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Original Article

The clinical characteristics of 80 cases of acquired immunodeficiency syndrome-associated Kaposi's sarcoma in Xinjiang Autonomous Region and the effect of different treatments on the prognosis

Tongtong Yang[1], Li He[2], Xuefeng Wan[3], Wubuli Maimaitiaili[2], Yuxia Song[1], Yuexin Zhang[2], Xiaobo Lu[2]

[1]Department of Infectious Diseases, Sixth People's Hospital of Xinjiang, Urumqi, P. R. China; Departments of [2]Infectious Diseases, [3]Dermatology, The First Teaching Hospital of Xinjiang Medical University, Urumqi, P. R. China

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Abstract: To analyze the clinical features of AIDS-related Kaposi's sarcoma (AIDS-KS) patients in Xinjiang Autonomous Region and the impact of CD_4^+T lymphocyte count, highly active antiretroviral therapy (HAART) and systemic chemotherapy on the prognosis. The clinical information of 80 AIDS-KS patients admitted in Sixth People's Hospital of Xinjiang Autonomous Region from January 2008 to August 2014 was retrospectively reviewed. Population characteristics, extent of lesions, KS progress, CD_4^+T lymphocyte count, combined opportunistic infections, treatment and prognosis of these patients were analyzed. The 80 patients were divided into five groups according to treatment methods, including HAART, HAART + chemotherapy, chemotherapy + HAART, chemotherapy, and untreated groups. The efficacy and prognosis of the five groups were compared. Among the 80 patients, 74 (92.50%) patients were Uygur. The average age was 39.5±9.9 years and male-to-female ratio was 3:1. The median of baseline CD_4^+T lymphocyte count was 152.5 cells/μL and the interquartile was 233.25 cells/μL. CD_4^+T lymphocyte counts were significantly increased after treatment in HAART, HAART + chemotherapy, and chemotherapy + HAART groups ($P < 0.05$). CD_4^+T lymphocyte count in chemotherapy groups was significantly reduced after treatment ($P < 0.05$). The untreated group had the highest mortality rate (33.3%). In HAART group, KS-associated immune reconstitution inflammatory response syndrome (KS-IRIS) appeared in 45.5% cases and 2 death cases were caused by KS-IRIS. In Xinjiang Autonomous Region, the incidence of AIDS-KS is high in young Uygur male people. HAART followed by chemotherapy has ideal efficacy, reduces the incidence of KS-IRIS and improves the prognosis.

Keywords: Kaposi's sarcoma, acquired immunodeficiency syndrome, prognosis

Introduction

Xinjiang Autonomous Region is a region with high incidence of acquired immunodeficiency syndrome (AIDS), which is a spectrum of conditions caused by infection with human immunodeficiency virus (HIV) [1]. Kaposi's sarcoma (KS), which is characterized by abnormal angiogenesis and inflammation, is one of the commonest opportunistic tumors in AIDS patients. The incidence of KS in patients with HIV infection is 100 thousand times of that in healthy people [2]. In AIDS patients without proper treatments, the progression of KS is fast, the condition is serious, and the prognosis is bad, with a mortality rate of 40% [3]. In the present study, we investigate the clinical characteristics of AIDS-associated KS (AIDS-KS), as well as its influence on prognosis.

Materials and methods

Patients

A total of 80 patients with AIDS-KS admitted at No. 6 Hospital of Xinjiang Autonomous Region between January 2008 and August 2014 were included in the present study. Inclusion criteria were: 18-65 years old; HIV positive; confirmed KS by histopathology; non-pregnant or no breast-feeding; no severe mental diseases; no other uncontrolled opportunistic infections

Table 1. General information of AIDS-KS patients

Indicators	No. of cases	Percentage (%)
Age (years)		
< 35	33	41.2
35-55	39	48.8
> 55	8	10.0
Gender		
Male	60	75.0
Female	20	25.0
Marital status		
Married	56	70.0
Unmarried	9	11.3
Divorced	12	15.0
Widowed	3	3.7
Education		
Primary school and lower	31	38.8
High school	42	52.5
College and above	7	8.7
Ethnic groups		
Uygur	74	92.5
Han	3	3.8
Others	3	3.8
HIV infection route		
Sexual transmission	48	60.0
Drug abuse	32	40.0
Clinical stages		
I	13	16.3
II	14	17.5
III	15	18.7
IV	38	47.5
Progression of disease		
Fast	31	38.8
Slow	49	61.2

before treatment; HGB > 80 g/L, WBC > 3.0×10^9/L, NEUT > 0.75×10^9/L, PLT > 50×10^9/L, ALT < 4 ULN, TBIL < 2 ULN, Ccr < 1.5 ULN fourteen days before treatment; no other tests accepted; informed consent signed. Exclusion criteria were: misdiagnosis; unable to follow research requirements; withdrawal from the study on patients own request; lost contact. HIV infection was diagnosed by Western blotting according to national guidelines [4]. The diagnosis of KS followed the generally used standards [5]. All procedures were approved by the Ethics Committee of Sixth People's Hospital of Xinjiang. Written informed consents were obtained from all patients or their families.

Histopathological slicing

The samples were washed with flowing water for 30 min, followed by fixation using ethanol-formaldehyde for 60-120 min. Then, the samples were treated with 80% ethanol for 60-120 min, 95% ethanol for 60-120 min twice, and ethanol for 30-60 min thrice, followed by transparency with xylene for 20 min thrice. The samples were then soaked in wax at 45-50°C for 60 min, and at 56-58°C for 60 min twice. Subsequently, the samples were embedded in wax for slicing.

Hematoxylin and eosin staining

The samples were treated with xylene for 5-10 min twice, ethanol for 1-3 min twice, 95% ethanol for 1-3 min twice, 80% ethanol for 1 min, and distilled water for 1 min, followed by staining with hematoxylin for 5-10 min, washing with flowing water for 1 min, 1% HCl-ethanol for 1-3 min, washing with water for 10-15 min and 1-2 min. Then, the samples were stained using 0.5% eosin for 1-3 min, followed by washing with distilled water for 1-2 s, 80% ethanol for 1-2 s, 95% ethanol for 2-3 min twice, ethanol for 3-5 min for thrice, xylene for 3-5 min thrice. Finally the samples were mounted with neutral gum.

Staging of KS

The staging of AIDS-KS was according to Brambilla [6] staging system. In stage I, skin lesions occur is distal limbs. In stage II, skin lesions are widely distributed at distal limbs. In stage III, ulcers occur at multiple limbs. In stage IV, tumors metastasize to other organs. The progression of KS was classified as fast progression and slow progression, which was defined by the area of skin lesions within 3 months.

Treatment of KS

For highly active antiretroviral therapy (HAART), Zidovudine/Tenofovir + Lamivudine + Efavirenz/Kaletra treatment plan was used. For systemic chemotherapy, intravenous infusion of Adriamycin (40 mg/m^2), Bleomycin (15 mg/m^2), and Vincristine (2 mg/m^2) was performed for 3 treatments. Each treatment was composed of two infusions separated by two weeks. For patients with mild KS symptoms and no system involvement, HAART was performed first, fol-

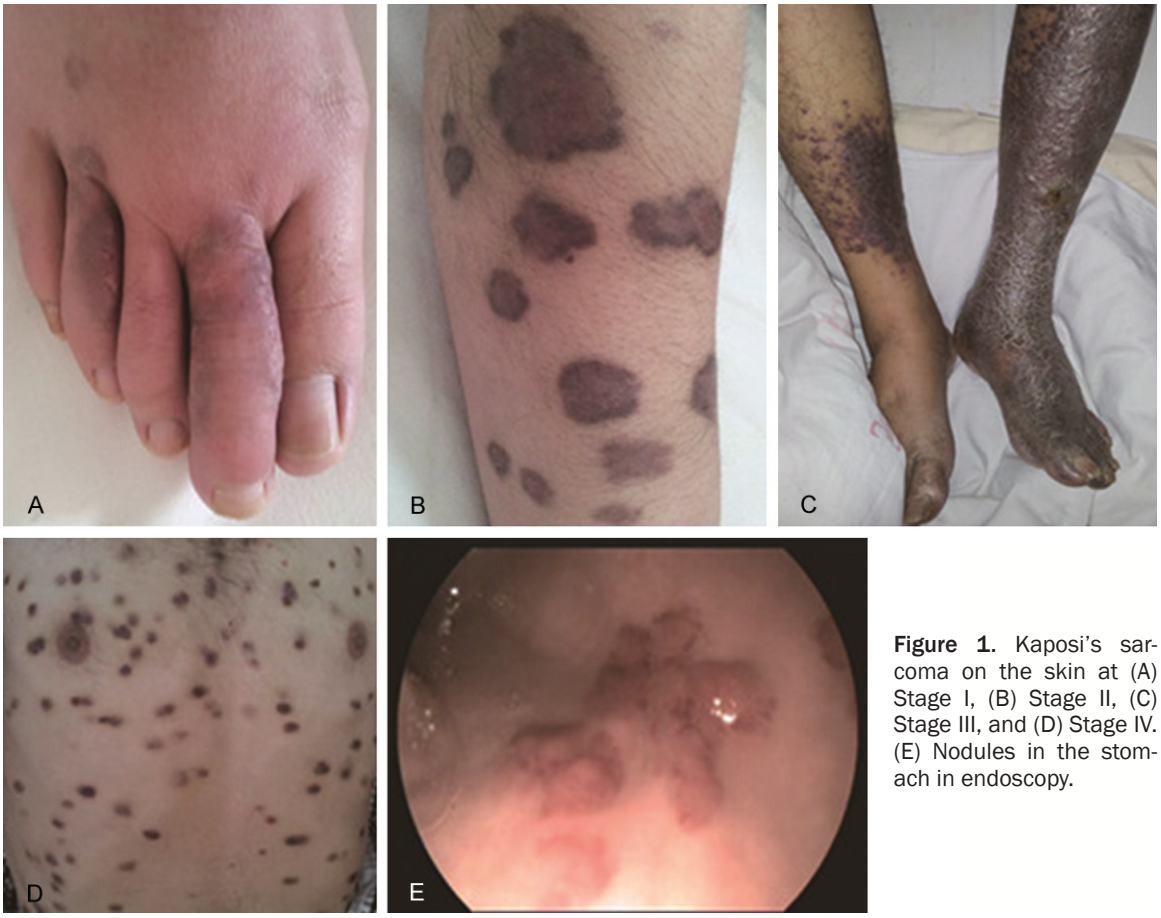

Figure 1. Kaposi's sarcoma on the skin at (A) Stage I, (B) Stage II, (C) Stage III, and (D) Stage IV. (E) Nodules in the stomach in endoscopy.

Table 2. KS focus distribution of AIDS-KS patients

Sites	No. of cases	Percentage (%)
Head and neck		
Head and face	47	58.8
Neck	17	21.3
Oral cavity	22	27.5
Eyes	6	7.5
Trunk		
Chest	38	47.5
Abdomen	19	27.1
Back	42	52.5
Perineum	3	3.8
Four limbs		
Upper limbs	43	53.8
Lower limbs	57	71.3
Hands	9	11.3
Feet	25	31.3
Internal organs		
Stomach and intestines	9	11.3
Lungs	3	3.8
Liver	4	5.0
Kidney	2	2.5

lowed by systemic chemotherapy when necessary. For patients with severe KS symptoms or combined system involvement, systemic chemotherapy was performed first, and HAART was initiated accordingly. Some patients did not have HAART or systemic chemotherapy due to bad disease conditions or compliance.

Evaluation of KS treatment effectiveness

To evaluate the effectiveness of KS treatment, complete alleviation, partial alleviation, and no response were used [7]. For complete alleviation, skin lesions totally disappear. For partial alleviation, areas of lesions are reduced to less than 50%. For no response, areas of lesions are reduced no more than 50%.

Statistical analysis

All data were analyzed using SPSS 17.0 (IBM, Armonk, NY, USA). Measurement data with normal distribution were expressed as means ± standard deviations, and compared using t test. Measurement data with skewed distribution were given by median (*M*) and interquartile

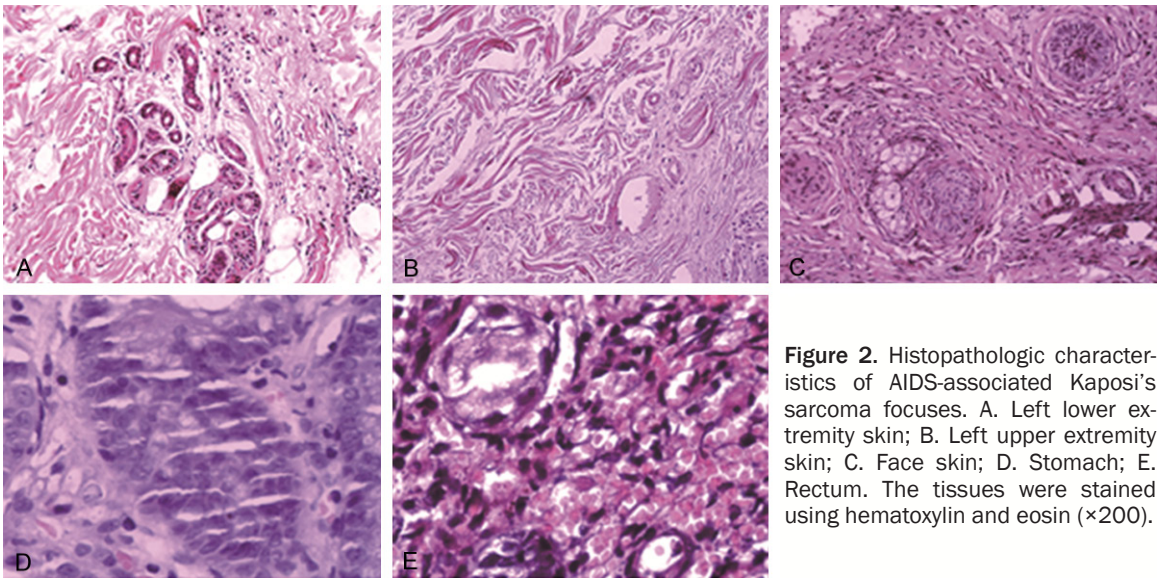

Figure 2. Histopathologic characteristics of AIDS-associated Kaposi's sarcoma focuses. A. Left lower extremity skin; B. Left upper extremity skin; C. Face skin; D. Stomach; E. Rectum. The tissues were stained using hematoxylin and eosin (×200).

Table 3. Occurrence of opportunistic infections in AIDS-KS patients

Opportunistic infections	No. of cases	Percentage (%)
Mycobacterium tuberculosis infection	32	40.0
Bacterial pneumonia	24	30.0
Fungal pneumonia	9	11.3
Pneumocystis pneumonia	8	10.0
Esophageal candidiasis	4	5.0
HIV encephalopathy	4	5.0
Shingles	4	5.0
Cytomegalovirus retinitis	4	5.0
Progressive multifocal leukoencephalopathy	1	1.3
Lymphoma	1	1.3
Toxoplasma encephalopathy	1	1.3
Cryptococcal meningitis	1	1.3

(Q_R), and compared using rank sum test. Count data were expressed as frequency and rate, and compared using χ^2 test. Differences with $P < 0.05$ were considered statistically significant.

Results

General clinical characteristics of AIDS-KS patients

To learn the general clinical information of patients, we recorded gender, age, ethnic group, HIV infection route, education, and KS focus site of all 80 patients. The data showed that the ages of the patients ranged between 28 and 76 years, with an average of 39.5±9.9 years. The male to female ratio was 3:1, the number of married patients was 56, and the number of patients with education history of high school or lower was 73. Among all patients, Uygur accounted for 92.5% (74 cases). The main route of HIV infection was sexual contact (48 cases, 60.0%), including 13 cases of marital sexual transmission and 35 cases of drug syringe transmission. Regarding disease history, 4 cases had fathers with esophageal cancer, while one case among these four also had mother with lung cancer. Among the 80 patients, 31 cases had fast disease progression. The numbers of patients at clinical stages I, II, III and IV were 13, 14, 15 and 38 (**Table 1**). These results indicate that AIDS-KS commonly occurs in poorly educated young and middle-aged Uygur males who were infected via sexual contact or intravenous injection of drugs.

Clinical manifestation of KS and the distribution of KS focuses

To study the clinical manifestation of KS and the distribution of KS focuses, visual inspection was performed. The clinical manifestation of KS mainly included plaques (27 cases, 33.8%), nodules (51 cases, 63.8%, local swelling (52 cases, 65.0%), pigmentation (20 cases, 25.0%), pain (35 cases, 43.8%), ulcers (7 cases, 8.8%),

Table 4. Occurrence of complications in AIDS-KS patients

Complications	No. of cases	Percentage (%)
Hepatitis C	34	42.5
Syphilis	12	15.0
Hepatitis B	4	5.0
Stomach duodenal ulcer	3	3.8
Chronic enteritis	3	3.8
Cholecystitis	3	3.8
Gallstones	2	2.5
Genital warts	2	2.5
Intestinal obstruction	2	2.5
Diabetes	2	2.5
Hypothyroidism	2	2.5
Ulcerative colitis	1	1.3
Gastric cancer	1	1.3
Kidney stones	1	1.3
Psoriasis	1	1.3
Hydronephrosis	1	1.3
Hepatitis B cirrhosis	1	1.3

bleeding (3 cases, 3.8%), itching (13 cases, 16.3%), and dysphagia (1 case, 1.3%) (**Figure 1**). Among the 80 patients, 31 cases had focuses in all of head, neck, trunk, and limbs; 13 cases had focuses only in internal organs; and 5 cases had focuses only in limbs and trunk. In addition, 25 cases had mucosal involvement, and 17 cases had lymph node involvement (**Table 2**). These results suggest that the clinical manifestations of AIDS-KS are mainly plaques, nodules, swelling, pain, and pigmentation, being accompanied with ulcers, bleeding, itching, or swallowing difficulties.

Laboratory examinations

To measure the biochemical indicators of patients, laboratory examinations were performed. Before treatment, the average white blood cell count of the 80 patients was $5.5\pm3.2\times10^9$/L, lymphocyte percentage was 0.29±0.123, the percentage of neutrophils was 0.57±0.157, hemoglobin content was 106.3±23.1 g/L, and platelet count was $181.4\pm71.3\times10^9$/L. The median of baseline CD4 + T lymphocyte count was 152.5 cells/μL, and the interquartile was 233.5 cells/μL. The number of patients with CD4 + T lymphocyte count < 200 cells/μL was 47, and the number of patients with CD_4^+T lymphocyte count > 350 cells/μL was 18. For the 31 patients with fast progression, the median of baseline CD_4^+T lymphocyte count was 150.0 cells/μL, and the interquartile was 225.0 cells/μL, being statistically insignificant from those in patients with slow progression, whose median of baseline CD_4^+T lymphocyte count was 156.0 cells/μL and interquartile was 229.5 cells/μL ($Z = -0.538$, $P > 0.05$). Among the 80 patients, 12 cases had HIV RNA levels being lower than lower detection limit, while the median of HIV RNA levels of other patients was 6.38×10^5 copies/mL, and the interquartile was 2.76×10^6 copies/mL. Among all patients, 36 were diagnosed to have KS according to biopsy pathological examinations (**Figure 2**). These results indicate that AIDS-KS patients usually have mild anemia, CD_4^+T lymphocyte count lower than 200/μL, and detection of RNA of HIV.

Most KS patients tend to have opportunistic infections or complications

To determine the possibility of KS patients to have opportunistic infections and complications, the percentage of patients with opportunistic infections and complications was calculated. Common opportunistic infections included Mycobacterium tuberculosis infection (40.0%), bacterial pneumonia (30.0%), fungal pneumonia (11.3%), and pneumocystis pneumonia (10.0%) (**Table 3**). KS patients with combined lung infections accounted for 91.3%, in which combined hepatitis C virus infection and combined syphilis infection accounted for 42.5% and 15.0%, respectively (**Table 4**). The results suggest that most KS patients tend to have opportunistic infections or complications.

Treatment with HAART, chemotherapy or the combination of both is effective in reducing death rate of KS

To investigate the therapeutic effects of HAART and chemotherapy, or the successive combination of both, 23 cases only received HAART, 21 cases received HAART and then chemotherapy, 12 cases received chemotherapy and then HAART, 6 cases only received chemotherapy, and 18 cases received neither of the treatments. Ten out of 23 patients (43.5%) in HAART group had immune reconstitution inflammatory response syndrome (IRIS) and aggravated KS symptoms after treatment. In addition, comparison of CD_4^+T lymphocyte counts before and

Table 5. CD_4^+T lymphocyte counts in different groups of patients before and after treatment (means ± standard deviation)

Groups	No. of cases	CD_4^+T lymphocyte count (No./μL)		Statistics	*P* value
		Before treatment	After treatment		
HAART	20#	137.2±109.1	225.9±113.6	-3.599	< 0.05
HAAR + Chemotherapy	21	171.3±121.1	302.4±235.4	-4.292	< 0.05
Chemotherapy + HAART*	11#	276.6±205.5	465.7±407.4	-2.351	< 0.05
Chemotherapy	6	369.8±196.4	256.5±159.9	3.624	< 0.05
Untreated	8#	207.3±156.2	187.6±165.1#	-1.260	< 0.05

Note: *expressed as M (Q_R); #CD_4^+T lymphocyte count at half year. #patients who were dead or lost contact were not included. HAART, highly active antiretroviral therapy.

Table 6. Therapeutic outcome of AIDS-KS patients in different groups

Groups	No. of cases	Completely alleviated (%)	Partially alleviated (%)	No effect	KS treatment efficiency
HAART	20	15 (75.0%)	2 (10%)	3	17/20 (85%)
HAART + Chemotherapy	21	20 (95.24%)	1 (4.76%)	0	21/21 (100%)#
Chemotherapy + HAART	11	10 (90.90%)	1 (9.09%)	0	11/11 (100%)#
Chemotherapy	6	6 (100%)	0	0	6/6 (100%)#
Untreated*	8	0	1	7	

Note: *excluding 8 dead patients and 6 patients with lost contact. #, P < 0.05 compared with HAART group.

after treatment showed that CD_4^+T lymphocyte counts were significantly altered before and after treatment (**Table 5**). After half a year of treatment, the therapeutic effects were evaluated. The effectiveness for HAART + chemotherapy, chemotherapy + HAART and chemotherapy was 100%, while that for HAART was 85.0%. Among the 80 patients, 8 died, including 3 deaths caused by KS. Among the 8 dead patients, 7 had CD_4^+T lymphocyte counts lower than 200/μL, 3 had internal organ involvement, and all 8 cases had fast progression (**Table 6**). In HAART group, 2 cases died of KS-related immune reconstitution inflammatory response syndrome, and 1 case died of the combination of tuberculosis and bacterial pneumonia. In chemotherapy + HAART group, 1 case died of severe tuberculosis caused by cease of HAART drugs after 5 months of treatment. In untreated group, 2 cases died of severe pneumonia, 1 case died of KS deterioration, and 1 case died of the combination of blood disseminated tuberculosis and tuberculous meningitis. The total death rate in all treatment groups was 6.5% (4 out of 62), being significantly different from that in untreated group (33.3%, 4/12) (χ^2 = 6.296, P < 0.05). These results indicate that treatment with HAART, chemotherapy or the combination of both is effective in reducing death rate of KS.

Discussion

The occurrence of KS is usually dependent on regions and ethnic groups. In Europe and USA, the incidence of KS in gays is higher than that in lesbians, but in China KS mainly occurs in minority ethnic groups, such as Uygur and Kazakh [8, 9]. Stolka et al. showed that risk factors for KS among HIV-positive individuals included KSHV seropositivity, non-use of a mosquito bed net, minority ethnicity, treatment from a traditional healer, history of transfusion, and family history of cancer [10]. The present study shows that AIDS-KS mainly affects males in Xinjiang Autonomous Region, with Uygur patients accounting for 92.5% of all patients. The HIV infection route for these patients is mainly sexual transmission (60.0%). Another report shows that the main infection route for Han patients with KS is also sexual transmission [11]. KS occurs at any stage of HIV infection and any locations, affecting mucosa of the skin, and internal organs [12]. As CD_4 T-cell count further decreases, the incidence of AIDS-KS tends to increase, leading to the increase in its prevalence [13]. Cloarec et al. found that KS in HAART era occurs regardless of the level of immune restoration and it can be associated to immunosenescence in some cases, although other mechanisms may promote atypical KS

[14]. In the present study, most KS focuses occur in head and neck, trunk, and limbs, with head and face accounting for 58.8%, internal organ involvement accounting for 18.7%, and gastrointestinal involvement accounting for 15.0%. Blood tests show mild anemia but normal levels of white blood cells and platelets. The baseline CD_4^+T lymphocyte count in patients with fast progression is not significantly different from that in patients with slow progression, indicating that baseline CD_4^+T lymphocyte count is not significantly correlated to KS progression speed. A study by Maimaitiaili et al. shows that opportunistic infections and complications are mainly tuberculosis infection (15 cases, 37.5%) and hepatitis C virus infection (20 cases, 50.0%) [15]. In the present study, Mycobacterium tuberculosis infection accounts for the majority of opportunistic infections and complications (40.0%), and 42.5% of all patients have combined hepatitis C virus infection, being consistent with tuberculosis and hepatitis C virus infection rates in HIV/AIDS population in Xinjiang Autonomous Region [15]. Combined hepatitis C virus infection may be caused by intravenous drug intake by syringes. In addition, 15.0% patients have combined syphilis infection, which may be connected to sexual transmission.

There is no standardized treatment plan for KS by now. Clinically, tumor sites, lesion extent, related symptoms, opportunistic infections and systemic immune status should be considered. For KS in early stage and at slow progression, HAART should be performed first, and then tumor changes should be monitored. A study shows that KS can be alleviated after HAART [16]. However, timely systemic chemotherapy is necessary for patients with fast progression or involvement of key internal organs. Lin et al. show that, for AIDS-KS patients who were treated with ineffective HAART, 93.7% have alleviated KS symptoms, and 89.8% have increased CD_4^+T lymphocyte count after chemotherapy [17]. A study by Mosam et al. shows that the response rate after treatment with HAART combined with systemic ABV chemotherapy (66%) is higher than that after treatment with only HAART (39%) [18]. In the present study, treatment effectiveness for KS in each treatment group is satisfactory, with the overall death rate in all treatment groups being significantly lower than that in untreated group (6.5%, 4/62). Of note, post-treatment CD_4^+T lymphocyte counts in HAART, HAART + chemotherapy and chemotherapy + HAART groups were significantly higher than those before treatment, while those in chemotherapy and untreated groups were reduced after treatment, suggesting that starting HAART first is effective in increasing CD_4^+T lymphocyte counts and improving cellular immune functions. Of note, KS-associated IRIS (KS-IRIS) usually occurs in the first 3 months after HAART, leading to the fast progression of KS. In this case, HAART should be immediately stopped, followed by the initiation of systemic chemotherapy [19]. Increase in CD_4^+T lymphocyte count and decrease in HIV viral load are the two prerequisites for the occurrence of KS-IRIS. Speicher et al. reported a case of KS-IRIS in which KS focus appeared on week 8 after HAART, ART was maintained and treatment with PLD was commenced. The patient responded well to PLD, but the disease relapsed a year later. However, after further PLD, the patient remained well for the following 5 years [20]. In the present study, 10 cases (43.5%) in HAART group had KS-IRIS, and two of these patients died of KS-IRIS. Leidner et al. studied 19 cases of KS-IRIS and showed that 4 out of 6 deaths were related to KS-IRIS [21]. Stover et al. reported a case of death caused by KS-IRIS, in which the patient had severe breathing difficulties and skin damages after HAART [22]. This report suggests that lethal KS-IRIS may occur after HAART. A study by Letang et al. shows that the morbidity and mortality of KS-IRIS in Sub-Saharan Africa are higher than those in the UK, probably due to the unavailability of chemotherapy in Sub-Saharan Africa. Lu et al. suggest that KS-IRIS should be considered in HIV-infected patients with pre-existing KS who had clinical worsening of dermatologic and pulmonary lesions after the initiation of cARTT [23]. The present study indicates that the combination of HAART and systemic chemotherapy can reduce the morbidity and mortality of KS-IRIS. In addition, analysis of the 8 deaths in the present study shows that 7 cases had CD_4^+T lymphocyte count < 200/μL before treatment, 3 had combined internal organ involvement before treatment, and all of these patients had fast progression of KS. The observation suggests that low CD_4^+T lymphocyte count, combined internal organ involvement and fast KS progression may be the influencing factors for the prognosis of AIDS-KS patients. In conclusion, early diagnosis and timely treatment are important for the survival of AIDS-KS patients, and systematic evaluation of the conditions of AIDS-KS patients before treatment should be performed.

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Disclosure of conflict of interest

None.

Address correspondence to: Dr. Xiaobo Lu, Department of Infectious Diseases, The First Teaching Hospital of Xinjiang Medical University, No. 137 South Liyushan Road, Urumqi, Xinjiang Autonomous Region, P. R. China. Tel: 86-991-4362823; Fax: 86-991-4324139; E-mail: qmxiaobo@aliyun.com

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