Kimura Disease: A Detailed Analysis of Clinical and Radiological Manifestations in a Retrospective Case Series

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Background: Kimura disease (KD) is a rare chronic inflammatory disease that affects mainly young Asian men and is characterized by painless subcutaneous masses, lymphadenopathy, and elevated serum IgE levels. Despite its benign nature, KD poses a diagnostic and therapeutic challenge due to its rarity and clinical variability.

Objective: This study aimed to provide a comprehensive analysis of the clinical and radiological features of KD in a retrospective case series, to assess treatment outcomes, and to discuss the implications for diagnosis and management.

Methods: We retrospectively analyzed four histologically confirmed cases of KD admitted to Zhejiang Provincial People's Hospital from January 2018 to October 2023. Clinical and radiological data were retrospectively analyzed, and imaging findings were analyzed by two neuroradiologists to determine lesion characteristics and contrast enhancement patterns.

Results: Our findings showed that the patients were predominantly male, with a mean age of 43 years and an age range of 13–71 years. All patients presented with painless subcutaneous masses and three of them had peripheral blood eosinophilia and elevated serum IgE levels. Radiographically, the lesions were predominantly ill-defined with heterogeneous enhancement, accompanied by subcutaneous fat atrophy. Complete surgical excision and oral corticosteroids were effective treatments, and no recurrence was noted during follow-up.

Conclusion: KD should be considered in the differential diagnosis of painless subcutaneous masses in the head and neck region, especially in the presence of eosinophilia and elevated IgE levels. Our findings contribute to the understanding of KD's clinical and radiological spectrum and highlight the need for long-term follow-up due to the risk of recurrence.

Keywords: Kimura disease, computed tomography, CT, magnetic resonance imaging, MRI, eosinophilia

Introduction
Kimura disease (KD), also referred to as eosinophilic hyperplastic lymphoid granuloma, is a rare idiopathic chronic lymphoproliferative disorder of unknown etiology. It is characterized by angiolymphoid proliferation accompanied by elevated peripheral eosinophilia and increased serum immunoglobulin E (IgE) levels.¹ Kimura et al provided a systematic characterization of the disease as “unusual granulations associated with hyperplastic alterations in lymphoid tissue” in 1948 led to the current name, Kimura disease.² KD is a rare disease, with less than 300 cases reported worldwide according to histopathological reports.³ The disease typically affects young Asian males aged 20 to 40 years. It is most common in China and Japan but rarely seen in European and American countries.⁴–⁶ The male-to-female ratio is generally 4:1, and the incidence in children is relatively lower.⁷,⁸
KD is prevalent in the head and neck region, particularly in the posterior auricular and parotid regions, and its incidence is as high as 73.9%. The predominant clinical feature of KD is a painless subcutaneous mass with or without regional lymphadenopathy. Histopathological examination is the primary diagnostic method for KD, distinguished by prominent follicular hyperplasia with eosinophil infiltration in the interfollicular area and reactive germinal center. In addition, clinical features, laboratory tests, and imaging are equally significant.

KD is a benign chronic inflammatory condition and no malignancy has been reported to date, however, it is prone to recurrence, and this benign inflammatory disease is not easy to diagnose, often resulting in misdiagnosis or under-diagnosis of the patient, leading to over or inappropriate treatment. Hence, it is imperative to carry out relevant investigations, and this study aims to analyze retrospectively the clinical data and radiologic characteristics of 4 patients diagnosed with KD. Furthermore, we will discuss the treatment and prognosis of these patients while briefly reviewing pertinent literature. The aim of this study was to provide a comprehensive analysis of the clinical and radiological features of KD in a retrospective case series, to assess the efficacy of treatment, to discuss the implications for diagnosis and management, and to provide a solid foundation for the diagnosis and treatment of KD.

Methods
Study Sample
This study conducted a retrospective analysis of KD patients admitted to Zhejiang Provincial People’s (ZJPP) Hospital from January 2018 to October 2023. Inclusion criteria were pathologically confirmed KD masses showing active germinal centers and eosinophil infiltration.

We reviewed 4 patients’ demographics, clinical characteristics, and imaging manifestations from the electronic medical records, including duration of symptoms, regional lymphadenopathy, peripheral blood eosinophil, serum IgE level, treatment, recurrence, CT, and MRI.

Imaging Acquisition
CT: Enhanced CT scans of the head were performed at 5-mm section thickness and interval using two CT scanners as follows: 1) SOMATOM Definition AS+ (Siemens Medical Systems, Erlangen, Germany), and 2) Aquilion ONE (Toshiba Medical Systems, Tokyo, Japan). Scanner settings of 100–120kVp, 512×512 matrix, and automatic tube current were used. CT data were reconstructed at 1.25-mm section thickness and interval with brain algorithm reconstruction. Intravenous injection of 50 mL Iohexol containing 350 mg iodine per mL (Omnipaque, GE Healthcare, China) was administered at an injection rate of 3–4 mL/s.

MRI: Clinical routine MR images were obtained with a 3.0 T MRI scanner (Discovery MR 750, GE Healthcare) with an eight-channel head coil using the same MR parameters for all patients, including axial T1-weighted imaging (T1WI), T2-weighted imaging (T2WI), diffusion-weighted imaging (DWI), and T2-weighted fat suppression (T2-FS) imaging. Contrast-enhanced sagittal, coronal, and transverse fat-suppressed T1WI were acquired after intravenous injection of 0.2 mmol/kg of gadopentetate dimeglumine. All sequences were performed with section thickness = 5.0 mm and inter-slice gap = 1.5 mm.

Analysis of Radiological Data
All imaging features were assessed on the specific Picture Archiving and Communication System (PACS, V6.0, Greenlander Info-Tech Co., Ltd) of Zhejiang Provincial People’s Hospital by two neuroradiologists (F.Z. and M.Z., with 4 and 8 years of respective work experience). They independently completed the review of the images, and any discrepancies between them were resolved through consultation with a third board-certified radiologist, Y.C., who has 20 years of experience in head and neck radiology. The imaging findings of the lesions were reviewed, such as the location, size, number, margin, CT density, signal intensity on MRI, lesion texture, contrast enhancement patterns, and adjacent structure involvement.

The margins of the lesions were classified as well-defined or ill-defined. The signal intensity or CT density, in comparison to adjacent muscles, determined whether the lesion texture was homogeneous or heterogeneous. In addition
to being categorized as homogeneous or heterogeneous, the contrast enhancement patterns also assessed the degree of enhancement by assigning it as slight if similar to skeletal muscle, moderate if larger than skeletal muscle, and intense if comparable to thyroid gland. Abnormal lymph node size was defined as a maximum size exceeding 1.5 cm in level-1 or level-2 of the neck, and surpassing 1 cm in other neck lymph nodes; abnormal lymph node progression was defined as lymph node enhancement greater than skeletal muscle.

Results

Clinical Characteristics

Among 4 patients who were pathologically confirmed KD and underwent CT and MRI examinations were analyzed. The patients were composed of four patients with a mean age of 43.0 ± 27.8 years (range, 13–71 years), including 3 male patients and 1 female patient (sex ratio 3:1). The initial presenting symptoms in all patients comprised of painless subcutaneous masses or localized swelling, and one of them additionally experiencing edema of the right upper eyelid. The duration of symptoms varied from 1 to 180 months (average = 56.7 months). A swollen regional lymph node was palpated in patient 3. Peripheral blood eosinophilia absolute count was increased in 3 patients ranging from 0.62×10^9/L to 2.1×10^9/L (normal reference range 0.02–0.52×10^9/L). Serum IgE levels were elevated in 3 patients who underwent serum immunoglobulin examination (normal reference range < 87 IU/mL). Among the 4 cases, three underwent surgical resection and one was treated with oral corticosteroids (methylprednisolone 0.5 mg/kg-day, and the dose was gradually reduced as the masses shrank), and none of them relapsed throughout the duration of the follow-up period (ranging from 6 to 28 months). The demographic and clinical characteristics are summarized in Table 1.

Radiologic Findings

The MRI and CT findings of all the lesions are summarized in Table 2. Two patients underwent CT examinations, one underwent MRI, and the other underwent both examinations simultaneously. Among them, 3 cases had multiple lesions, and 1 case had a solitary lesion. The lesion regions including retroauricular (n = 2), parotid region (n = 1), submandibular gland (n = 1), maxillofacial region (n = 1), and preauricular (n = 1). Diffuse subcutaneous fat atrophy was present around the lesions in three patients. Most of the lesions of the 4 patients were located in the subcutaneous tissues, and lesions showed a well-defined margin in patients (1/4, 25%).

The ill-defined lesions appeared in 2 patients showing slight hypo-density without calcification or necrosis on CT images. The masses showed heterogeneous intense enhancement in patient 1 (Figure 1). The well-defined lesions appeared in another patient, showing hyper-density on unenhanced CT imaging and homogeneous intense enhancement (Figure 2). Two patients who underwent MRI scans showed enlarged nodular or irregular clumpy signals, both displaying hypointensity on T1WI and hyperintensity on T2WI. The lesion of patient 3 showed hyper-signal on T2-FS with linear hyper-signal intensity within it, and the mass presented homogeneous significant enhancement (Figure 3). There was a slight enhancement in patient 4 on enhancement CT images (Figure 4). All four patients presented ipsilateral cervical lymphadenopathies, displaying a uniform and non-necrotic round-to-ovoid shape. Furthermore, one patient also had concomitant contralateral lymphadenopathy.

Histopathology Examination

All cases were histopathologically confirmed as KD and the findings were following typical pathological features. All specimens were soft, greyish-white in cross-section, and microscopically, lymphoid follicular hyperplasia and fibrous tissue with extensive eosinophilic infiltration were observed. The lesion of patient 3 shows homogeneous intense enhancement on postcontrast fat-suppressed T1WI and linear hypo-signal intensity within the mass on T2-FS, which indicates that may represent a vascular component. In the biopsy pathology specimens in the present study, we found focal eosinophilic micro abscess formation in patients 1, 2, and 4. Immunohistochemical staining was conducted in 3 cases, which were positive staining for CD3, CD19, CD20, CD23, Ki-67, Bcl-2, and Bcl-6, and negative staining for Cyclin D1.
<table>
<thead>
<tr>
<th>No.</th>
<th>Age (Years)</th>
<th>Gender</th>
<th>Clinical Presentation</th>
<th>Duration of Symptoms (Months)</th>
<th>Palpable Regional Lymph Nodes</th>
<th>Blood Eosinophilia (×10⁹ /L)</th>
<th>Serum IgE Level (IU/mL)</th>
<th>Treatment</th>
<th>Follow-Up (Months)</th>
<th>Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>M</td>
<td>Painless, slowly growing mass, right submandibular gland; Swelling of the right upper eyelid</td>
<td>36</td>
<td>(-)</td>
<td>2.1</td>
<td>&gt;2000</td>
<td>Surgical excision</td>
<td>13</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>42</td>
<td>F</td>
<td>Painless masses, behind both ears</td>
<td>1</td>
<td>(-)</td>
<td>0.32</td>
<td>(-)</td>
<td>Surgical excision</td>
<td>28</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>46</td>
<td>M</td>
<td>Painless mass, left cheeks</td>
<td>10</td>
<td>(+)</td>
<td>0.62</td>
<td>355</td>
<td>Methylprednisolone</td>
<td>41</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>71</td>
<td>M</td>
<td>Painless mass, slowly growing mass, Left preauricular and retroauricular</td>
<td>180</td>
<td>(-)</td>
<td>0.9</td>
<td>1160</td>
<td>Surgical excision</td>
<td>19</td>
<td>No</td>
</tr>
</tbody>
</table>

**Abbreviation:** IgE, Immunoglobulin E.
### Table 2 CT and MRI Findings of Kimura Disease in Patients

<table>
<thead>
<tr>
<th>No./Imaging</th>
<th>Location</th>
<th>Number</th>
<th>Margination</th>
<th>Density/Signal Intensity</th>
<th>Size (mm)**</th>
<th>Enhancement</th>
<th>Adjacent Structures</th>
<th>Lymphadenopathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/CT and MRI</td>
<td>Bilateral parotid region and submandibular gland</td>
<td>Multiple</td>
<td>Ill-defined</td>
<td>Slightly hypo- on CT and hypo- on T1WI and hyper- on T2WI</td>
<td>18×12×10</td>
<td>Heterogeneous; intense, (-)</td>
<td>Bilateral level 2A, 2B, 3, 4, 5</td>
<td>Left level 2A, 2B, 3, 4</td>
</tr>
<tr>
<td>2/CT</td>
<td>Bilateral retroauricular</td>
<td>Multiple</td>
<td>Well-defined</td>
<td>Hyper- on CT</td>
<td>17×9×18</td>
<td>Homogeneous; intense</td>
<td>Bilateral level 2A, 2B</td>
<td></td>
</tr>
<tr>
<td>3/MRI</td>
<td>Left maxillofacial region</td>
<td>Single</td>
<td>Ill-defined</td>
<td>Hypo- on T1WI and hyper- on T2WI</td>
<td>14×13×20</td>
<td>Homogeneous; intense</td>
<td>Bilateral level 1B, Right level 2A</td>
<td></td>
</tr>
<tr>
<td>4/CT</td>
<td>Left preauricular and retroauricular</td>
<td>Multiple</td>
<td>Ill-defined</td>
<td>Slightly hypo-on CT</td>
<td>37×22×39</td>
<td>Homogeneous; slightly</td>
<td>Left level 2A, 2B, 3, 4</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The size of lesions was measured at the greatest dimension on the CT/MRI images.

**Abbreviations:** CT, computed tomography; MRI, magnetic resonance imaging; T1WI, T1-weighted imaging; T2WI, T2-weighted imaging; hypo, hypointense; hyper, hyperintense.
Kimura disease is a rare chronic inflammatory condition characterized by subcutaneous painless masses, lymphadenopathy, peripheral eosinophilia, and increased serum IgE levels.\textsuperscript{13,14} The condition was first described by Kim and Szeto in China in 1937 under the name “eosinophilic hyperplastic lymphogranuloma”\textsuperscript{1}. The study summarizes the clinical characteristics and radiological findings of four patients with KD associated with mass complications. KD was most frequently observed in the head and neck, which is consistent with previous studies.\textsuperscript{15} Other less frequent sites include the arm,\textsuperscript{16} thigh,\textsuperscript{17} groin,\textsuperscript{18} breast,\textsuperscript{19} back,\textsuperscript{10} and et al. Lee et al\textsuperscript{10} proposed a male-to-female ratio of 4.5:1 and identified the peak age at diagnosis as middle-aged (median: 41.35 years) for patients with KD. At the same time, the males

\textbf{Discussion}

Kimura disease is a rare chronic inflammatory condition characterized by subcutaneous painless masses, lymphadenopathy, peripheral eosinophilia, and increased serum IgE levels.\textsuperscript{13,14} The condition was first described by Kim and Szeto in China in 1937 under the name “eosinophilic hyperplastic lymphogranuloma”.\textsuperscript{1} The study summarizes the clinical characteristics and radiological findings of four patients with KD associated with mass complications. KD was most frequently observed in the head and neck, which is consistent with previous studies.\textsuperscript{15} Other less frequent sites include the arm,\textsuperscript{16} thigh,\textsuperscript{17} groin,\textsuperscript{18} breast,\textsuperscript{19} back,\textsuperscript{10} and et al. Lee et al\textsuperscript{10} proposed a male-to-female ratio of 4.5:1 and identified the peak age at diagnosis as middle-aged (median: 41.35 years) for patients with KD. At the same time, the males

\begin{center}
\textbf{Figure 1} Kimura’s disease in a 13-year-old man with a slowly growing mass for 36 months. (a and b) Axial contrast-enhanced computed tomography (CT) shows multiple ill-defined masses located in the bilateral parotid region and submandibular gland; lesions show a heterogeneous moderate enhancement and diffuse atrophy of subcutaneous fat (arrow). (c–e) The mass is hypo-signal on T1-weighted images, and hyper-signal on T2-weighted and T2-weighted fat suppression (T2-FS) images (arrow). (f) Sagittal T2-FS showing multiple swollen lymph nodes in the neck (circle).
\end{center}

\begin{center}
\textbf{Figure 2} Kimura’s disease in a 42-year-old man with two painless masses for 1 month. (a and b) Axial contrast-enhanced computed tomography (CT) shows two well-defined masses located in the bilateral retroauricular region; lesions show a homogeneous moderate enhancement (arrow). (c) Photomicrograph shows hyperplasia of lymphoid follicular tissue in lymph nodes with germinal center formation, intense eosinophilic infiltration, and eosinophil micro-abscess.
\end{center}
**Figure 3** Kimura’s disease in a 46-year-old man with a single painless mass in the left cheek for 10 months. (a–d) The mass is hyper-signal on T2-weighted and T2-weighted fat suppression (T2-FS) images with strips of small low-signal vascular shadows within it; lesions show a homogeneous significant enhancement (arrow).

**Figure 4** Kimura’s disease in a 71-year-old man with two painless masses for 180 months. (a and b) Axial contrast-enhanced computed tomography (CT) shows two ill-defined masses located in the left preauricular and retroauricular region with atrophy of the subcutaneous fat; lesions show a homogeneous slight enhancement (arrow). (c) Photomicrograph shows multifocal infiltration of lymphocytes and eosinophils in the dermis.
accounted for 75% of all patients in this study and the mean age at diagnosis was 43 years ranging from 13–71 years, which is similar to the findings of the above-mentioned studies in the literature.

Currently, the cause and pathogenesis of KD are not well understood. It is widely believed that various factors such as insect bites, Epstein-Barr virus, human herpesvirus, and Candida albicans may disrupt T-cell regulation or trigger an IgE-mediated type 1 hypersensitivity reaction.20,21 The presence of increased levels of eosinophils and IgE in the peripheral blood of KD patients suggests that Th1 and Th2 cells, as well as T regulatory cells, may play a role in the development of KD. Ohta et al employed flow cytometry to analyze T-cell subsets and discovered a significantly higher proportion of Th2 cells in KD patients compared to the control group.22 Future studies could delve more deeply into genetic susceptibility, environmental triggers, and molecular immunological factors, which may contribute to understanding the pathogenesis of KD. Furthermore, this study observed elevated eosinophil counts in three-quarters of KD patients’ peripheral blood samples. Meanwhile, serum IgE was also significantly raised in three patients, and serum IgE levels were not obtained from another case. Notably, to our knowledge, there are only four cases of KD with normal serum eosinophil counts or/and IgE levels reported globally,23 and this study involves a fifth case with eosinophils in the normal range. Therefore, even in the absence of peripheral eosinophilia or/and elevated IgE levels, KD must be considered in differentiating painless subcutaneous masses. In addition, there are some case reports of concurrent nephropathies, such as proteinuria and nephrotic syndrome, which might be caused by glomerular IgE deposition, and endocapillary and mesangial hyperplasia.24 It has been reported that proteinuria is present in 12–16% of KD cases and nephrotic proteinuria occurs in about 60–70% of KD patients, none of whom had nephrotic symptoms in this study.25 Other complications include pruritus, rash, allergic rhinitis, asthma, and urticaria, which may be related to eosinophil infiltration and cytokine release.26 However, the present study has not found any cases of related symptoms.

KD is presently recognized as a benign inflammatory disorder, with a relatively favorable prognosis. The primary pathological feature of KD is subcutaneous angioblastic lymphoid hyperplasia with peripheral eosinophilia.27 Although a pathologic examination is essential for a definitive diagnosis, imaging studies play a pivotal role in the early identification and comprehensive characterization of the disease’s distribution. This spares patients from potentially harmful invasive diagnostic procedures or unnecessary radical surgery. Gopinathan and Tan et al12 have divided KD into two distinct morphological subtypes in conformity with variations in CT morphological features: subtype 1, characterized by nodular lesions with well-defined borders, uniform density, and homogeneous enhancement; subtype 2, characterized by diffuse swelling with indistinct borders, heterogeneous enhancement, and infiltration of surrounding subcutaneous fat. Among the three patients who underwent CT examination in this research, only one exhibited subtype 1 while the remaining patients presented with subtype 2. Takeishi et al20 classified Kimura disease into two categories based on specific MRI features shown by KD located at different sites. The first type is located in the posterior auricular region and other sites adjacent to the bone and appears on MRI as a homogeneous solid mass, the second type is located in the parotid area and has a heterogeneous interior structure on MRI. Patient 3 belongs to the first category and patient 1 to the second category in this study.

Previous reports on the imaging manifestations of KD are somewhat non-specific and variable. On pre-contrast CT and MRI scans, KD tends to manifest as either well-defined nodular masses or ill-defined plaque-like infiltrative masses in the subcutaneous tissue, with or without accompanied by lymphadenopathy.12 The majority of lesions are situated near the major salivary glands, especially the parotid gland, and may be accompanied by diffuse atrophy of subcutaneous fat, which is considered a relatively characteristic feature. The density of the involved enlarged lymph nodes is homogeneous on CT, and areas of hypodense cystic necrosis and foci of calcification are rarely seen.19 It has been suggested that varying degrees of subcutaneous fat atrophy and lesion enhancement indicate different stages of this inflammatory disease spectrum. The more pronounced the subcutaneous fat atrophy, the worse the focal enhancement of KD, reflecting the chronicity of the disease,11 which was confirmed by Lin et al29 in a follow-up of the same patients suffering from KD, where gradual fibrosis and sclerosis around the microvessels behind the lesion capillaries increased as time progressed, resulting in decreased lesion enhancement. Three patients (3/4) with KD in this study showed diffuse subcutaneous fat atrophy, and only one case did not show this symptom, which may be related to the short clinical course of the disease at 1 month and early inflammation. Patient 4 had slight enhancement, probably due to chronic inflammation, and this patient was found to have a painless mass in the left preauricular and retro-auricular for almost 180 months, which was
consistent with previous studies. The diversity of signal intensities on MR images of KD lesions is due to histologically varying degrees of vascular and fibrotic components. Abundant vascular proliferation may explain the marked enhancement and flow-through effect, whereas extensive fibrosis may contribute to the linear low attenuation pattern after enhancement on MR images. In the present study, the lesion features of patient 3 on MR images indicated that a vascular component was present. Although some studies describe the presentation of KD on CT and MRI, imaging techniques and interpretation criteria may vary between medical centers. Future studies could work to establish standardized imaging evaluation protocols to improve diagnostic consistency and accuracy.

KD needs to be distinguished from various inflammatory and neoplastic diseases, including parotid tumors, lymphomas, tuberculous lymphadenopathy, and Angio lymphoid hyperplasia with eosinophilia (ALHE). Parotid tumors are typically encapsulated or pseudo-encapsulated and are confined to the parotid gland. In contrast, KD often extends irregularly into the subcutaneous tissue region. Hodgkin’s lymphoma typically manifests as painless lymph node enlargement. The initial masses are commonly found in the neck region like KD. However, lymphomas are usually not associated with peripheral soft tissue or fatty changes and have a short clinical course, often accompanied by the fusion of lymph nodes in the affected region. Lymphoma has a high signal intensity on DWI, and its ADC value is much lower than KD. In contrast, tuberculous lymphadenopathy often manifests as symptoms including mild fever, fatigue, night sweats alongside elevated erythrocyte sedimentation rate. Unlike KD, Tuberculous lymphadenopathy is usually necrotic with central low density, peripheral rim enhancement, and a tendency for matting. KD and ALHE have similar histopathologic and clinical features, both are prevalent in the head and neck and present clinically as subcutaneous masses with lymphoid infiltrates, eosinophils, and angioplasia. However, the prevalence of ALHE is highest among women in the middle-age group, exhibiting no significant ethnic disparities, and lacking any association with renal impairment. Histopathologically, it is the absence of fibrosis in ALHE, whereas KD has significant fibrosis at all stages, thus serving as the key to differential diagnosis.

The treatment options for KD include surgical excisions or conservative therapies, such as systemic or intralesional corticosteroids, cytotoxic therapy, or radiotherapy, while the optimal treatment is still controversial. The preferred treatment for this condition has been suggested to be complete surgical excision, with or without corticosteroid therapy. However, in cases where the lesion is large, ill-defined, and systemically involved, achieving complete removal through surgery can often be challenging and recurrence rates tend to be high. Oral corticosteroids are effective in the treatment of Kimura disease, but patients are more likely to relapse once they stop taking the drug. Recurrence rates are various due to the different treatment methods for KD, the recurrence rate was lowest (26.94%) for surgical resection combined with adjuvant therapy, followed by surgical resection alone with an overall recurrence rate of 30.5%. Medical therapy alone had a recurrence rate of 45%, while radiotherapy alone had the highest recurrence rate of 60%. To achieve stratified patient management and effectively control recurrence in high-risk patients, a novel treatment utilizing antibodies has surfaced, patients successfully treated with mepolizumab, dupilumab, and benralizumab have been reported in some literature.

Despite the four valuable cases presented herein, this study has several limitations. Firstly, a small and single-center retrospective study was included, which limits the generalizability and statistical power of the results. Future studies could increase the sample size of patients from different regions, races, and genders. Secondly, patients were excluded based on keyword searches in the electronic medical records, which may have introduced selection bias. Finally, not all patients underwent brain MR, as CT is not sensitive to detecting small early lesions, and patients with KD may have been overlooked and underestimated.

**Conclusion**

In summary, younger men with a painless subcutaneous head and neck mass, peripheral blood eosinophilia, and elevated serum IgE levels should be highly considered for the diagnosis of KD. The distribution, morphology, and enhancement pattern of the lesion can be demonstrated by CT or MRI. These imaging techniques serve as valuable tools for diagnosing KD and assessing the inflammatory state of the disease. Nevertheless, a definitive diagnosis should be confirmed through
pathological biopsy. In terms of treatment, surgery intervention, conservative treatment, or antibodies can be used to treat KD, which requires prolonged follow-up of patients due to its tendency to recur. Future studies could focus on patient follow-up after treatment, including specific recurrence rates, complications, and satisfaction, in order to provide a comprehensive assessment of KD treatment efficacy. Meanwhile, we could also explore new biomarkers, treatments, or disease prevention strategies.

**Ethical Approval**

This study followed the Helsinki Declaration and was approved by the Ethics Committee board of Zhejiang Provincial People’s Hospital. The need to obtain the informed consent was waived by the Ethical Committee because of de-identification data involving no potential risk to patients and no link between the patients and researchers. All methods were carried out in accordance with relevant guidelines and regulations.

**Disclosure**

All authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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