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## E-CASE REPORT

### Skin Ultrasound in Kaposi Sarcoma<sup>☆</sup>



R. Carrascosa,<sup>a,\*</sup> F. Alfageme,<sup>b</sup> G. Roustán,<sup>b</sup> M.D. Suarez<sup>c</sup>

<sup>a</sup> Servicio de Dermatología, Hospital Universitario La Princesa, Madrid, Spain

<sup>b</sup> Servicio de Dermatología, Hospital Universitario Puerta de Hierro, Majadahonda, Madrid, Spain

<sup>c</sup> Servicio de Anatomía Patológica, Hospital Universitario Puerta de Hierro, Majadahonda, Madrid, Spain

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#### KEYWORDS

Kaposi sarcoma;  
Ultrasound;  
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**Abstract** The use of ultrasound imaging has recently been increasing in numerous dermatologic diseases. This noninvasive technique provides additional details on the structure and vascularization of skin lesions. Kaposi sarcoma is a vascular tumor that typically arises in the skin and mucosas. It can spread to lymph nodes and internal organs. We performed B-mode and color Doppler ultrasound studies in 3 patients with a clinical diagnosis of Kaposi sarcoma confirmed by histological examination. We found differences in the ultrasound pattern between nodular and plaque lesions, in both B-mode and color Doppler. We believe that skin ultrasound imaging could be a useful technique for studying cutaneous Kaposi sarcoma, providing additional information on the structural and vascular characteristics of the lesion.

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#### PALABRAS CLAVE

Sarcoma de Kaposi;  
Ultrasonidos;  
Doppler;  
Diagnóstico

#### Ecografía cutánea en el sarcoma de Kaposi

**Resumen** Recientemente ha aumentado el uso de la ecografía cutánea en múltiples enfermedades dermatológicas. Se trata de una técnica no invasiva, que nos proporciona más detalles acerca de la estructura y vascularización de las lesiones cutáneas. El sarcoma de Kaposi es un tumor vascular, que se localiza principalmente en la piel y las mucosas, pudiendo afectar los ganglios linfáticos y los órganos internos. Presentamos 3 pacientes con diagnóstico de sarcoma de Kaposi, sospechado clínicamente, y confirmado histológicamente, a los cuales realizamos exploración ecográfica en modo B y modo Doppler color. Encontramos diferencias en el patrón ecográfico, tanto en modo B como en modo Doppler color, entre las lesiones que clínicamente correspondían a nódulos frente a las que eran placas. Consideramos que la ecografía cutánea

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\* Corresponding author.

E-mail address: [rachel170786@gmail.com](mailto:rachel170786@gmail.com) (R. Carrascosa).

podría ser útil como prueba complementaria, en el estudio de las lesiones cutáneas del sarcoma de Kaposi, proporcionándonos más información acerca de sus características estructurales y vasculares.

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## Introduction

Kaposi sarcoma (KS) is a tumor that arises in the vascular endothelium and mainly affects the skin and mucosae, although it can spread to the lymph nodes and even to internal organs.<sup>1,2</sup> Human herpesvirus 8 (HHV-8) is considered the etiologic agent of KS.<sup>3</sup> The 4 clinical variants of KS are classic KS (CKS), iatrogenic KS (IKS), endemic (African) KS, and KS associated with AIDS (AIDS-KS).<sup>1,2,4</sup> The suspected diagnosis is based on the presence of macules, plaques, and/or nodules, which may be violaceous or reddish and asymptomatic, although up to 10 different clinical forms have been reported.<sup>2</sup> The lesions have a characteristic distribution on the lower leg, except in the case of AIDS-KS, in which the lesions mainly affect the face and trunk.<sup>4</sup> Diagnosis is confirmed by skin biopsy, which typically reveals proliferation of irregular cleft-shaped vessels and spindle-shaped cells, with no significant histologic differences between the clinical variants.<sup>1,4</sup>

Use of ultrasound was recently implemented in several skin diseases, such as inflammatory dermatoses and benign and malignant tumors, as well as in cosmetic dermatology.<sup>5-11</sup>

We report 3 cases of KS in which skin lesions were evaluated using B-mode and color Doppler ultrasound. Here, we aim to establish a correlation between ultrasound findings and the clinical and histologic characteristics of KS skin lesions and to describe the usefulness of both types of ultrasound in this disease.

## Case Descriptions

### Patient 1

The patient was an 80-year-old woman who consulted for an asymptomatic nodule that recently appeared on her right ankle. She had developed a similar lesion on the same leg 5 years previously. The lesion was confirmed both clinically and histologically as CKS, and the result of the extension study was negative. The lesion was treated with surgery. The physical examination revealed a reddish-violaceous nodular lesion on the internal surface of the right ankle (Fig. 1A). B-mode ultrasound revealed a solid hypoechoic, homogeneous, solid oval lesion with regular, well-defined edges. The lesion affected the papillary and reticular dermis. Color Doppler revealed intense intralesional vascularization that was more marked on the inferior pole. Spectral analysis showed biphasic arterial flow (Fig. 1B). KS was confirmed by histology, and the lesion was removed. The result of a second extension study was negative. The patient continues to be followed, with no signs of new lesions.

### Patient 2

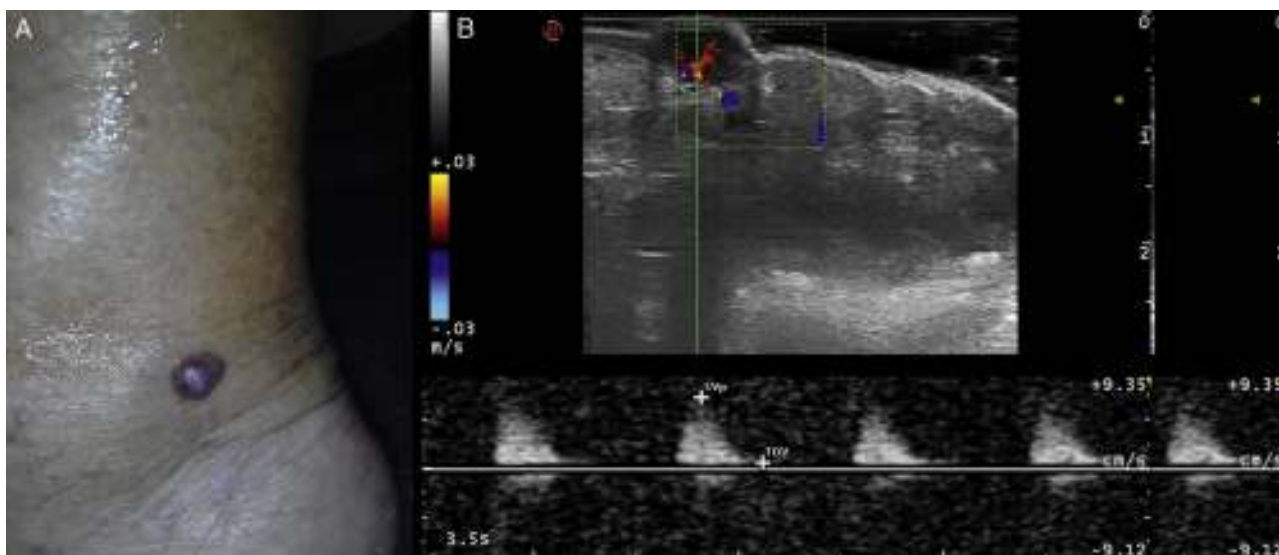
The patient was a 42-year-old man diagnosed with pulmonary fibrosis who had received a lung transplant 5 years previously followed by immunosuppressive treatment. He consulted for 2 localized asymptomatic plaques that had appeared on his left leg 2 months earlier. Physical examination revealed 2 reddish-violaceous plaques on the anterior surface of the thigh and left knee (Fig. 2A). The B-mode ultrasound examination revealed a solid, hypoechoic, and heterogeneous lesion with irregular, acicular edges that reached the papillary dermis. Color Doppler ultrasound did not reveal intralesional vascularization (Fig. 2B). The skin biopsy confirmed the diagnosis of IKS, and the results of serology testing were positive for HHV-8 and cytomegalovirus. The results of the extension study were negative. The lesions improved when immunosuppressive treatment was modified.

### Patient 3

The patient was a 67-year-old man who had received a heart transplant 7 years earlier. Surgery was followed by immunosuppressive treatment. He consulted for asymptomatic nodules and papulae that had appeared 3 months previously on his legs, hands, and palate. The physical examination revealed a reddish papule on the hard palate, a reddish-violaceous nodule on the dorsum of the right hand, and multiple reddish-violaceous papules grouped in plaques on the anterior surface of the legs (Fig. 3, A and B). B-mode ultrasound of 1 of the plaques on the legs revealed a solid hypoechoic, heterogeneous lesion with irregular acicular edges affecting the papillary dermis. Examination of the nodule on the hand using the same technique revealed a solid, hypoechoic, homogeneous oval or round lesion with irregular, well-defined edges affecting the papillary and reticular dermis. Color Doppler revealed no intralesional vascularization in the plaque-like lesion, although in the case of the nodule, slight vascularization was visible at the inferior pole (Fig. 3, C and D). Skin biopsy confirmed the diagnosis of IKS. The results of the extension study were negative, and the lesions improved when immunosuppressive therapy was modified.

## Discussion

In the cases of KS we report, the pattern revealed by B-mode ultrasound was solid and hypoechoic, and the lesions were located in the dermis. Nodules were more homogeneous, with regular, well-defined outlines, whereas plaques were less homogeneous with irregular edges, acicular

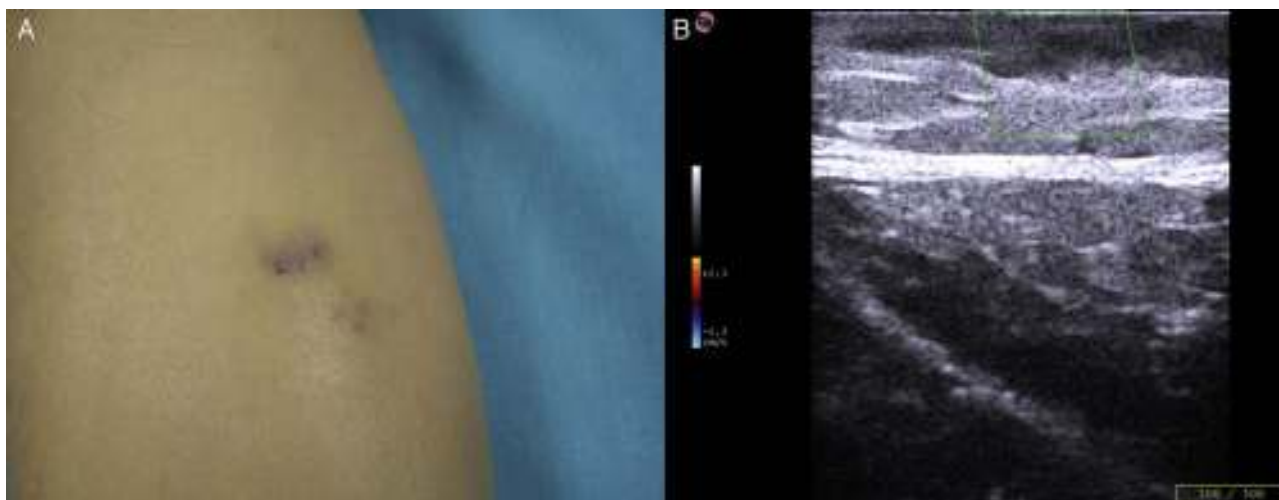


**Figure 1** A, Reddish-violaceous nodule on the right ankle. B, The ultrasound lesion shows a solid, hypoechoic, homogeneous oval lesion with regular, well-defined edges in the papillary and reticular dermis. Color Doppler shows intense intralesional vascularization that is more marked in the inferior pole. Biphasic arterial flow is observed in spectral mode.

morphology, and less well-defined outlines. A review of the literature reveals few studies that use cutaneous ultrasound to describe the structural characteristics of KS skin lesions; in addition, the results of these studies are contradictory. In 1993, Bogner et al.<sup>12</sup> described KS skin lesions as hypoechoic, with a homogeneous structure and well-defined outlines. In contrast, Cammarota<sup>13</sup> reported the KS ultrasound pattern to consist of a solid, nonhomogeneous nodule with a poorly defined outline. More recently, in 2011, Solivetti et al.,<sup>14</sup> who used higher-frequency probes, analyzed the ultrasound characteristics of KS skin lesions (confirmed by histology) in 24 patients, from each of whom a single skin lesion (both plaques and nodules) was selected according to its size (0.4 cm-2 cm). Their ultrasound pattern corresponded to hypoechoic lesions with well-defined (and frequently

multilobulated) outlines located between the epidermis and dermis and, in some cases, in the subcutaneous layer. Most of the lesions had a homogeneous structure, which was more homogeneous in CKS lesions than in AIDS-KS lesions. However, the authors admit that this finding could be attributed to the small size of the lesions studied (all <2 cm) and the possibility that the largest lesions could have a more heterogeneous structure owing to intratumoral degeneration, necrosis, and/or fibrosis.

As for color Doppler, we observed intralesional vascularization that was more marked at the lower pole in lesions clinically defined as nodules and markedly diminished or absent vascularization in lesions that were clinically defined as plaques. Only 1 study in the literature used color Doppler to describe the vascular characteristics of KS skin



**Figure 2** A, Reddish-violaceous plaque on the anterior surface of the left thigh. B, The ultrasound examination revealed a solid, hypoechoic, heterogeneous lesion with irregular, acicular edges in the papillary dermis. Color Doppler did not reveal intralesional vascularization.



**Figure 3** A, Reddish-violaceous nodule on the dorsum of the right hand. B, Multiple reddish-violaceous papules coalescing to form plaques on the anterior surface of the legs. C, Ultrasound of the nodule revealed a solid, hypochoic, homogeneous oval lesion with well-defined and regular edges in the papillary and reticular dermis. Color Doppler revealed mild intralesional vascularization in the inferior pole. D, Ultrasound examination of the plaque revealed a solid, hypochoic, heterogeneous lesion with irregular, acicular edges in the papillary dermis. No intralesional vascularization was observed in color Doppler.

lesions.<sup>14</sup> The authors found that the skin lesions of CKS and those of AIDS-KS differed and that intralesional vascularization was absent in most cases of CKS and often present in those of AIDS-KS. They postulated that the intralesional vascularization found in the latter could be associated with the formation of new vessels induced by the human immunodeficiency virus<sup>15</sup>; however, in CKS with intralesional vascularization, this ultrasound finding could be associated with a more aggressive clinical picture or higher HHV-8 load.<sup>14</sup>

In conclusion, cutaneous ultrasound (B-mode and color Doppler) could be useful as a complementary test in the study of skin lesions in KS. The technique could provide us

with more information on the structural and vascular characteristics of the lesions.

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

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