CASE REPORT

Castleman Disease Presenting with Pseudotumour Cerebri and Myasthenia Gravis: A Case Report and Literature Review

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ABSTRACT

Castleman disease (CD) is a rare lymphoproliferative disorder that may present with various autoimmune, inflammatory, or neurologic syndromes. This is a case of a 21-year-old woman who presented with signs and symptoms of pseudotumour cerebri (PTC) who subsequently developed myasthenia gravis (MG), and was incidentally found to have a large mass in the posterior mediastinum. Upon resection, the mass was classified as unicentric CD involved with follicular dendritic cell sarcoma. Following treatment with IVIG in the setting of progressive weakness and dyspnea, she has had complete symptom resolution while maintained on a low dose of pyridostigmine for the last two years. There are 13 cases of MG and five cases of optic disc edema described as PTC associated with CD in the literature, but to our knowledge, this is the sole case reported of the intersection of all three conditions in one patient. Increased serum levels of interleukin-6 and vascular endothelial growth factor may provide clues as to the association of CD with these neurologic syndromes.

ARTICLE HISTORY

Received 11 May 2018
Revised 30 May 2018
Accepted 1 June 2018

KEYWORDS

Pseudotumour cerebri;
Castleman disease;
myasthenia gravis; POEMS
syndrome; VEGF; interleukin-6

Introduction

Castleman disease (CD), or angiofollicular lymph node hyperplasia, is a lymphoproliferative disorder that was first described by Benjamin Castleman in 1956.¹ CD is classified as one of two types: unicentric (UCD) when localized to a single lymph node, or multicentric (MCD) when occurring systemically. It is also classified by histological variant: hyaline vascular, plasma cell, or mixed. Both types are associated with elevated erythrocyte sedimentation rate, C-reactive protein, and serum interleukin-6 (IL-6) levels.² However, they differ sharply in their clinical course – patients with UCD are typically asymptomatic, and the tumour is often found incidentally on physical examination or imaging. Symptomatic presentations of UCD are often related to tumour compression of local structures. Multicentric CD, on the other hand, usually presents with constitutional symptoms, lymphadenopathy, hepatosplenomegaly, and requires evaluation for lymphoma. Myasthenia gravis (MG) has been reported in 11 previous

cases of UCD and one case of MCD, while optic disc edema initially described as pseudotumour cerebri (PTC) has been noted in five cases of MCD.^{3–16} To our knowledge, there have been no cases published that involve all three of these disorders. We describe the case of a young female patient who developed PTC and MG in the context of UCD, and provide a review of the literature involving the intersection of these disorders.

Case presentation

A 21-year-old woman presented for an urgent neuro-ophthalmic consultation complaining of headache, intracranial noises, and blurred vision. Her medical history included lichen planus and recent weight gain, with a BMI of 35.7 kg/m². She was noted to have bilateral optic disc elevation (Figure 1), a normal brain MRI, and lumbar puncture revealed an elevated opening pressure of 38 cm of water with normal CSF composition. She was diagnosed with PTC and acetazolamide

Figure 1. Optic fundus photography. On initial encounter, the patient demonstrated bilateral papilledema, with elevation of the optic discs and mildly blurred margins.

was initiated, which gradually improved her symptoms. She also began following a weight loss plan.

Seven months later, the patient returned to the office with improved neuro-ophthalmic symptoms, resolved papilledema, and 18 lbs. of weight lost. However, she reported new symptoms – she felt that her smile was drooping on the right side and she was having difficulty talking and reading at length without tiring. Her neurologic examination was normal at that visit. She returned home during summer break from college and noted progression of her facial weakness with new-onset dysphagia. She was seen by her local neurologist, who suspected that she had MG. Testing revealed elevated acetylcholine receptor (AChR) antibodies, and she was prescribed pyridostigmine 60 mg TID. A CT thorax was obtained to evaluate for possible underlying thymoma, and demonstrated a large, 9 cm posterior mediastinal mass (Figure 2). The patient then disclosed that, 18 months prior, in the setting of chronic respiratory symptoms, a thoracic mass was found incidentally on chest imaging and read as a 7 cm bronchogenic cyst. Following additional review with her current team of physicians, the mass was felt to be inconsistent with a bronchogenic cyst, and the patient underwent a thoracotomy. Histological examination of the specimen led to a diagnosis of follicular dendritic cell sarcoma (FDCS) arising in the setting of a mediastinal lymph node involved by hyaline vascular CD (Figure 3). A panel of immunostains demonstrated the neoplastic spindle cells having a follicular dendritic cell phenotype, based on their

Figure 2. CT thorax, lung window. Following myasthenia gravis diagnosis, screening for thymoma revealed a posterior mediastinal mass measuring $4.7 \times 5.9 \times 8.6 \text{ cm}^3$ (asterisk).

expression of CD21, CD23, and CD35. An association between CD and human herpes virus 8 exists; however, immunostain for this virus was negative. Likewise, Epstein Barr Encoding Region (EBER) *in situ* hybridization studies for Epstein-Barr virus were also negative. A PET/CT scan performed several weeks post-surgery showed no abnormal fluorodeoxyglucose (FDG) uptake in the area of resection, indicating lack of recurrence (Figure 4).

Three months after her surgery, the patient experienced a fall due to sudden weakness in her

Figure 3. Histologic slides from the mediastinal mass (Hematoxylin & Eosin stain), revealing follicular dendritic cell sarcoma arising in a lymph node involved by hyaline vascular Castleman's Disease (CD). 3A: Follicular lymphoid hyperplasia with atretic germinal centres and expanded mantle zones was noted. 3B: On higher magnification, the follicles are penetrated by capillaries ("lollipop follicles", asterisk), and the lymphocytes in the mantle zone showed a so-called "onion-skin" pattern (arrow), both classic findings of CD. Additionally and admixed with the areas of classic CD was a neoplastic proliferation of spindle cells arranged in fascicles and storiform arrays and whorls (Figure 3c, asterisk) without significant atypia or mitotic activity (Figure 3d).

Figure 4. Fused PET/CT, three months post-surgery. No abnormal fluorodeoxyglucose (FDG) uptake is seen in the site of the resection.

extremities, requiring a visit to the ED. On exam, she had fatigability on upper extremity strength testing and hip flexion was 4+/5 bilaterally; the rest of her

lower extremity strength was normal. Following increase in her pyridostigmine dosage, her symptoms and pulmonary function tests significantly improved. She was discharged home on increased pyridostigmine and on follow-up, she continued to have fluctuating weakness in her face and extremities. She was advised to urgently begin IVIG treatment, but she deferred until completion of her college examinations. Soon after, the patient was re-admitted to the hospital with severe fatigue, exertional dyspnea, muscle weakness, and headache. On exam, she had moderate weakness with shoulder abduction and hip flexion. She was started on a course of IVIG with symptom resolution at discharge. At subsequent office visits, she remains asymptomatic, only requiring a stable dose of pyridostigmine. Repeat CT thorax studies to the present do not show any residual or recurrent mass, and recent repeat full-body PET/CT reveals no abnormal metabolic activity or lymphadenopathy.

Discussion

There are 12 reports in the literature, the present case included, describing UCD associated with MG, and

Table 1. Summary of cases in the literature involving CD and MG.

Reference	Year	Age	Sex	Tumour location	Clinical type	Histological type	Presenting symptoms
Emson et al. ³	1973	14	F	Retroperitoneum	Unicentric	Hyaline vascular	Ptosis, chest tightness
Pasaoglu et al. ⁴	1994	15	F	Neck, mediastinum	Multicentric	Mixed-cell	Weakness
Chorzelski et al. ⁵	1999	31	M	Retroperitoneum	Unicentric	Hyaline vascular	Mucosal erosions and bullae
Day et al. ⁶	2003	39	F	Mediastinum	Unicentric	Hyaline vascular	Speech difficulty, ptosis, diminished swallow reflex
Westphal et al. ⁷	2010	72	F	Mediastinum	Unicentric	Hyaline vascular	Muscle weakness, ptosis, diplopia
Kojima et al. ⁸	2011	59	M	Mediastinum	Unicentric	Hyaline vascular	Several year history of MG
Lee et al. ⁹	2012	51	M	Mediastinum	Unicentric	Hyaline vascular	Ptosis, dysarthria, difficulty chewing, weakness
Jakubíková et al. ¹⁰	2013	35	M	Abdomen	Unicentric	Mixed-cell	Mucosal erosions
Ishikawa et al. ¹¹	2014	55	F	Mediastinum	Unicentric	Hyaline vascular	Ptosis, speech impairment, severe dyspnea
Wang et al. ¹²	2014	29	M	Retroperitoneum	Unicentric	Hyaline vascular	Upper and lower limb fatigue
Dinesha et al. ¹³	2014	25	F	Retroperitoneum	Unicentric	Hyaline vascular	Mucosal erosions
Benjamin et al. ¹⁴	2015	29	F	Pelvis	Unicentric	Hyaline vascular	Acute lower abdominal pain
current study	2018	21	F	Mediastinum	Unicentric	Hyaline vascular	Headache, blurred vision, pulsatile tinnitus

only one such case of MCD (Table 1).^{3–14} Of the 12 UCD cases, 10 (83%) involve the hyaline vascular subtype of UCD, while the other 2 involve the mixed-cell variety. Eight cases (67%) presented with symptoms of MG, three (25%) presented with erosive skin and mucosal lesions of pemphigus before MG symptoms developed, and one (8%) presented as an acute abdomen. In every case in which the UCD mass was found in the mediastinum, it was an incidental finding while looking for a thymoma, as it was in our case. In cases when it was located in the abdomen or pelvis, it was discovered on imaging to evaluate for pain or palpated on physical exam. Four patients experienced a myasthenic crisis following removal of the mass and were treated with plasmapheresis, IVIG, and/or steroids. Ten patients (83%) were treated with an anticholinesterase, and four (33%) report continued pyridostigmine maintenance. The three patients who presented with pemphigus died during hospitalization or within one year. Their courses were more severe, and they died of sepsis, complications from bronchiolitis obliterans, and a ventricular arrhythmia, respectively.^{5,10,13} The other nine patients reported either minimal or no symptoms of MG at follow-up.

Five cases in the literature report what is described as PTC in association with CD involved women between the ages of 40 and 61. In all five cases, the patients had the MCD (Table 2).^{15,16} All five of these cases presented with symptoms of optic disc swelling,

with three of them having elevated opening pressures ranging from 25 to 38 cm of water and two presented with hepatosplenomegaly and diffuse lymphadenopathy. In four of the cases, serum protein electrophoresis revealed an IgA spike (mostly polyclonal), while two had IgG or IgM in excess. Only two of the cases involved the sclerotic bone lesions commonly found in MCD, and three revealed significant thrombocytosis. All five patients had peripheral neuropathy. Three of the patients were administered corticosteroids, and only two were given acetazolamide to relieve the intracranial pressure. Two patients received chemotherapy, both of whom showed improved peripheral neuropathy. The prognosis in these cases varied – three patients had resolved papilledema and neuropathy years later, one had unresolved symptoms and was lost to follow-up, and one had a complicated course with repeated pneumonia and sepsis and died within five months of diagnosis. By applying the current diagnostic criteria for POEMS,¹⁷ these five cases were all likely patients with POEMS syndrome (Peripheral neuropathy, Organomegaly, Endocrinopathy, Monoclonal gammopathy, Skin changes) and secondary optic disc swelling, not PTC. CD has recently been defined as one of the major criteria of POEMS syndrome, and papilledema (a minor criterion) was found in 29–55% of POEMS patients in various series.¹⁸ Interestingly, there is a separate entity of CD variant of POEMS with no

Table 2. Summary of cases in the literature involving CD and optic disc edema described as PTC.

Reference	Year	Age	Sex	Tumour location	Clinical type	Presenting symptoms
Black et al. ¹⁵	1988	40	F	Mediastinum	Multicentric	Headache, blurred vision
Feigert et al. ¹⁶	1990	52	F	Diffusely spread	Multicentric	Hepatosplenomegaly
Feigert et al. ¹⁶	1990	59	F	Diffusely spread	Multicentric	Flickering scotoma
Feigert et al. ¹⁶	1990	49	F	Diffusely spread	Multicentric	Headache, blurred vision
Feigert et al. ¹⁶	1990	61	F	Diffusely spread	Multicentric	Diffuse lymphadenopathy, peripheral neuropathy

clonal plasma cell disorder, and these patients may have associated papilledema.¹⁷ However, unlike our case, these patients all have the MCD variant, along with the systemic symptoms of POEMS.¹⁹

While the cause of our patient's papilledema was PTC and not POEMS syndrome, the connection between POEMS and CD may help explain our patient's unusual presentation. Both IL-6 and vascular endothelial growth factor (VEGF) have been shown to correlate with disease activity in both CD and POEMS, and these factors have been implicated in the pathogenesis of both diseases.¹⁷ The germinal centres of hyperplastic lymph nodes in CD have also been shown to produce significant amounts of IL-6, which stimulates VEGF production, leading to angiogenesis.^{20,21} VEGF has specifically been implicated as a possible instigator of papilledema in POEMS, and the degree of papilledema²² and peripapillary retinal thickness²³ has been shown to correlate with plasma VEGF levels and respond to anti-VEGF therapy in these patients.²⁴ Castleman tumour-induced increase in IL-6 and VEGF may explain the papilledema found across the spectrum of CD, from UCD as in our case, to MCD with POEMS syndrome. As noted above, while all previous cases of CD and optic disc edema described as PTC have been MCD, our case is the first to describe a patient with UCD and PTC. She was also a patient that fit the typical presentation of PTC being a woman of reproductive age and overweight. Thus, this could be an incidental case of PTC and UCD or perhaps a novel presentation. Additionally, while patients with POEMS typically have normal to mildly elevated opening pressures, our patient's opening pressure was significantly elevated. Again, this raises the possibility that her PTC was concurrent and incidental to the CD.

Serum IL-6 is also elevated in MG, and anti-IL-6 receptor antibody therapy (tocilizumab) has been shown to be beneficial for both CD and MG patients.^{25–29} It has been suggested that increased IL-6 in CD actively stimulates plasma cell differentiation leading to increased levels of autoantibodies, which may explain an association of CD with MG and other autoimmune disorders.¹⁰ Serum IL-6 levels obtained 10 and 22 months' post-surgery were noted to be 2.4 pg/mL and 0.9 pg/mL, respectively, within normal limits. Serum VEGF levels were obtained 28 months post-operatively, and were 66 pg/mL (normal: 0–115 pg/mL). Unfortunately,

levels of IL-6 and VEGF were not obtained pre-operatively, and therefore is a limitation in this case for drawing a stronger link between all three conditions.

FDCS, an extremely rare neoplasm, has been reported in twenty-two other patients with CD, and has been shown to develop from the hyperplastic tissue in CD tumours.^{30–37} It is almost always found within unicentric, hyaline vascular CD, as it was in our patient. None of these patients had papilledema, and only one had MG and was included in our review of cases above.⁷ Paraneoplastic pemphigus was the only other autoimmune disorder reported, and all three of those patients died from either sepsis or respiratory failure soon after presentation. The remaining FDCS patients had varying presentations and outcomes, from complete resolution or local recurrence to metastasis, treatment failure and death.

In summary, increased IL-6 and VEGF activity may explain our patient's presentation, similar cases described in the literature, and more broadly why CD is associated with such seemingly disparate disorders as MG and PTC. Limitations in our case include that it is a case study, we did not have baseline levels of IL-6 and VEGF prior to tumour resection, and her presentation of concurrent PTC, CD, and MG could all be entirely incidental. Nonetheless, our patient presenting with PTC, MG, and CD all diagnosed within a span of nine months may be more than just a fascinoma. Further investigation into the role of IL-6 and VEGF in PTC, CD and MG may reveal a potential unifying link between these conditions.

Declaration of interest

There are no relevant financial disclosures and no conflicts of interest.

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