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ORIGINAL ARTICLE

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Kikuchi–Fujimoto Disease: analysis of 244 cases

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Abstract Kikuchi–Fujimoto Disease (KFD) was first described in Japan in 1972. The disease frequently mimics tuberculous lymphadenitis, malign lymphoma, and many other benign and malignant conditions. To our knowledge, there is no previous study comparing the clinical and laboratory characteristics of patients from different geographical parts of the world. We searched literature records beginning from 1991 and analyzed epidemiological, clinical, and laboratory data of 244 patients (including cases diagnosed in our institution) reported in 181 publications. Of the 244 cases, 33% were male and 77% were female. Mean age was 25 (1–64) and 70% was younger than 30. Most of the cases were reported from Taiwan (36%), USA (6.6%), and Spain (6.3%). Fever (35%), fatigue (7%) and joint pain (7%) were the most frequent symptoms, while lymphadenomegaly (100%), erythematous rashes (10%), arthritis (5%), hepatosplenomegaly (3%), leucopenia (43%), high erythrocyte sedimentation rate (40%), and anemia (23%) being the most common findings. KFD was associated with SLE (32 cases), non-infectious inflammatory diseases (24 cases), and viral infections (17 cases). SLE was more frequent in cases from Asia than Europe (28 and 9%, respectively). The disease was self-limiting in 156 (64%) and corticosteroid treatment was necessary in 16 (16%) of the cases. The mortality rate was 2.1%. Early diagnosis is crucial as the clinical and laboratory presentation generally imitates situations needing lengthy and costly diagnostic and therapeutic interventions. Additionally, association with SLE needs further investigation.

Keywords Fujimoto · Histiocytic lymphadenitis · Kikuchi

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Introduction

Kikuchi–Fujimoto Disease (KFD) or histiocytic necrotizing lymphadenitis is known to be a benign, generally self-limiting condition, which usually affects female patients under the age of 30 years. Most of the cases improve within a six-month period. The disease frequently mimics tuberculous lymphadenitis, malignant lymphoma, and some other benign and/or malignant diseases in terms of clinical and laboratory presentation. KFD was first described in Japan in 1972. Our knowledge about KFD is mostly based on case reports. The aetiology is unknown, although a viral or autoimmune pathogenesis, notably with systemic lupus erythematosus (SLE), has been suggested. It presents most often with cervical lymphadenopathy, which may be painful and can be accompanied by fever and upper respiratory tract symptoms. Unilateral involvement of the posterior cervical group is the commonest picture. Less common manifestations include fever, axillary and mesenteric lymphadenopathy, splenomegaly, parotid gland enlargement, cutaneous rash, arthralgias, myalgias, aseptic meningitis, bone marrow haemophagocytosis, and interstitial lung disease. The cutaneous lesions include erythematous macules, papules, plaques, and nodules. Laboratory investigations are usually unremarkable except for elevated erythrocyte sedimentation rate (ESR), mild neutropenia, and lymphocytosis in some cases [1–5].

A pathologist, rather than a clinician, usually diagnoses KFD. Morphologically, it is characterized by a necrotizing lymphadenitis associated with karyorrhexis and by paucity, or more commonly, an absence of granulocytes. Open biopsy is the only reliable way to establish the diagnosis, but according to some authors, fine-needle biopsy may also be helpful [6].

We have gathered most of our knowledge of KFD from previous case reports. Unfortunately, we don't have enough information about the clinical presentation, course, and laboratory findings. Yu et al. had reported a series of 58 patients (37 female/21 male). He pointed out that painful cervical lymphadenopathy, sore throat, fever, non-productive cough, fatigue, and weight loss were common clinical findings, and leucopenia, high erythrocyte sedimentation rate, elevated transaminases, and anemia were common laboratory abnormalities in this series in which 93% of the patients were still alive [3]. Although most of the cases were reported from Far-East countries, regional distribution on the world is not well known. We assessed the KFD cases in terms of epidemiological, clinical, and laboratory characteristics, and comorbid conditions, treatment strategies and clinical outcomes were analyzed as well.

Materials and methods

KFD cases published in English and available in the internet from January 1991 to June 2005 were analyzed in this study. We searched the disease in the records of Pubmed using the key words " Kikuchi", "Fujimoto", "Disease", "Case" and "Report". In this way, we found 181 reports; but three of them, which had not conveyed satisfactory and/or reliable information, were not included in this analysis. Full texts of the reports were obtained and geographical distribution, country, age, gender, year of diagnosis, symptoms, findings of physical examination, localization of lymphadenopathy, laboratory findings, comorbid diseases, and treatment choices were recorded.

Statistical analysis was done using Statistical Package for the Social Sciences (SPSS) 10.0 for Windows (SPSS, Chicago, IL, USA).

Results

Since 1991, 330 KFD cases had been reported in Pubmed. Of these, 33% was male and 77% was female. Mean age was 25 (1–64), and 70% was younger than 30 years.

If we look at the countries where the patients were reported from, Taiwan (119, 36%), USA (22, 6.6%), and Spain (21, 6.3%) are on top of the list. Table 1 shows the distribution of cases in terms of country. Geographically, most of the cases were reported from East Asia and the Far-East (166 cases, 50%). Europe (91 cases, 27%) and America (22 cases, 7%) followed this region in numbers.

The most common symptoms were fatigue and joint pain. Erythematous rash, arthritis, and hepatosplenomegaly are second to lymphadenopathy in frequency with physical examination (Table 2). Cervical lymphadenomegaly was present in 79% of the cases, cervical and axillary involvement together were present in 8%, axillary as a single site in 5%, and generalized lymphadenomegaly in 5%. Inguinal, mesenteric, and cutaneous lymphnode involvements were relatively rare. Laboratory wise, leucopenia (43%), increased erythrocyte sedimentation rate (40%), and anemia were the most common findings (Table 3). In our analysis group, most of the cases self-improved without any treatment (64%), and 39 (16%) patients had corticosteroid treatment. Seven of them had pulse steroid treatment and the others received 1 mg/kg oral methylprednisolone. The remaining 44 patients (18%) had various treatments (antibiotics, paracetamol, non-steroidal anti-inflammatory drugs, immunoglobulins, methotrexate, hydroxychlorin, cyclosporin, cyclophosphamide, azothioprine, etc.) as either monotherapy or combination therapy. Seven of all patients had died (five female and two male), ending up with a mortality rate of 2.1%.

When accompanying diseases were considered, 32 patients had SLE, 24 had non-infectious inflammatory diseases, and 17 had various viral diseases (Table 4). Antinuclear antibody (ANA) positivity rate and association with SLE were significantly high in cases from East Asia and the Far-East compared to cases from Europe. (Table 5). There was no difference between geographical regions in

Table 1 Distribution of cases in terms of country

Country	Number of cases	Country	Number of cases
Taiwan	119 [3, 5]	Greece	9
USA	22	Germany	8
Spain	21	Saudi Arabia	7
UK	19	Brazil	6
Japan	17	Nepal	6
Italy	15	Turkey	5 [7] and ([a])
India	15	Other 28 countries	32
Korea	15 [4]	Total	330
France	14		

([a]) Solmazgul E, Demirel F, Kaplan M, Tuncel T, Yıldırım S, Kucukardali Y. KiKuchi Fujimoto Disease: presentation of 3 cases. 7th congress on internal medicine, Antalya, 16–20 September 2005

Table 2 Frequency of symptoms and physical examination findings

Symptoms (n=224)	Count of patients (%)	Physical examination findings (n=224)	Count of patients (%)
Fever	78 (35)	Lymphadenomegaly	224 (100)
Fatigue	15 (7)	Erythematous rashes	22 (10)
Joint pain	14 (7)	Arthritis	12 (5)
Rashes	10 (5)	Hepatomegaly	7 (3)
Weight loss	9 (5)	Splenomegaly	5 (2)
Loss of appetite	7 (3)	Xerophthalmia	4 (2)
Sweating	6 (3)	Aphthous lesions	2 (1)
Muscle ache	4 (2)		

Table 3 Laboratory characteristics of the cases

Parameter (n=244)	Number of patients (%)	Parameter (n=244)	Number of patients (%)
Leucopenia	43 (18)	Increased LDH	15 (6)
High sedimentation rate	40 (16)	Viral serology positivity	13 (5.3)
Anemia	23 (9)	Thrombocytopenia	10 (4)
High AST, ALT levels	19 (8)	Other serological abnormalities	8 (3)
ANA positivity	18 (7)	Leucocytosis	5 (2)

terms of symptoms, physical examination findings, and affected organs The number of patients from USA was limited, compared to the rest of the world, and brought together a non-negligible possibility that some of the cases could be from Asia in origins. Therefore, we just compared the cases from Europe with patients from East Asia and the Far-East.

As to the three cases (two male and one female patients 18, 20, and 24 years old, respectively) diagnosed in our institution, long-lasting insistent fever and lymphadenopathy were the most prominent clinical findings. The first patient had applied with fever, bilateral tender axillary lymphadenopathy, cutaneous rash, high erythrocyte sedimentation rate, increased serum LDH, anemia and leucopenia. The second case was under treatment for tuberculous lymphadenitis for 2 months without either clinical or laboratory improvement and repeated cervical lymph node biopsy suggested KFD and after 1 month of corticosteroid treatment, the patient improved substantially. In our third case, the disease had manifested with fever, weight loss, cervical lymphadenopathy, anemia, increased erythrocyte sedimentation rate, and elevated transaminases. Diagnosis was established with cervical lymph node biopsy and the patient improved within 3 months under corticosteroid treatment. ANA was negative and no evidence suggesting SLE existed in our three cases (Solmazgul E, Demirel F, Kaplan M, Tuncel T, Yıldırım S, Kucukardali Y. KiKuchi Fujimoto Disease: presentation of three cases. 7th National Congress on Internal Medicine, 16–20 September, 2005 Antalya) [7].

Table 4 Co-morbid diseases (n=244)

Co-morbid diseases	Counts of patients (%)
Systemic lupus erythematosus	32 (13)
Other non-infectious inflammatory diseases[a]	24 (10)
Viral diseases[b]	17 (7)
Fever of unknown origin	11 (5)
Neurological involvement[c]	11 (5)
Hemaphagocytic syndrome	7 (3)
Lymphoma	6 (3)
Tuberculosis	5 (2)
Others	13 (5)
Total	126 (51)

[a]Arthritis, mixt connective tissue disease, anti-phospholipid syndrome, thyroiditis, polymyositis, scleroderma, autoimmune hepatitis, Still's disease
[b]HHV6, EBV, CMV, HBV, HCV, HIV, AIDS, ParvoV19, HSV-1, Dengue V
[c]Aseptic meningitis, mononeuritis multiplex, hemiparezi, brachial neuritis, photophobia

Table 5 Comparison of European cases and cases from East Asia and the Far-east with respect to ANA positivity and association with SLE

	East Asia and Far-east (n=64)	Europe (n=91)	P value
ANA positivity	15 (2%3)	3 (3%)	0.00017 (chi-square)
SLE association	18 (28%)	8 (9%)	0.000214 (chi-square)

Discussion

As described in the results section, the disease has a course of non-specific signs, symptoms, and laboratory findings. However, a female patient under the age of 30, presenting with fever, lymphadenopathy, cutaneous eruptions, high sedimentation rate, and elevated transaminases should be suspected for KFD and histopathological evaluation should not be delayed.

Although the differential diagnosis may include several non-neoplastic conditions such as systemic lupus erythematosus, toxoplasmic lymphadenitis, infectious mononucleosis and cat-scratch disease, the main diagnostic problem encountered by the referring histopathologist is to distinguish Kikuchi disease from non-Hodgkin's lymphoma [8]. Some patients may also have hepatosplenomegaly. Liver biopsy reveals reactive changes and hepatic enzymes revert to normal within 1 month in most patients.

Some patients have many clinical manifestations of systemic lupus erythematosus: generalized lymphadenopathy, erythematous skin lesions, unexplained fever, arthralgia, and weight loss. Nevertheless, the diagnosis is not confirmed by the absence of auto-antibodies, anti-native DNA antibodies, which are relatively specific for the diagnosis of systemic lupus erythematosus. In fact, the relation between Kikuchi's disease and SLE is not yet completely understood and remains complex. Earlier reports imply that SLE may be present before, at the same time, or after the clinical appearance of KFD. In fact, SLE patients may develop a lymphadenopathy that is clinically and histologically similar to KFD. In our analysis, 32 cases were associated with SLE. Of these, 18 (56%) had both KFD and SLE together, six (19%) had SLE later, four (12%) had a previous diagnosis of SLE, and four (12%) did not meet enough criteria for the definition of SLE and were accepted as incomplete SLE.

Some kind of viral or postviral etiology has been proposed, and the relation of the disease with several infectious agents has been investigated. These agents include Epstein–Barr virus, cytomegalovirus, varicella-zoster virus, human herpesvirus-6, human immunodeficiency virus, *Yersinia enterocolitica*, and Toxoplasma [1, 9–11]. However, no convincing causal relation between these infections and Kikuchi's disease has been shown yet. In a study by Dominguez, 42 KFD patients were tested for HHV6 serology and 32 (76%) of them showed highly positive titration. The specimens obtained from lymphoid tissue, were found to be positive for HHV6, by the methods of PCR and in situ hybridization in ten (24%) and four (9%) of the cases, respectively [12]. In another study, lymphoid tissues from 34 KFD patients were examined with molecular techniques, and association with infectious mononucleosis was found in two patients, but no relation with HHV could be shown in any patients [13].

It has been reported that a cutaneous involvement had been observed in 30% of patients with Kikuchi's disease [14]. In our analysis, 22 of the cases had cutaneous, mostly erythematous, lesions. Histopathological examination of skin usually revealed leucocytoclastic vasculitis (LCV). LCV may be the presenting sign in many different clinical disorders, or it can be idiopathic. All patients must be screened for underlying causes, including drugs, infections, systemic autoimmume diseases, or neoplasms. Initially, the pathogenesis of LCV is immune-complex-related, but in its later stages different pathogenetic mechanisms may intensify the reaction and lymphocytes may predominate in the infiltrate. Cutaneous involvement of the disease may be in a different pattern like an angiocentric infiltration by mononuclear cells among which plasmacytoid cells and karyorrhexis are seen as described by Letawe [15]. The skin lesions may be maculopapular, in rubella form, a drug eruption, urticaria, or disseminated erythema. However, none of these lesions is pathognomonic [14].

Occasionally, the disease may progress to a mortal state. A female patient was reported to die of abrupt heart failure, which was partly attributable to autoimmune complications (hemolytic anemia, leucopenia, thrombocytopenia) despite vigorous immunosuppressive treatment [16]. Another patient died of pulmonary hemorrhage, and the only etiological factor that could be shown upon postmortem examination was KFD [17]. Meanwhile, a 24-year-old pregnant woman (29 weeks of gestation) died because of coagulopathy and multiorgan failure, which was a consequence of KFD-triggered hemaphagocytic syndrome [18]. Another 41-year-old female had KFD associated with polymyositis affecting the lungs and could not survive despite intense immunosuppressive treatment [19]. Post-transplantation development of KFD is also an interesting issue. Tsai et al. reported three cases who developed the disease after transplantation and died of respiratory failure probably because of a reason other than KFD [20].

In general, affected lymph nodes are less than 3 cm in diameter but rarely may reach 5–6 cm. Macroscopically the necrosis can be noticed [2, 9, 21–24]. Characteristic histopathological findings of KFD are: erosion of the lymphoid tissue; well-defined patchy foci of fibrinoid necrosis; signet-ring and crescent shaped histiocytes with foamy cytoplasm around the necrotic tissue; karyorrhectic and apoptotic debris of a variety of cells (histiocytes, plasmacytes, immunoblasts, small and/or giant lymphocytes). Interestingly, there is no neutrophilic or eosinophilic reaction against necrosis. Some authors suggest that histiocytic proliferation (which is a composition of plasmocytoid monocytes, small lymphocytes, activated T lymphocytes and plasma cells, without granulomatous inflammation) is more characteristic than necrosis alone [25, 26].

Other organs like skin and bone marrow may show similar histopathological features as lymph nodes. Entities like, lymph node infarction, SLE, tuberculosis, and malign lymphoma, which may have necrotising lymphadenopathy in the clinical course, must be considered for the differential diagnosis. Some of these diseases are malign and some benign, but all are in need of different therapeutic approach. In case of lymph node infarction, there is ischemic necrosis but not apoptotic debris. In lupus lymphadenitis, hematoxylene bodies and vasculitis may help to differentiate. Epitheloid histiocytes, giant cells, and formation of granulomas are characteristic of tuberculosis, histoplasmosis, lepra, and cat-scratch disease. Perivascular plasmacyte infiltration is seen in syphilis, while eosinophils in *Yersinia* and neutrophils in bacterial infections are predominant in affected areas. Decreased lymphocyte count, hemaphagocytic histiocytes and serological tests are helpful in the diagnosis of EBV infection. Necrotic sites consist of abundant eosinophils and plasmacytes in allergic reactions. Necrosis is quite wide and surrounded by atypical lymphocytes in lymphomas [25]. Sometimes plasmacytoid monocytes may fill in the sinuses, mimicking mononuclear infiltration, and misdiagnosed as malign lymphoma. This confusion may be avoided simply by looking for other morphological features of lymphoma [25].

Although a proportion of cases were misdiagnosed as Hodgkin's disease, absence of Reed–Sternberg cells and the lack of the characteristic background cell population should have excluded this possibility. Immunophenotypical traits are also useful to differentiate lymphoma from KFD. Lymphoid component is predominantly made up of CD3 (+) mature T cells. CD4 and CD8 positivity is variable and, rarely, CD56 positivity may exist. Apoptosis rate is very high among lymphocytes and histiocytes. CD30 and CD45 are positive, but CD15 is negative in immunoblasts. The ratio of CD20 (+) B lymphocytes are very low. Histiocytes express CD11b and CD68 (KP1). Plasmacytoid monocytes are positively stained with histiocyte markers and CD10 but negatively stained with myeloperoxidase. S-100 protein stains paracortical dentritic cells. Proliferation markers (Ki-67) are positive in activated lymphoid foci and negative in histiocytes and plasma cells [9, 21, 24, 27].

Apparently, most of the cases were reported from Far-East countries, but there exist reports from other regions of the world. Europe is second in numbers. To our knowledge, there is no previous study comparing the clinical and laboratory characteristics of patients from different geo-

graphical parts of the world. In our analysis, we compared cases from Europe with cases from Asia and the Far-east in terms of symptoms, physical examination findings, laboratory findings, localization of lymphadenopathy, and comorbid diseases. We could not find major differences between groups, except for ANA positivity and SLE association rates, as described above, which is an issue that encourages further investigation. It is also noteworthy that adult-onset Still's disease, which has some similarities with KFD in clinical presentation, has been reported as a comorbid condition in some cases. Lymphadenopathy (60%), fever (95%), rashes (88%), arthralgia (99%), increased erythrocyte sedimentation rate (99%), elevated transaminase levels (73%), hepatomegaly (40%), and anemia (68%) are frequent in Still's disease, as it is in KFD, and the relation of these two diseases needs to be defined [28].

From the results of our analysis we conclude that symptoms of the disease can be very distressing to the patient, especially the lingering fever and fatigue, and early recognition is essential as the clinical features can resemble diseases like tuberculous lymphadenitis or malignant lymphoma, and the diagnosis will minimize potentially harmful and unnecessary evaluations and treatments.

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