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Classical Kaposi sarcoma: an ınsight into demographic characteristics and survival outcomes

Engin Eren Kavak[1*] and Yüksel Ürün[1]

Abstract

Background Classical Kaposi's sarcoma (CKS) is a rare angioproliferative disease associated with HHV-8, usually seen in the Mediterranean and Middle East regions. Knowing the subtypes, affected regions, and factors influencing prognosis is important for disease management.

Objective To analyze the demographic characteristics, prognostic factors, treatment modalities, and survival of patients diagnosed with CKS.

Methods Our center's records of patients diagnosed with CKS between January 2010 and December 2021 were retrospectively analyzed. Thirty-eight patients with histopathologically proven CKS were included in the study. Demographic and clinical characteristics of the patients, macroscopic, histopathologic, and immunohistochemical features of the lesions, treatments, and responses to treatment were evaluated. Kaplan–Meier survival curves were used to estimate survival outcomes, and log-rank test analyses were performed for intergroup comparisons.

Results The median age at diagnosis of the patients was 71.0(39.0–93.0) years. Ten patients were female, and 28 were male. At the time of diagnosis, 63.2% of the patients had localised disease, nine patients were locally advanced, and five patients were metastatic. The tumor was most commonly localised in the lower extremity (65.8%), followed by the upper extremity. The median follow-up period was 69 (49–77.6) months. Local recurrence was detected in 24 patients during the follow-up. Median overall survival was not reached (NR) in localised disease(95% CI: 70.5-NR). In locally advanced disease, it was 31.1 months (95% CI: 13.8–63.0). In metastatic disease, it was 16.3 (95% CI: 12.6–20.0) months ($p=0.005$).

Conclusion This study emphasizes that CKS in our centre predominantly affects older males and typically manifests with nodular, early-stage lesions at the time of diagnosis. The majority of patients exhibited localised disease with no evidence of systemic involvement, while lymphedema was a frequent accompanying condition. Ulcerative manifestations were relatively uncommon, and survival outcomes varied significantly based on disease stage, with a marked decline in overall survival for patients with metastatic disease. The findings emphasize the importance of early diagnosis and the development of tailored treatment strategies to improve patient outcomes.

Keywords Kaposi sarcoma, Classical Kaposi sarcoma, Overall survival, Clinical forms

Introduction

Kaposi's sarcoma (KS), which was first defined as "idiopathic multiple pigmented sarcoma of the skin" by Moritz Kaposi in 1872, is a malignancy with malignant angiomatous features [1]. KS can occur at any age and in both

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sexes but is more common in adult men [2]. According to Globocan 2022 data, the incidence of KS is 0.5 in men and 0.3 in women per 100,000 people [3]. This rare malignancy has become more common, especially after its association with acquired immunodeficiency syndrome (AIDS) was revealed in the 1980s. There are four clinical types of KS: classical, endemic (African type), epidemic (AIDS-related), and iatrogenic (transplant-related).

Classical Kaposi's sarcoma (CKS), which is not associated with HIV infection, is most common in Eastern Europe and Mediterranean countries and affects older men [4]. It is evident that countries neighboring the Mediterranean coast, including but not limited to Italy, Greece, Israel, Turkey, the Middle East, and Eastern/Central Europe, are endemic to CKS [5]. This type, which usually has a good prognosis, usually presents as an indolent purple macule, solitary nodule, or plaque on the lower extremities and hands. Lesions tend to progress proximally and may wax and wane or slowly progress over years to decades. This type of mucosal involvement is rare. The diagnosis of CKS is based on clinical findings and histopathologic examination [6, 7].

The role of human herpes virus-8 (HHV-8) in the etiology of CKS was first reported by Chang et al., who in 1984 demonstrated viral DNA in biopsy samples of patients [8]. There is a direct correlation between HHV-8 positivity and the incidence of CKS. It is thought that HHV-8 is transmitted through saliva, and poor hygiene habits and crowded life facilitate transmission [9, 10]. Age is an important risk factor in CKS. The prevalence of CKS increases with age [11]. Other reported risk factors include cereal cultivation, the use of quinine as a treatment for malaria, and living in rural areas [10].

To date, KS has no accepted staging system. There is no accepted classification for CKS, iatrogenic, or endemic KS, which are outside the scope of AIDS-related KS. Although Krigel's staging system has long been used for CKS, recent studies suggest that the classification described by Brambilla is probably more appropriate [12]. One staging system was based on multiple retrospective analyses of 300 classic CKS cases: stage I (macronodular stage) small lesions (macules) confined to the lower extremities; stage II (infiltrative stage): larger lesions (plaques) confined to the lower extremities; stage III(florid): multiple large lesions (plaques and nodules) confined to the lower extremities; and stage IV (disseminated): multiple involvement of large lesions extending beyond the lower extremities (Fig. 1) [13].

The most common elementary lesion is a slow-growing solitary nodule in the distal extremity. Internal organ metastases can be observed in advanced cases. Cases accompanied by a second primary malignancy have been reported, but no controlled studies have yet been conducted on this subject [9]. The main goals of treatment in CKS, a benign low-grade tumor, are to alleviate symptoms, prevent disease progression, and reduce the accompanying edema, lethargy, and psychological stress. In common cases, surgical excision, local treatments, and chemotherapy may be preferred [14].

Fig. 1 Multiple involvement of large lesions extending beyond the lower extremities

There are not enough clinical studies reported from our country regarding CKS, which is relatively common in the geography of our country. In this study, we evaluated the clinical and treatment characteristics of 38 patients who were followed up at Ankara University, Department of Medical Oncology between 2010 and 2021.

Material and methods

Study group

Between January 2010 and December 2021, the data of 38 patients with histopathologically proven KS in the Department of Medical Oncology, Ankara University Faculty of Medicine, were retrospectively analyzed (Strobe Flow Diagram). Information about the patients was collected retrospectively and included patients' demographic information, treatment strategy, clinical outcome, along with results from laboratory and imaging evaluations. Age, gender, comorbidities, smoking, localisation of the lesions, clinical forms of the lesions,

accompanying symptoms, treatment, and treatment responses of the patients included in the study were reviewed. The presence of HHV8 latent nuclear antigen-1 (LANA) monoclonal antibodies was analyzed in patients diagnosed with CKS. The primary endpoint was defined as overall survival (OS), measured as the interval between diagnosis and the date of death or last visit.

Statistics

Descriptive statistics were expressed as mean ± standard deviation for variables with normal distribution, median (min–max) for variables with non-normal distribution, and number of cases and (%) for nominal variables. Survival analyses were performed with the Kaplan–Meier survival curves, and log-rank test analyses were performed for intergroup comparisons. Results were considered statistically significant for $P<0.05$. Statistical analyses were performed using SPSS version 30 software.

Results

The median age at diagnosis of the patients was 71.0(39.0–93.0) years. Ten patients were female, and 28 were male. Twenty-one of the patients were current or former smokers. The number of LANA + patients was 23 (60.5%). While 20 (52.6%) of the patients had no comorbidity, 10 (26.3%) had one comorbidity, 2 (5.3%) had two comorbidities and 6 (15.8%) had three comorbidities. The most prevalent comorbidities were hypertension (15 patients) and diabetes mellitus (13 patients). 24 (63.2%) of the patients had localised disease, nine(23%) patients with locally advanced disease, and five (13.2) patients with metastatic disease at the time of diagnosis. The most common site of localised tumors was the lower extremity (25 patients,65.8%), followed by the upper extremity. Most of the lesions were plaque in a clinical form (29 patients,76.3%). Six (15.8%)patients were associated with a second hematological malignancy: 3 with Hodgkin's lymphoma, 2 with Chronic Lymphocytic Leukemia(CLL), and 1 with Hairy Cell Leukemia. 20 (52.6%) patients had no symptoms, 7 (18.4%) had pain, 7 (18.4%) had lymphedema and 4 (10.5%) had ulceration. Of the five patients who had metastatic disease at the time of diagnosis, two (20%) had Hodgkin's lymphoma in remission. Local recurrence was detected in 14 (36.8%) of localised patients at diagnosis (Table 1).

Only Excision was performed in 21.1% (8), radiotherapy in 28.9% (11), and chemotherapy (doxorubicin based monotherapy/combination) in 18.4% ($n=7$) of the patients. Four patients received chemotherapy and radiotherapy together, and three patients received radiotherapy after excision. Five patients were followed up without treatment. The median follow-up period was 69 (49–76.6) months. The median OS in the entire cohort was

Table 1 Demographic characteristics of the patients

Median Age at diagnosis_ Yr (Range)	71.0(39.0–93.0)
< 65y_ n (%)	10 (26.3)
≥ 65y_ n (%)	28(73.7)
Sex_ n(%)	
Female	28(73.7)
Male	10(26.3)
Smoking _n(%)	
Current or former smoking	21(55.3)
No smoking history	17(44.7)
Comorbidity_n(%)	
None	20(52.6)
1	10(26.3)
2	2(5.3)
≥ 3	6(15.8)
LANA_ n(%)	
Positive	25(62.5)
Negative	13(37.5)
Clinical Form_ n(%)	
Solitary	7(18.4)
Plaque	29(76.3)
Macule	2(5.3)
Stage _n(%)	
I-II(Local)	24(63.2)
III(Locally advanced)	9(23.7)
IV(Metastatic)	5(13.2)
Localization_ n(%)	
Lower extremity	25(65.8)
Upper extremity	5(13.2)
Lower + Upper extremity	3(7.9)
Whole body	5(13.2)
Second malignancy_ n(%)	6(15.8)
Hodgkin's lymphoma	3(7.9)
Chronic Lymphocytic Leukemia	2(5.3)
Hairy Cell Leukemia	1(2.6)
Symptoms_ n(%)	
None	20(52.6)
Lymphedema	7(18.4)
Ulceration	4(10.5)
Pain	7(18.4)
Treatment_ n(%)	
Observation	5(13.2)
Only Excision	8(21.1)
Radiotherapy(RT)/ Cryotherapy	11(28.9)
Chemotherapy	7(18.4)
Chemoradiotherapy	4(10.5)
RT + Excision	3(7.9)
Local Recurrence_ n(%)	
Yes	24(63.2)
No	14(36.8)
Vital Status_ n(%)	
Dead	16(42.1)
Alive	22(57.9)
Median OS_months(Range)	70.5(27.9-NR)
Follow-up period, median_ months(Range)	69 (49–77.6)

LANA HHV8 latent nuclear antigen-1, *NR* Not Reached, *OS* Overal Survival, *S.D.* Standart Deviation

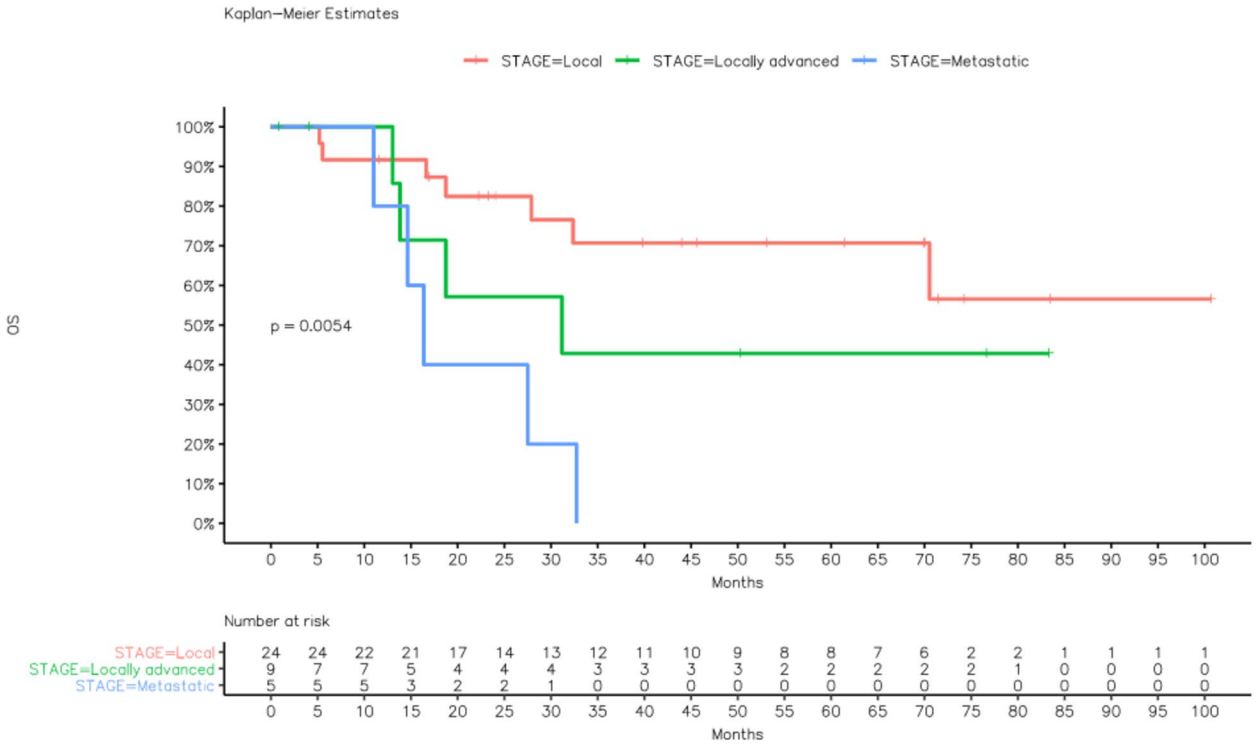

Fig. 2 Kaplan–Meier survival curves of patients according to stage

70.7 months (95%CI: 27.9-NR). Median overall survival was not reached (NR) in localised disease(95% CI: 70.5-NR). In locally advanced disease, it was 31.1 months (95% CI: 13.8 -63.0). In metastatic disease, it was 16.3 (95% CI: 12.6–20.0) months ($p=0.005$) (Fig. 2).

Median overall survival in clinical forms was 70.5(95% CI: NR-NR) months for macular lesions and 16.6(95% CI: 2.1–31.0) months for solitary lesions. It was not reached in plaque-form lesions (95% CI: 31.1-NR) ($p=0.068$). It was not considered significant (Fig. 3). The 3- and 5-year survival rates of patients are summarised in Table 2. Following the exclusion of secondary malignancies($n=32$) from the survival analyses, were 75% for patients with and 79% for patients without secondary malignancies at the local stage, 55% versus 50% for locally advanced stage, and 20% versus 0% for metastatic stage. No difference was observed in the 5-year survival results. The log-rank test showed a statistically significant difference in overall survival according to disease stage ($p=0.001$) and clinical form ($p=0.05$) (Supp. Table 1).

Univariate analysis was employed to assess the demographic characteristics, clinical features, and treatment modalities of the patients about survival. Among the variables, only stage [HR 95% CI: 5.75(1.77–18.60) ($p=0.003$)] demonstrated a statistically significant effect (Table 3). When the factors affecting survival were analysed univariately, with patients with secondary malignancy excluded from the analysis, smoking was found to be significant [HR 95% CI: 3.70(1.01–13.52) ($p=0.04$]. Similarly, metastatic stage remained a significant factor (HR 95% CI: 12.06(2.27–63.9) ($p=0.003$)) (Supp. Table 2).

Discussion

There are few demographic and clinical studies reported so far about CKS, which is more common in Mediterranean countries than in other regions, except for the study conducted by Su et al. [15] with 18 patients, and Gün et al. [16] with 24 patients diagnosed with CKS. The incidence of CKS is strongly influenced by ethnic and geographical factors. The incidence of CKS was found to be 0.20/100,000 per year in Greece, 0.02–0.06/100,000 per year in the United States of America in studies in which the majority were Eastern European, Jewish, and Mediterranean, 2.7/100,000 in men and 0.75/100,000 in women in Israel [17, 18].

Although the pathogenesis of KS is still not fully elucidated, it is known that all forms are associated with HHV-8. However, a small proportion of people infected with HHV-8 develop CKS [19]. Serologic methods (enzyme immunoassay or immunofluorescence antibody), polymerase chain reaction,

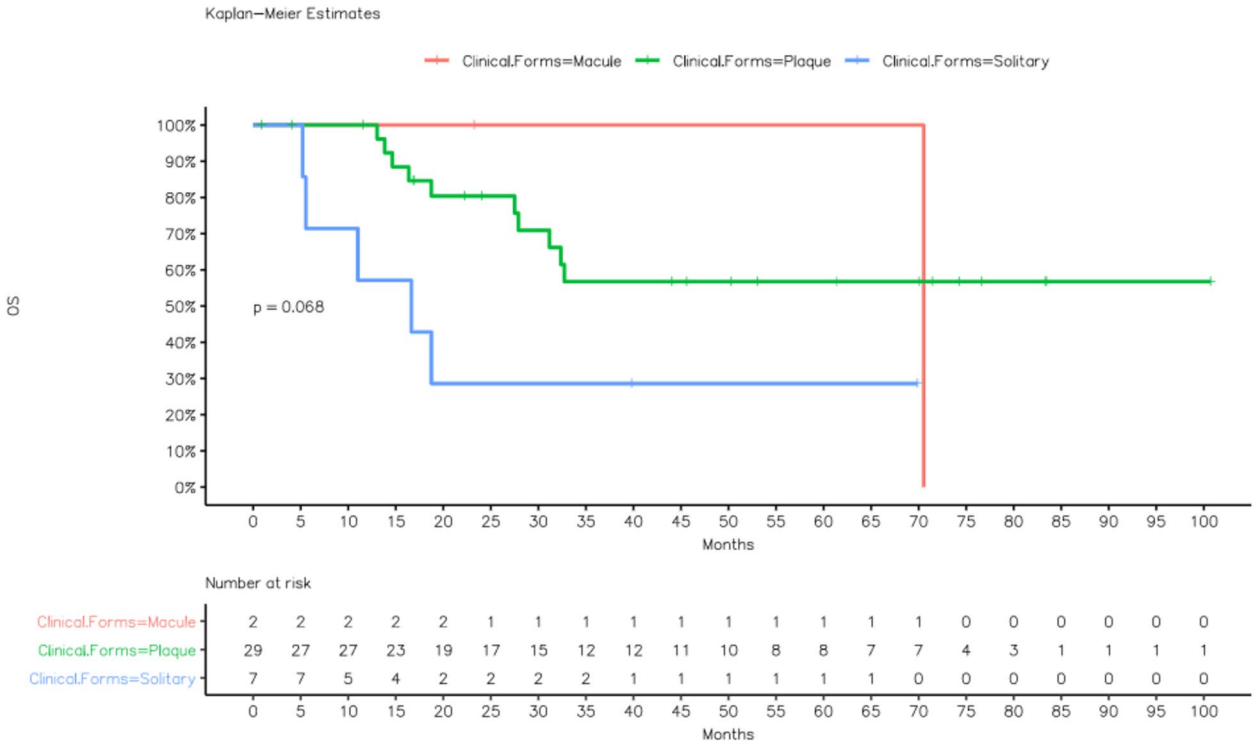

Fig. 3 Kaplan–Meier survival curves of patients according to clinical forms

Table 2 The 3-year and 5-year survival rates of patients

Variable	3-Year OS (%)	5-Year OS (%)
Stage—Local	85	70
Stage—Locally Advanced	55	50
Stage—Metastatic	20	0
Clinical Form—Macule	100	100
Clinical Form—Plaque	75	60
Clinical Form—Solitary	40	30

OS Overal Survival

or immunohistochemical methods can be used for HHV-8 detection. In our study, LANA was used in the immunohistochemical examination of tissue samples for HHV-8 detection. LANA was positive in 62.5% of our patients. Previous studies have also reported LANA negativity in patients with CKS, and it has been reported that this may be related to low viral copy number or sequence polymorphism in the primary binding sites of HHV-8. In addition, factors arising from the fixation and tissue tracking stages of biopsy materials may cause loss of antigenic properties in tumor tissue. This may prevent immunohistochemical demonstration of HHV-8 antigen [20].

The clinical course of AIDS-associated KS is variable, ranging from minimal disease presenting as an incidental finding to a rapidly progressive neoplasm that can result in significant morbidity and mortality, depending on the specific sites of involvement [21]. The recommendation for almost all patients with AIDS-associated KS is systemic treatment with potent combination antiretroviral therapy (cART) [22]. In CKS; Given the absence of treatments capable of eradicating latent human herpesvirus 8 (HHV-8) infection, treatment aims to provide symptom palliation, alleviate lymphoedema, improve function, reduce the size of cutaneous or visceral lesions and delay disease progression [22].

In our study, the median age at diagnosis of the patients at the time of diagnosis was 71.0 (39.0–93.0) years. The proportion of patients over 65 years of age was 67.5%. It is seen that our results are similar to other studies conducted in our country, [15, 16]. In Israel, 2107 patients with CKS diagnosed over 38 years were evaluated, and it was revealed that the age at diagnosis has gradually increased in both men and women during this period [18].

The higher incidence of CKS in men than in women is not fully understood. However, this is probably due to differential and higher expression of antigen presentation, lymphocyte activation, cytokine and immune cell regulation, and disease resistance genes, including

Table 3 Univariate analysis of patients' survival

Variable	*P* value	HR(95%)
Age at diagnosis		
65 yr >	0.17	2.36(0.67–8.34)
65 yr ≤		
Sex		
Female	0.91	1.06(0.34–3.31)
Male		
Smoking		
Current or former smoking	0.07	2.63(0.91–7.63)
No smoking history		
Comorbidity		
None	0.17	2.00(0.72–5.52)
≥ 1		
LANA		
Positive	0.07	2.45(0.90–6.61)
Negative		
Clinical Form		
Solitary	0.88	0.85(0.10–6.75)
Plaque	0.33	2.90(0.33–25.6)
Macule		
Stage		
I-II(Local)	0.26	2.01(0.58–6.90)
III(Locally advanced)	**0.003**	5.75(1.77–18.6)
IV(Metastatic)		
Localization		
Lower extremity	0.16	1.23(0.91–1.65)
Upper extremity		
Lower + Upper extremity		
Whole body		
Symptoms		
None	0.10	1.27(0.94–1.70)
Lymphedema		
Ulceration		
Pain		
Treatment		
Observation	0.59	1.07(0.81–1.42)
Only Excision		
Radiotherapy(RT)		
Chemotherapy		
Chemoradiotherapy		
RT + Excision		

Fc receptors and immunoglobulin G (IgG) superfamily [23]. Furthermore, genetic factors may also cause a more effective immune response to HHV-8 in women [24]. In our study, in line with the literature, male predominance was approximately 3 times higher.

In their study, Anderson et al. demonstrated that cigarette smoking is associated with a reduction in the risk of CKS [25]. Conversely, some studies have shown that smoking increases the risk of CKS [26, 27]. In our study, 55% of patients were current or former smokers. In our study, smoking was a nearly significant risk factor for overall survival in univariate analysis (HR(95%): 2.63(0.91–7.63), p: 0.07). A substantial effect was observed in the patient cohort following exclusions of patients with secondary malignancies (HR 95% CI: 3.70 (1.01–13.52); $p=0.04$).

Dermatological textbooks refer to more than 10 different morphological variants of KS such as patch(macule), plaque, nodular, lymphadenopathic, exophytic, infiltrative, ecchymotic, telangiectatic, keloidal, cavernous or lymphangioma-like variants [28]. The most common forms are the first 3. Therefore, in our study, we classified patients into 3 clinical forms: solitary, macular, and plaque.

KS elementary lesions are characterized by red and purple violaceous nodules, macules, or plaques. CKS lesions show slow progression, and lesions may coalesce over time to form large plaques and nodules. Lesions are usually localised in the lower extremities [10]. Similar to other studies, plaque was the most frequent elementary lesion observed in our study, and the most common localisation was found to be in the lower extremity. Furthermore, the log-rank test showed that both disease stage and clinical form had a statistically significant effect on overall survival ($p=0.001$ and $p=0.05$, respectively), indicating their prognostic relevance in patients with CKS.

In various publications, it has been reported that KS may be associated with other primary malignancies [17]. Tumors frequently associated with CKS include Hodgkin's or non-Hodgkin's lymphoma, chronic lymphocytic leukemia(CLL), multiple myeloma, mycosis fungoides, and hairy cell leukemia [29]. The extant literature on the subject presents conflicting data concerning the association of other malignancies, either before or following a diagnosis of CKS. KS has been demonstrated to be associated with secondary malignancies, with an incidence ranging from 15 to 37 percent. Once diagnosed with KS, the risk of KS disease is 20 times higher than expected, depending on age, gender and ethnicity [30].In our study, a second hematological malignancy was observed in 6 patients: 3 with Hodgkin's lymphoma, 2 with CLL, and 1 with hairy cell leukemia. Due to the retrospective nature of the study, it is not possible to ascertain the temporal sequence of the diseases, i.e. whether they occurred before, after, or simultaneously.

Systemic chemotherapy is required in rapidly progressing forms of CKS Stage 2 and in stages 3 and 4 [31]. Spontaneous regression has also been reported in some publications [32]. Since most of our patients were in the early stages, excision, cryotherapy, and radiotherapy were frequently used in the treatment. In our clinic, the size of the lesions, type, and localisation of the elementary lesion are taken into consideration, and patients are evaluated together with medical oncology and radiation oncology. Surgical excision is primarily recommended for solitary

lesions. For lesions measuring less than 2 cm in diameter and exhibiting limited diffusion, cryotherapy treatment is administered. In cases with a high number of lesions, large nodules, and infiltrating lesions, we evaluate the patients together with radiation oncology and recommend radiotherapy. In cases where radiotherapy cannot be performed, chemotherapy treatment is planned by medical oncology since total electron beam therapy is not available in our hospital.

Indications for systemic chemotherapy include widespread disease, rapidly progressive disease, visceral involvement, and moderate to advanced symptomatic edema. In light of the studies referenced in the prevailing guidelines, the utilization of liposomal doxorubicin [33] or paclitaxel [34] is advocated as the primary systemic treatment for CKS. In view of the logistical challenges posed by the challenging geographical conditions that prevailed in the nation during that period, seven patients were treated with doxorubicin-based monotherapy or combination therapy as an alternative to conventional chemotherapy.

CKS is usually a benign disease, often confined to the skin, and visceral involvement is rare [35]. Since the patients are mostly elderly, the risk of mortality is related to comorbidities. Since our study was conducted retrospectively, we could not access all the data on mortality rates and causes. In particular, we did not evaluate the effect of malignancies associated with CKS on survival. This constitutes the shortcoming of our study.

Conclusion

In this study, it has been determined that CKS in our center has a late age onset, male predominance was consistent with previous studies. Plaque-type and early-stage lesions were frequently observed at the time of diagnosis, a second primary malignancy is rare, there is no systemic involvement and symptoms such as lymphedema, ulceration and hemorrhage accompanying CKS are less common. Our retrospective evaluation of the cases showed similarities with the studies presented in the literature regarding demographic data, clinical presentation, and histopathologic types. Multicenter studies will better reveal the disease's demographic, clinical, and histopathological features, and a common approach to the disease and its treatment can be developed.

Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
CI	Confidence Interval
CKS	Classic Kaposi's Sarcoma
CLL	Chronic Lymphocytic Leukemia
CS	Classical Sarcoma
DNA	Deoxyribonucleic Acid
HHV	Human Herpes Virus
HIV	Human Immunodeficiency Virus
KS	Kaposi's Sarcoma
LNA	Latent Nuclear Antigen
OS	Overall Survival
SPSS	Statistical Package for the Social Sciences

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

EEK: Conceptualization; Investigation; Writing—original draft; Writing—review & editing; Validation; Methodology; Software; Formal analysis; Project administration; Data curation; Supervision; Resources; VisualizationYÜ: Conceptalizuation, editing.All authors reviewed the manuscript.

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Data availability

The datasets generated and examined in the present study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Approval for this study was granted by the Ankara University Faculty of Medicine Hospital on 10 June 2022, with the decision number E-32557014–604.01.02–543229. Written informed consent was obtained from all participants, and the study was planned and conducted according to the ethical principles outlined in the 1964 Declaration of Helsinki and its 2008 revision.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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