liposarcoma of the Spermatic Cord: A Report of Two Cases and a Review of the Literature

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Extratesticular neoplasms, though rare, are clinically significant lesions that affect patients of all ages. Although ultrasound (US) is currently the imaging modality of choice for the detection and evaluation of intrascrotal tumor, there are only limited reports on the imaging findings, particularly on the US appearance of the intrascrotal liposarcoma. We report on the US features of two cases of spermatic cord liposarcoma, and discuss the role of US and other imaging modalities in the demonstration and diagnosis of this entity. The literature on spermatic cord liposarcoma was also reviewed.


KEY WORDS: • scrotum • liposarcoma • ultrasound • computed tomography • magnetic resonance image

INTRODUCTION
Sarcomas of the genitourinary tract account for nearly 2% of all urologic tumors. The spermatic cord is the most commonly involved urologic site, and accounts for approximately 30% of all genitourinary sarcomas [1–3]. Among the neoplasms involving the scrotum and its contents, testicular tumors are the most common; paratesticular neoplasms account for only about 2% of neoplasms involving the scrotum and its contents, and 70% of these are benign tumors [4]. Malignant tumors of the spermatic cord are usually sarcomas, and approximately 3–7% of paratesticular sarcomas are liposarcomas [1]. The ultrasound (US) features of liposarcoma in other parts of the human body have been reported; however, those of the spermatic cord liposarcoma have seldom been described [2]. We report on two cases of spermatic cord liposarcoma and their US and other imaging findings. A literature review was also conducted.

CASE PRESENTATIONS
Case 1
A 73-year-old man had a history of right indirect hernia, status post hernioplasty. He felt a painless, progressively enlarged right scrotal mass 1 year after hernioplasty. There were no constitutional symptoms or voiding complaints. Physical examination showed a hard tumor mass of about 7 cm in size in the right hemiscrotum. Scrotal US with 7-MHz linear array transducers (XP10, Acuson, Mountain View, CA, USA) revealed a heterogeneously hyperechoic mass lesion measuring at least 8 × 5 cm² in the right...
hemiscrotum with some relatively hypoechoic parts. The lesion showed no obvious color flow signals on the color Doppler US (Fig. 1A and B). Pelvic computed tomography (CT) scan showed a $16 \times 12 \times 5$ cm$^3$ mass lesion in the right hemiscrotum. The mass contained fat and soft tissue with the density ranging from −110 to 50 HU (Fig. 1C and D). No obvious lymphadenopathy could be identified in the lower abdomen. The US and CT patterns were compatible with the fat-containing tumor, especially liposarcoma. Right radical orchiectomy and wide excision were performed 2 weeks later. A yellowish soft tissue mass measuring $17 \times 13 \times 4$ cm$^3$ closely attached to the spermatic cord was resected during surgery. Histopathologic study of the resected specimen (Fig. 2) revealed a well-differentiated liposarcoma with dedifferentiated components, which included nests of poorly differentiated large lipoblasts arising from the areas of myxoid, sclerosing, or well-differentiated liposarcoma. The submitted testis and spermatic cord showed no remarkable changes. The resection margins were not free of neoplastic cells.

The scrotum was exposed to radiation given at a tumor dose of 6,469 cGy/36 fraction/63 days, and the residual hard mass in the right scrotum shrank after radiotherapy. The patient was followed up regularly with physical examination, scrotal US, and abdominal CT scan. The CT and US examinations were performed 1.5 and 2 years later, respectively,

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**Fig. 1.** Case 1. Ultrasound (US), color Doppler US and computed tomography (CT) scan study of the scrotum: (A) US of the right hemiscrotum demonstrates an ill-defined hyperechoic mass (arrows) containing some hypoechoic regions (arrowheads), compatible with fat-containing tumor; (B) color Doppler US study shows minimal color flow signals in the mass lesion (arrows); (C) CT scan of the scrotum reveals a fat-containing mass (arrows) with inhomogeneous solid part (arrowhead) in the right hemiscrotum; (D) CT scan after contrast injection demonstrates the heterogeneous enhancement of the solid part (arrowhead).
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and showed no identifiable tumor recurrence. The patient has been disease free for more than 2 years.

**Case 2**
A 68-year-old man had a 10-year medical history of diabetes mellitus and hypertension. He also had surgical histories of renal cell carcinoma (stage II), status post left-side radical nephrectomy 7 years previously, and sigmoid colon carcinoma, Dukes’ A, status post anterior resection 5 years previously, and urinary bladder leiomyoma, status post transurethral resection of bladder tumor, 3 years previously. He felt a painless, progressively enlarged right scrotal mass for more than 1 month. He had no voiding complaints. Physical examination revealed a soft tumor mass of roughly 6 cm in size in the right hemiscrotum. Scrotal US with 7-MHz linear array transducers (XP10, Acuson, Mountain View, CA, USA) revealed a heterogeneously hyperechoic mass lesion measuring $6 \times 4 \times 3$ cm$^3$ in the right spermatic cord with no color flow signal on the color Doppler US (Figs. 3A–C). The US appearance suggested a fat-containing tumor, with the possibility of a liposarcoma. Pelvic magnetic resonance image (MRI, 1.5T Magnetom Vision, Siemens, Erlangen, Germany) showed an oval-shaped mass lesion measuring roughly $7 \times 4 \times 3$ cm$^3$, with fat-containing parts in the right hemiscrotum (Fig. 3D). No obvious lymphadenopathy could be identified in the retroperitoneum. It was considered as a lipoma or a liposarcoma and an excision biopsy was performed. A yellowish soft tissue mass was noted, measuring $8 \times 6 \times 6$ cm$^3$ in size, and histopathologic study revealed a well-differentiated liposarcoma of the sclerosing type (Fig. 4). The patient received regular follow-up with physical examination and scrotal US. A US examination, completed 6 months later, showed no identifiable recurrence of tumor.

**DISCUSSION**
The average age of patients with liposarcoma of the spermatic cord is 55 years (range, 16.5–85 years), with a slight right side preponderance (31:20, right: left). Less than 6% of cases have a history of scrotal surgery or trauma [1]. Firm, painless, slow-growing fluctuant masses are common initial presentations. Most liposarcomas have a maximum diameter of 5–10 cm; however, retroperitoneal tumors measuring up to 15 cm have been described. Generally, liposarcomas are low-grade, well-differentiated lesions that spread by local extension; however, high-grade tumors may spread by hematogenous and lymphatic routes [2].

Standard therapy of spermatic cord liposarcoma involves radical orchietomy with wide local resection of the surrounding soft tissues and high ligation of the cord [5]. Adjuvant radiation therapy for intermediate or high-grade lesions, lymphatic invasion, inadequate margin, or recurrence is usually
performed to reduce the incidence of locoregional recurrence after surgery [5]. The risk of local recurrence of liposarcoma is comparable to that of high-grade lesions [3], but, since their relapses tend to be localized, the prognosis remains good [6]. The overall 5- and 10-year disease-specific survivals of spermatic cord sarcoma are 75% and 55%, respectively [3]. However, the high risk of local recurrence always necessitates long-term follow-up [4].

Liposarcomas are rarely diagnosed preoperatively and are often mistakenly diagnosed as more common diseases, such as inguinal hernia or spermatic cord lipoma [1]. High-resolution US (e.g. 7.0–10 MHz or higher frequency), in conjunction with color Doppler function, has become the imaging modality of choice for the examination of the scrotum and its contents [2]. It provides valuable information for the differential diagnosis of a variety of disease processes involving the scrotal contents that have similar clinical manifestations [7]. Scrotal US is now widely used to discriminate the intratesticular or extratesticular location of a mass [8]. It is also very helpful in confirming the presence of a mass which is nonpalpable, and to characterize masses as cystic, solid or complex [9]. However, it is believed that the US findings are often variable and nonspecific, and do not usually show the definitive histologic nature, because of the extensive overlap of the US features between benign and malignant pathologies, such as a well-differentiated liposarcoma and a lipoma.
A liposarcoma needs radical orchiectomy; however, a lipoma needs only tumor excision [10]. The sonographic findings in our patients suggested that both the lesions in the hemiscrotums were fat-containing tumors, in which the relatively heterogeneous echogenicity of the lesion was indicative of the possibility of liposarcoma, which prompted a further evaluation with CT or MRI.

A pleomorphic-type liposarcoma presents as a heterogeneous mass consisting of many hyper- and hypoechoic nodules on the US [11], which can be distinguished easily from a lipoma. However, a well-differentiated liposarcoma is composed of fat with thick linear or nodular septa and may be mistaken a lipoma [9]. Some studies have discussed the different morphologies of a well-differentiated liposarcoma and a lipoma by other imaging modalities, such as CT [12] and MRI [12,13]. Large lesion size (> 10 cm), presence of multi-nodular margin, presence of thick and strongly enhanced septa, presence of nodular and/or globular or nonadipose mass-like areas, and decreased percentage of fat composition (< 75%) suggest a liposarcoma [12,13]. However, at times, these details may be identified with difficulty on US.

Histologically, increased vascularity can be found in a liposarcoma close to malignant cell invasions [14]. In this regard, color Doppler imaging and spectral analysis offer unique information that cannot be obtained by other imaging techniques [15]. Futani et al demonstrated that well-differentiated liposarcomas showed significantly more flow signals than intramuscular lipomas by using power Doppler US [14]. Belli analyzed 36 benign and 20 malignant soft tissue masses of the extremities by using sonography, color Doppler, and pulsed Doppler techniques [15]. He concluded that, by color Doppler and pulsed Doppler techniques, malignancy could be suspected when two of the following features are present: increased vascularization (3 or more afferent vessels), irregular arrangement of tumor vessels, tortuous vessel course or spotty flow signals and abrupt variations in the vessel caliber. A sensitivity of 85% and a specificity of 88% can be achieved by using these Doppler criteria. He also noted that the malignant lesions showed peak systolic velocities higher than 50 cm/s in 65% of cases, and most benign lesions (88.9%) showed lower velocities. But spectral waveform analysis showed that diastolic and venous velocities and pulsatility indices were not statistically significant between benign and malignant soft tissue masses. A combination of gray-scale US and Doppler features yielded a higher sensitivity (90%) [15]. In our cases, both tumors were relatively hypovascular on the color Doppler US. It was unfortunate that power Doppler US, which is more sensitive for flow detection than color Doppler US, was not performed. Thus, the vascularity of tumors in these two cases may be underestimated and may not provide further information on diagnosis.

In conclusion, in our first patient with pleomorphic-type liposarcoma, significant hypoechoic zones in
the territory of the large hyperechoic mass were strongly indicative of non-adipose components. In the US imaging done on the second patient, the heterogeneous echo pattern of a generally hyperechoic mass was also suggestive for the possibility of liposarcoma. Further evaluation is recommended on the basis of US features. The MRI evidence of nodular nonadipose components suggested that the lesion was probably a liposarcoma.

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REFERENCES