Idiopathic multicentric Castleman disease (iMCD) is a systemic disorder characterized by systemic inflammation and organ dysfunction associated with an increase in pro-inflammatory cytokines. Some patients with iMCD are positive for autoantibodies, although their significance and relationship with specific associated autoimmune diseases are unclear. This study retrospectively analyzed the clinicopathological features of iMCD patients focusing on autoantibodies. Among 63 iMCD patients in our database, 19 were positive for at least one autoantibody. Among the 19, we identified five with plasma cell type (PC)-iMCD lymph node histopathology and positive anti-phospholipid antibodies. These patients were likely to have thrombocytopenia, anasarca, fever, reticulin fibrosis or renal insufficiency, organomegaly (TAFRO) symptoms, and thrombotic events. The present study suggests that patients with undiagnosed or atypical autoimmune diseases, including anti-phospholipid syndrome (APS), were treated for iMCD. APS may present with thrombocytopenia or even multi-organ failure, which overlap with clinical presentations of iMCD. Due to differences in the treatment regimen and follow-up, recognition of the undiagnosed autoimmune disease process in those suspected of iMCD is essential. Our study highlights the importance of complete exclusion of differential diagnoses in patients with iMCD in their diagnostic workup.

Keywords: idiopathic plasmacytic lymphadenopathy; multicentric Castleman disease; autoimmune, anti-phospholipid syndrome

INTRODUCTION

Idiopathic multicentric Castleman disease (iMCD) is a rare, clinicopathologically heterogeneous disorder with systemic inflammation and/or multi-organ dysfunction related to a high pro-inflammatory cytokine status. Since Fajgenbaum et al. proposed the international consensus diagnostic criteria for iMCD, there has been less confusion regarding diagnostic and treatment approaches for the disorder. However, iMCD has considerable heterogeneity. Pathologically, iMCD is divided into plasma cell (PC) type, hypervascular (HV) type, and a mixed variant, although the histological definition of the mixed variant is unclear. The pathology of PC-type iMCD (PC-iMCD) is characterized by atrophic to hyperplastic germinal centers, interfollicular plasmacytosis, and mild to severe vascularity. Clinically, patients with iMCD are further classified into iMCD not otherwise specified (iMCD-NOS) or thrombocytopenia, anasarca, fever, reticulin fibrosis, renal insufficiency, organomegaly (TAFRO) symptoms, and thrombotic events. These patients were likely to have thrombocytopenia, anasarca, fever, reticulin fibrosis, renal insufficiency, organomegaly clinical subtype (iMCD-TAFRO). TAFRO syndrome is a heterogeneous entity with a constellation of the aforementioned symptoms, including infectious diseases,
malignancies, and rheumatologic disorders, and was first reported in 2010. Attention needs to be paid to the principle that iMCD-TAFRO is one of the causes of TAFRO syndrome, and they are not interchangeable. Some researchers argue that iMCD-NOS should be further classified into idiopathic lymphoplasmacytic lymphadenopathy with polyclonal hypergammaglobulinemia (IPL) and other (non-IPL). IPL was first described by Mori et al. in 1980 as systemic lymphadenopathy and hypergammaglobulinemia with increased inflammatory markers and serum interleukin-6 (IL-6) with indolent clinical courses. In 2008, Kojima et al. reported 28 iMCD cases (18 IPL and 10 non-IPL). Of note, 40% of the non-IPL patients were diagnosed with autoimmune diseases, such as Sjögren’s syndrome (SjS) and immune thrombocytopenic purpura, and they exhibited thrombocytopenia, anasarca, fever, reticulin fibrosis or renal insufficiency, and organomegaly (TAFRO) symptoms. A systematic literature review also revealed that patients with iMCD have a high prevalence of autoantibodies. To date, there have been several reports describing that autoimmune diseases, such as SjS and systemic lupus erythematosus (SLE), present as TAFRO syndrome without iMCD. At the same time, these reports raise a concern that there may be cases of overlooked autoimmune diseases misdiagnosed as iMCD. Considering the difference in treatment strategies, detecting atypical autoimmune diseases among iMCD is essential. We performed an exploratory analysis of iMCD patients in our database to investigate their clinical pathological characteristics, focusing on autoantibodies and co-existing autoimmune disorders.

MATERIALS AND METHODS

Design and study population

In this retrospective observational study, we performed an exploratory analysis of iMCD patients in our database. All cases were retrieved from surgical pathology consultation files from the Department of Pathology, Okayama University, in Okayama, Japan, which included 63 iMCD cases. All patients underwent surgical lymph node resection. We reviewed electric health records to assess the compatibility of the cases with the international diagnostic criteria of iMCD. We asked consultees to search for rheumatoid factor, anti-nuclear antibody (ANA), anti-double strand DNA antibody (dsDNA), anti-Smith antibody, anti-Ro/SS-A antibody (SS-A), anti-La/SS-B antibody (SS-B), anti-citrullinated protein antibody, anti-U1-ribonucleoprotein antibody (U1-RNP), anti-Scl-70 antibody, anti-amaioncyl tRNA synthetase antibody, anti-phospholipid antibodies (anti-cardiolipin (CL) or anti-cardiolipin-b2-glycoprotein-1 complex antibodies), anti-mitochondrial antibody, and anti-platelet antibodies, in addition to proteinase 3-antineutrophil cytoplasmic antibody (PR3-ANCA) and myeloperoxidase-ANCA (MPO-ANCA). All patients had negative viral serologies for hepatitis B, hepatitis C, and human immunodeficiency virus.

Clinical analysis

The following data of the patients were collected: age, sex, laboratory data including autoimmune panels, clinical courses, presence of thrombosis, and treatment.

Histological examination and immunohistochemistry

All lymph node specimens were fixed in 10% formaldehyde and embedded in paraffin. These paraffin-embedded tissue blocks were sliced into 3-µm thick sections and stained with hematoxylin and cosin (H&E). Immunohistochemical staining was performed on an automated Bond Max instrument (Leica Biosystems, Wetzlar, Germany) using the following primary antibodies: HHV-8 (13B10, 1:40; LifeSpan Biosciences, Seattle, WA, USA), CD20 (L26; 1:200; Novocstra, Newcastle, UK), and CD3 (PS1; 1:50; Novocstra). In situ hybridization was also performed for the κ and λ light chains (Leica Biosystems).

ETHICAL CONCERNS

The Institutional Review Board of Okayama University approved the study (reference number: 2007-033). We performed all study processes in accordance with the Declaration of Helsinki. Informed consent was received from all subjects involved in the study.

RESULTS

Baseline demographics and laboratory findings

Among the 63 iMCD patients, 19 had were positive for at least one autoantibody and only 5 were positive for anti-phospholipid antibodies. The baseline demographics and key laboratory and clinical findings are summarized in Table 1. Patients aged 48–73 years old had variable white blood cell and platelet counts, whereas two patients (cases 3 and 4) had severe thrombocytopenia attributable to TAFRO syndrome. Except for case 1, all patients had high alkaline phosphatase levels. Cases 2–4 had acute kidney injury, and case 4 required hemodialysis due to the severity of the disease. Although cases 1 and 2 had hi high immunoglobulin G (IgG) levels, the others had only marginally increased or normal serum IgG. Serum inflammatory markers were increased to some extent in all patients. Of note, cases 1, 2, and 5 developed acute thrombotic events during their clinical courses. Case 1 had left common femoral vein deep venous thrombosis. Case 2 had splanchnic venous thrombosis. Case 5 had adrenal infarction.

Autoantibodies

The autoantibodies of the five patients are shown in Table 2. Case 1 had high ANA and dsDNA titers, whereas the others had negative or weak positive results. Rheumatoid factor, PR3-ANCA, MPO-ANCA, and U1-RNP were negative in all patients. They all had negative serum and urine protein electrophoresis. Cases 1 and 4 had a considerably high
Table 1. Clinical Features of the Patients

| Case No. | Age/Sex | WBC (x 10^3) | Plt (x 10^3) | ALP (U/L) (Ref < 113) | Cr (mg/dL) | CrCl (mL/min/1.73 m²) | IgG (mg/dL) (Ref < 10) | CRP (mg/dL) (Ref < 0.5) | IL-6 (pg/mL) (Ref < 4.0) | Thrombosis* | Anasarca | Fever (BT > 37.5°C) | Reticulin fibrosis | Organomegaly |
|----------|---------|--------------|-------------|------------------------|------------|-----------------------|------------------------|------------------------|------------------------|-----------|--------|-----------------|-----------------|-------------|
| 1        | 73/F    | 4.0          | 133         | 94.2                   | 0.53       | 94                    | 3335                   | 10.2                   | 71.6                   | +         | +      | +               | +               | +           |
| 2        | 49/M    | 20.6         | 198         | 153                    | 1.94       | 39                    | 4935                   | 4.2                    | 13.8                   | +         | +      | +               | N/A             | +           |
| 3        | 48/M    | 5.7          | 14          | 384                    | 1.76       | 45                    | 1813                   | 8.0                    | 10.7                   | -         | +      | +               | N/A             | +           |
| 4        | 67/M    | 5.2          | 4           | 250                    | 1.53       | 46                    | 1859                   | 15.7                   | 579                    | -         | +      | +               | +               | +           |
| 5        | 51/F    | 13.9         | 99          | 1437                   | 0.86       | 78                    | 1257                   | 10.0                   | 91.8                   | +         | +      | +               | +               | +           |

Abbreviations: ALP, alkaline phosphatase; Cr, creatinine; CRP, C-reactive protein; IgG, immunoglobulin G; IL-6, interleukin-6; N/A, not available; Plt, platelet; WBC, white blood cell

* Case 1 had left common femoral vein deep venous thrombosis. Case 2 had splanchic venous thrombosis. Case 5 had adrenal infarction.

Table 2. Autoantibodies in the Included Patients

| Case No. | ANA (IU/mL) (Ref < 12) | dsDNA (IU/mL) (Ref < 12) | PR3-ANCA (U/mL) (Ref < 3.5) | MPO-ANCA (U/mL) (Ref < 3.5) | SS-A (U/mL) (Ref < 10) | SS-B (U/mL) (Ref < 10) | RNP (U/mL) (Ref < 10) | Direct Coombs | Anti-CL (U/mL) (Ref < 3.5) |
|----------|------------------------|--------------------------|-----------------------------|-----------------------------|-----------------------|-----------------------|----------------------|---------------|--------------------------|
| 1        | 1:1280                 | 45.1                     | N/A                         | N/A                         | 60                    | <0.5                  | 2.7                  | +             | 21.9                     |
| 2        | <1:40                  | 5.8                      | 1.38                         | 0.89                        | 2.66                  | 1.7                   | 3.8                  | –             | 20.2                     |
| 3        | <1:40                  | –                        | <1.0                         | <1.0                        | N/A                   | N/A                   | N/A                  | –             | 13.2                     |
| 4        | 1:80                   | 2.0                      | <0.5                         | <0.5                        | 240                   | 72                    | 3.6                  | –             | 13.0*                    |
| 5        | 1:80                   | 6.0                      | 1.0                          | 1.0                         | N/A                   | N/A                   | N/A                  | –             | 25.0                     |

* Titer of anti-cardiolipin-β2-glycoprotein-1 complex antibody (ref < 3.5 U/mL)

Abbreviations: ANA, anti-nuclear antibody; Anti-CL, anti-cardiolipin antibody; dsDNA, anti-double strand DNA antibody; MPO-ANCA, anti-myeloperoxidase antibody; PR3-ANCA, anti-proteinase-3 antibody; RNP, anti-ribonucleoprotein antibody; SS-A; anti-SS-A/Ro antibody; SS-B, anti-SS-B/La antibody.
SS-A, and case 4 also had a positive SS-B. All patients were positive for anti-CL or anti-cardiolipin-β2-glycoprotein-1 complex antibodies.

**Treatment regimen**

The treatment regimens for the included patients are described in Table 3. Except for case 1, all patients required additional treatment after high-dose corticosteroids (prednisolone 1 mg/kg). Of note, cases 4 and 5 had refractory disease activity even after treatment with tocilizumab (TCZ), and were administered rituximab (RTX) and cyclosporin.

**Histopathological Analysis**

The pathological findings of the included patients are summarized in Table 4. Lymph node specimens demonstrated numerous lymphoid follicles with atrophic to normal germinal centers and interfollicular expansion. The expanded interfollicular area consisted of the sheet-like proliferation of mature plasma cells and varying degrees of vascular proliferation (Figure 1). A high degree of hemosiderin deposition was observed in only case 1, and hyaline globulus of immunoglobulin was observed in cases 1 and 2. There were no light chain restrictions or HHV-8 positive cells. These histological findings were consistent with PC-iMCD. All patients had hypercellular marrow except for cases 1 and 4, who had a dry tap. No abnormalities were noted on karyotype testing.

**DISCUSSION**

This study retrospectively examined the clinicopathological features of iMCD patients, focusing on autoimmune panels and co-existing autoimmune disorders. We found five patients with PC-iMCD histopathology, positive anti-phospholipid antibodies, and similar clinical presentations, including TAFRO symptoms. The present study suggests that some of those diagnosed with iMCD are undiagnosed or have atypical autoimmune diseases. In particular, anti-phospholipid syndrome (APS) may be an important yet uncovered primary etiology of TAFRO syndrome masquerading as iMCD.

APS is a systemic autoimmune disease often characterized by thrombosis, loss of pregnancy, and the expression of anti-phospholipid antibodies (aPL). APS is sometimes associated with other rheumatic diseases such as SLE and SjS. Patients with APS often present with deep venous thrombosis, livedo reticularis, or stroke, but also thrombocytopenia, myocardial infarction, and rarely, catastrophic APS, which may be fatal and requires strong immunosuppression and targeted therapies with RTX or eculizumab. Mizuno et al. reported that patients with TAFRO syndrome can have thrombotic microangiopathy (TMA)-like glomerulopathy, which may be noted in APS. Future studies are warranted to confirm if APS is the underlying etiology of TAFRO syndrome with TMA-like glomerulopathy.

TAFRO syndrome is also a heterogeneous entity including iMCD-TAFRO, malignancy, infection, and autoimmune disease. Clinically, it is essential to sufficiently character-

**Table 3. Treatment Regimens**

| Case No. | 1st line | 2nd line | 3rd line | 4th line |
|----------|----------|----------|----------|----------|
| 1        | Prednisolone 1 mg/kg | - | - | - |
| 2        | Prednisolone 0.5 mg/kg | Melphalan-prednisolone | - | - |
| 3        | Prednisolone 1 mg/kg | Methylprednisolone pulse | - | - |
| 4        | Prednisolone 1 mg/kg | TCZ | RTX | CyA |
| 5        | Prednisolone 1 mg/kg | TCZ | RTX | - |

Abbreviations: CyA, cyclosporin; RTX, rituximab; TCZ, tocilizumab

**Table 4. Histological Findings of the Included Patients**

| Case No. | Germinal centers | Interfollicular area | Vascularity | High degree of hemosiderin deposition | Hyaline globulus of immunoglobulin |
|----------|------------------|----------------------|-------------|--------------------------------------|-----------------------------------|
| 1        | Atrophic         | Expansion and sheet-like proliferation of mature plasma cells | mild | + | + |
| 2        | Normal to hyperplastic | Expansion and sheet-like proliferation of mature plasma cells | moderate | - | + |
| 3        | Atrophic         | Expansion and mixed infiltration of mature plasma cells and immunoblasts. | moderate to severe | - | - |
| 4        | Normal to atrophic | Expansion and sheet-like proliferation of mature plasma cells | moderate | - | - |
| 5        | Normal to atrophic | Expansion and sheet-like proliferation of mature plasma cells | moderate to severe | - | - |
ize the primary etiology of TAFRO syndrome due to differences in treatment and follow-up plans. Currently, iMCD is treated using corticosteroids, anti-interleukin-6 monoclonal antibodies, such as tocilizumab, RTX, cyclosporin, or chemotherapy. Immunosuppressants or immunomodulatory medications are considered the first line for autoimmune diseases, and antplatelet or anticoagulation therapy may be required for APS. Although challenging, the complete exclusion of primary autoimmune diseases is essential before making a diagnosis of iMCD.

Our study has a few limitations that need to be considered upon reviewing the results. First, we performed the pathological analysis of patients at a single Japanese university hospital, which reduces the generalizability of the results to patients with iMCD from other countries and ethnicities. Second, due to the rarity of the disease, we were only able to include a small number of patients; further collection is necessary. Third, lymph node biopsy is not a regular diagnostic test for patients with APS. Future studies are required to examine and compare the lymph node histopathology of well-defined APS and PC-iMCD. Furthermore, aPLs may not be disease-specific to APS. Long-term follow-up and reevaluation of aPLs are necessary.

Regardless of these limitations, our retrospective study provides valuable insight on the clinicopathological characteristics of iMCD from an autoimmune standpoint. Both clinicians and pathologists need to recognize the heterogeneity of iMCD and perform diagnostic workups to pinpoint the primary etiology as close as possible to prevent premature closure in their decision-making.

AUTHOR CONTRIBUTIONS

YN and AN wrote the manuscript and analyzed the data. HS, HM, NS, SM, KO, and FO revised the draft manuscript. YN, AN, and YO performed data collection and curation. YS designed and supervised the study. All authors approved the final version.

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DATA AVAILABILITY STATEMENT
The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

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CONFLICT OF INTEREST
The authors declare no conflict of interest.

REFERENCES
1 Dispensieri A, Fajgenbaum DC. Overview of Castleman disease. Blood. 2020; 135: 1353-1364.
2 Fajgenbaum DC, Uldrick TS, Bagg A, et al. International, evidence-based consensus diagnostic criteria for HHV-8-negative/idiopathic multicentric Castleman disease. Blood. 2017; 129: 1646-1657.
3 Wang HW, Pittaluga S, Jaffe ES. Multicentric Castleman disease: Where are we now? Semin Diagn Pathol. 2016; 33: 294-306.
4 Takai K, Nikkuni K, Shibuya H, Hashidate H. [Thrombocytopenia with mild bone marrow fibrosis accompanied by fever, pleural effusion, ascites and hepatosplenomegaly]. Rinsho Ketsueki. 2010; 51: 320-325.
5 Kojima M, Nakamura S, Shimizu K, et al. Clinical implication of idiopathic plasmacytic lymphadenopathy with polyclonal hypergammaglobulinemia: a report of 16 cases. Int J Surg Pathol. 2004; 12: 25-30.
6 Mori T, Maeda K, Hasunuma K, et al. [Idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia and pleural effusion]. Nihon Kokyuki Gakkai Zasshi. 2000; 38: 288-292.
7 Kishimoto K, Sakata T, Itoh K, et al. [Idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia in a patient who died of progressive peripheral polyneuritis and cerebral dysfunction]. Rinsho Ketsueki. 1997; 38: 117-123.
8 Kaito K, Sakai O. [Nephropathy associated with idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia (IPL)]. Ryouikibetsu Shokogun Shirizu. 1997; (17 Pt 2): 343-346.
9 Torii K, Ogawa K, Kawabata Y, et al. Lymphoid interstitial pneumonia as a pulmonary lesion of idiopathic plasmacytic lymphadenopathy. Intern Med. 1994; 33: 237-241.
10 Morita M, Okada S, Yoshida H, et al. [A case of idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia associated with chronic nephritis]. Nihon Jinzo Gakkai Shi. 1994; 36: 1196-1202.
11 Yamashita E, Sato J, Fujino Y, et al. [A case of idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia]. Nihon Naika Gakkai Zasshi. 1993; 82: 277-279.
12 Tanabe N, Uchida T, Fujiwara Y, Ohnishi K, Tanaka M. Successful treatment of idiopathic plasmacytic lymphadenopathy with polyclonal hypergammaglobulinemia. Intern Med. 1992; 31: 549-552.
13 Mizorogi F, Hattori A, Ogasawara H, Takaki K, Tanaka T. [Idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia with elevated level of serum interleukin-6]. Rinsho Ketsueki. 1992; 33: 221-226.
14 Kato Y, Kobayashi H, Mihara H, et al. Ticlopidine treatment in idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia accompanied by nephrotic syndrome. Intern Med. 1992; 31: 504-507.
15 Tsutani H, Kamiya K, Domae N, et al. [Idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia (IPL) accompanied with severe thrombocytopenia and interstitial pneumonitis]. Rinsho Ketsueki. 1990; 31: 452-456.
16 Kondo M, Katoh S, Katoh T, et al. [A case of idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia associated with chronic renal failure]. Nihon Jinzo Gakkai Shi. 1990; 32: 1133-1137.
17 Yoshida H, Hara Y, Sato T, et al. [A case of idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia presenting plasmacytic infiltration and IgA deposition in the kidney]. Nihon Naika Gakkai Zasshi. 1989; 78: 1324-1328.
18 Iseki T, Kondo H, Iwasa S, et al. [A case of idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia concurrent with severe anemia and hyperviscosity syndrome]. Rinsho Ketsueki. 1988; 29: 1250-1255.
19 Tamura J, Kubota K, Kurabayashi H, et al. [Immunological analysis of an elderly case of idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia(IPL) having no symptoms over 5 years]. Nihon Ronen Igakkai Zasshi. 1987; 24: 580-585.
20 Yokoyama S, Sano M, Nakamaki T, et al. [Idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia (IPL) characterized by cutaneous involvement]. Rinsho Ketsueki. 1985; 26: 2021-2026.
21 Mori S. Idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia. A syndrome related to giant lymph node hyperplasia of plasma cell type. J Jap Soc RES. 1980; 20(suppl): 85-94.
22 Kojima M, Nakamura N, Otuski Y, et al. Pulmonary lesion of idiopathic plasmacytic lymphadenopathy with polyclonal hyperimmunoglobulinemia appears to be a cause of lymphoplasmyctic proliferation of the lung: A report of five cases. Pathol Res Pract. 2008; 204: 185-190.
23 Liu AY, Nabel CS, Finkelman BS, et al. Idiopathic multicentric Castleman’s disease: a systematic literature review. Lancet Haematol. 2016; 3: e163-e175.
24 Suzuki E, Ichimura T, Kimura S, Kanno T, Migitaka K. Primary Sjögren’s syndrome accompanied by clinical features of TAFRO syndrome. Case Rep Rheumatol. 2020; 2020: 8872774.
25 Ohta T, Oda N, Saito K, Tamiya S, Ueno T. A Case of repeated TAFRO syndrome-like symptoms and retroperitoneal hemorrhage in a patient with Sjögren syndrome. Cureus. 2020; 12: e12175.
26 Li ZY, Kim S, Huang S, Mian R. Multicentric Castleman dis-
ease with TAFRO syndrome and Sjögren’s. Clin Case Rep. 2019; 7: 2388-2392.

27 Tokunaga M, Yamada M, Yoshikawa S, et al. [Systemic lupus erythematosus with marked eosinophilia and clinical features mimicking TAFRO syndrome]. Rinsho Ketsueki. 2018; 59: 688-694.

28 Hasegawa E, Sato H, Wada Y, et al. Characterization of patients with systemic lupus erythematosus who meet the diagnostic criteria for TAFRO syndrome. Lupus. 2018; 27: 417-427.

29 Fujiwara Y, Ito K, Takamura A, Nagata K. The first case of thrombocytopenia, anasarca, fever, renal impairment or reticulin fibrosis, and organomegaly (TAFRO) syndrome with unilateral adrenal necrosis: a case report. J Med Case Rep. 2018; 12: 295.

30 Fujimoto S, Kawabata H, Kurose N, et al. Sjögren’s syndrome manifesting as clinicopathological features of TAFRO syndrome. Medicine (Baltimore). 2017; 96: e9220.

31 Iwanaga N, Harada K, Tsuji Y, et al. [TAFRO syndrome with primary Sjogren’s syndrome]. Nihon Rinsho Meneki Gakkai Kaishi. 2016; 39: 478-484.

32 Edahiro Y, Ichikawa K, Sunami Y, Koike M, Komatsu N. [Autoimmune hemolytic anemia in a patient with TAFRO syndrome]. Rinsho Ketsueki. 2015; 56: 2346-2350.

33 Girón-González JA, García del Río E, Rodríguez C, Rodríguez-Martorell J, Serrano A. Antiphospholipid syndrome and asymptomatic carriers of antiphospholipid antibody: prospective analysis of 404 individuals. J Rheumatol. 2004; 31: 1560-1567.

34 Cervera R, Rodriguez-Pintó I. Catastrophic antiphospholipid syndrome: task force report summary. Lupus. 2014; 23: 1283-1285.

35 Erkan D, Cervera R, Asherson RA. Catastrophic antiphospholipid syndrome: where do we stand? Arthritis Rheum. 2003; 48: 3320-3327.

36 Mizuno H, Sawa N, Watanabe S, et al. The clinical and histopathological feature of renal manifestation of TAFRO syndrome. Kidney Int Rep. 2020; 5: 1172-1179.

37 Mizuno H, Sekine A, Oguro M, et al. Renal histology in a patient with TAFRO syndrome: a case report. Hum Pathol. 2018; 82: 258-263.

38 Nishimura Y, Fajgenbaum DC, Pierson SK, et al. Validated international definition of the thrombocytopenia, anasarca, fever, reticulin fibrosis, renal insufficiency, and organomegaly clinical subtype (TAFRO) of idiopathic multicentric Castleman disease. Am J Hematol. 2021; 96: 1241-1252.