

Case Report

Concurrence of chordoid gliomas with Rosai-Dorfman component: report of two rare cases

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Abstract: Chordoid glioma (CG), which often originated from the third ventricle, was a type of rare and slowly growing low grade glioma with chordoid appearance. So far, concurrent occurrence of third ventricle chordoid gliomas with Rosai-Dorfman disease (RDD) has never been observed. In this study, the clinical features, pathological characteristics as well as their prognosis of two CG with RDD component cases were discussed. Herein, we reported two cases of CG with RDD component from a 45-year-old female and a 38-year-old male respectively. Radiologically, the two lesions were located on the region of suprasellar-third ventricular with homogenous contrast enhancement. They underwent gross total resection and remained free of disease progress till now. Microscopically, both lesions showed the classic morphology of CG and RDD component. A morphologic curiosity is presented in tumors manifested by CG with RDD component in the suprasellar-third ventricular region. To the best of our knowledge, this is the first presentation of two collision tumors consisting of CG and RDD on the suprasellar-third ventricular region. Awareness of this entity is important to distinguish it from other CGs. More examples and a timely follow-up are required for understanding the biological features of these cases.

Keywords: Rosai-Dorfman disease, chordoid glioma, suprasellar-third ventricular

Introduction

Chordoid glioma is a rare neoplasm which was firstly named by Brat et al in 1998 [1]. They occurred typically in anterior third ventricle with variable extension to the suprasellar region. They were considered as a World Health Organization (WHO) grade II tumor [2, 3]. Radiologically, they present with isointense on T1-weighted MRI and strong uniform contrast after enhancement. Histologically, the histogenesis of this neoplasm remains unclear although it is currently classified into the WHO grade II gliomas. It was a unique tumor showing chordoid and glial features [4]. And lymphocyte/plasma cell infiltration is regular. Chordoid gliomas are rarely accompanied by other components. So far, only two cases of chordoid glioma coexisting with other different histological components have been reported by Lee HW (with Rathke's cleft cyst) and Poyuran R (with epidermoid cyst) [5, 6]. Herein, we report two rare cases of CG accompanied by RDD component in adult patients. This is the first description of this kind of tumor.

Patients and methods

Case 1

A 45-year-old woman presented with a history of memory decline, calculation decrement, sleepiness, dizziness and headache for six months and a progressive left visual blurring for three months. Since her dizziness kept worsening, she was eventually admitted to our hospital.

Her blood tests showed that neutrophil percentage was mildly elevated. Physical examination showed no hepatosplenomegaly, no superficial lymph node enlargement, no fever or other focal lesions. Neurological examination showed no neurological deficit except for muscle strength weakness.

The magnetic resonance imaging (MRI) of the head showed a mass in the anterior third ventricle and suprasellar region. The mass was isointense on T1WI, isointense on T2WI and homogeneously enhanced following gadolinium administration (**Figure 1A-D**).

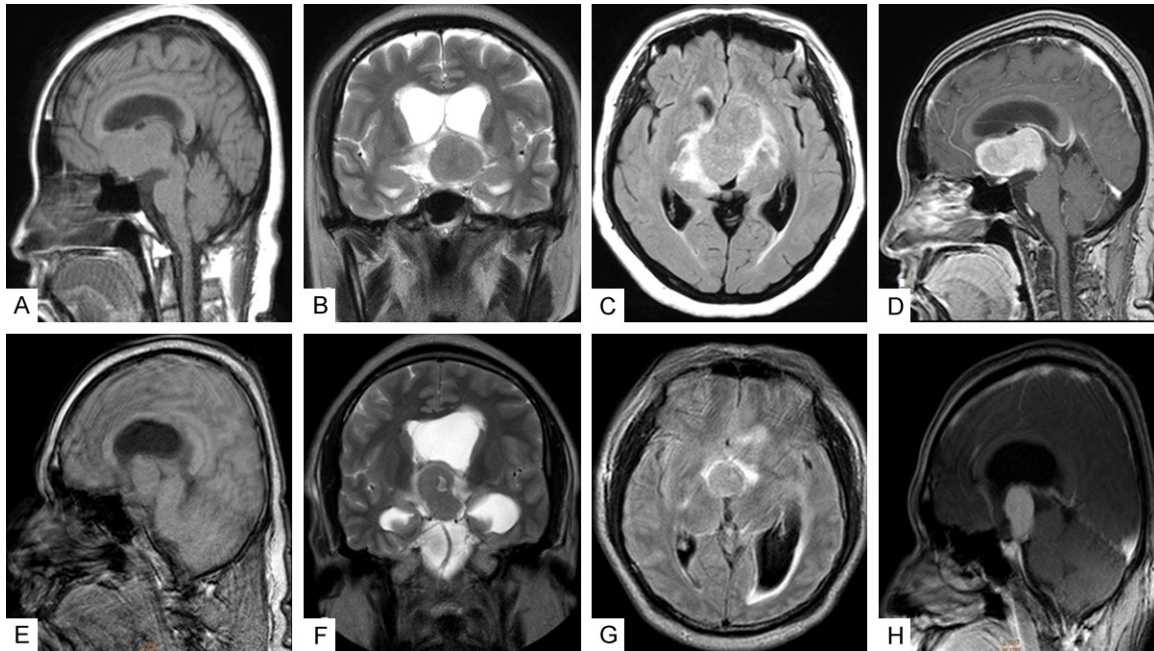


Figure 1. Magnetic resonance imaging findings. MRI of head (patient 1) shows a mass in the anterior third ventricle and suprasellar hyperdense. The mass is isointense on sagittal T1WI (A), isointense on coronal T2W (B), isointense on axial FLAIR (C), and is with heterogeneous contrast enhancement (D). MRI of head (patient 2) shows a lesion located in the suprasellar. The mass is isointense on sagittal T1WI (E), isointense on coronal T2W (F), isointense on axial FLAIR (G), and is homogeneously enhancing following gadolinium administration (H).

She underwent right frontal craniotomy. The lesion was located in the anterior 3rd ventricle. The tumor was adherent to the anterior wall of the 3rd ventricle and optic chiasm. The adherence of the tumor required micro-dissection in order to obtain a gross total resection.

The postoperative course was uneventful, apart from restoration of vision. She did not receive any further treatment and remains free of disease for 4 months.

Case 2

A 38-year-old man was admitted in October 2016 with a 10-day history of headache. Since his headache kept worsening, he was admitted to our hospital. No neurological deficits were found. Physical examination revealed a suprasellar mass lesion and no hepatosplenomegaly, lymphadenopathy, fever or other focal signs. Routine hematological and biochemical studies were normal except the mild elevation of neutrophil percentage.

MRI showed a lesion in the sella area (**Figure 1E, 1F**). The tumor manifested heterogeneity on T2WI and isointense on T1WI. After gad-

linium injection, obvious enhancement was found. He underwent a right frontal craniotomy. The lesion was located in the third ventricle, adhering to the hypothalamus and the optic chiasm. The tumor underwent gross total resection. The postoperative course was uneventful. He did not receive any further treatment and remains free of disease progress for 6 months.

Pathologic results

Macroscopically, the tumor in patient 1 was an irregular, tough and grayish red mass measured as 5.2×3×2 cm. At sectioning, the mass showed some areas in gray. The tumor in patient 2 was an irregular and grayish red mass that measured as 4×4×4 cm. At sectioning, the mass also showed some areas in gray.

Histologically, the tumour in both patients was consisted of chordoid glioma areas which were interlaced with clusters of histiocytes component. The chordoid glioma areas were composed of polygonal cohesive, epithelioid tumor cells (**Figure 2A**), which were distributed in sheet and cords (**Figure 2B, 2C**). Myxoid stromal changes were focally apparent. The tumor cells were mild in size with eosinophilic cyto-

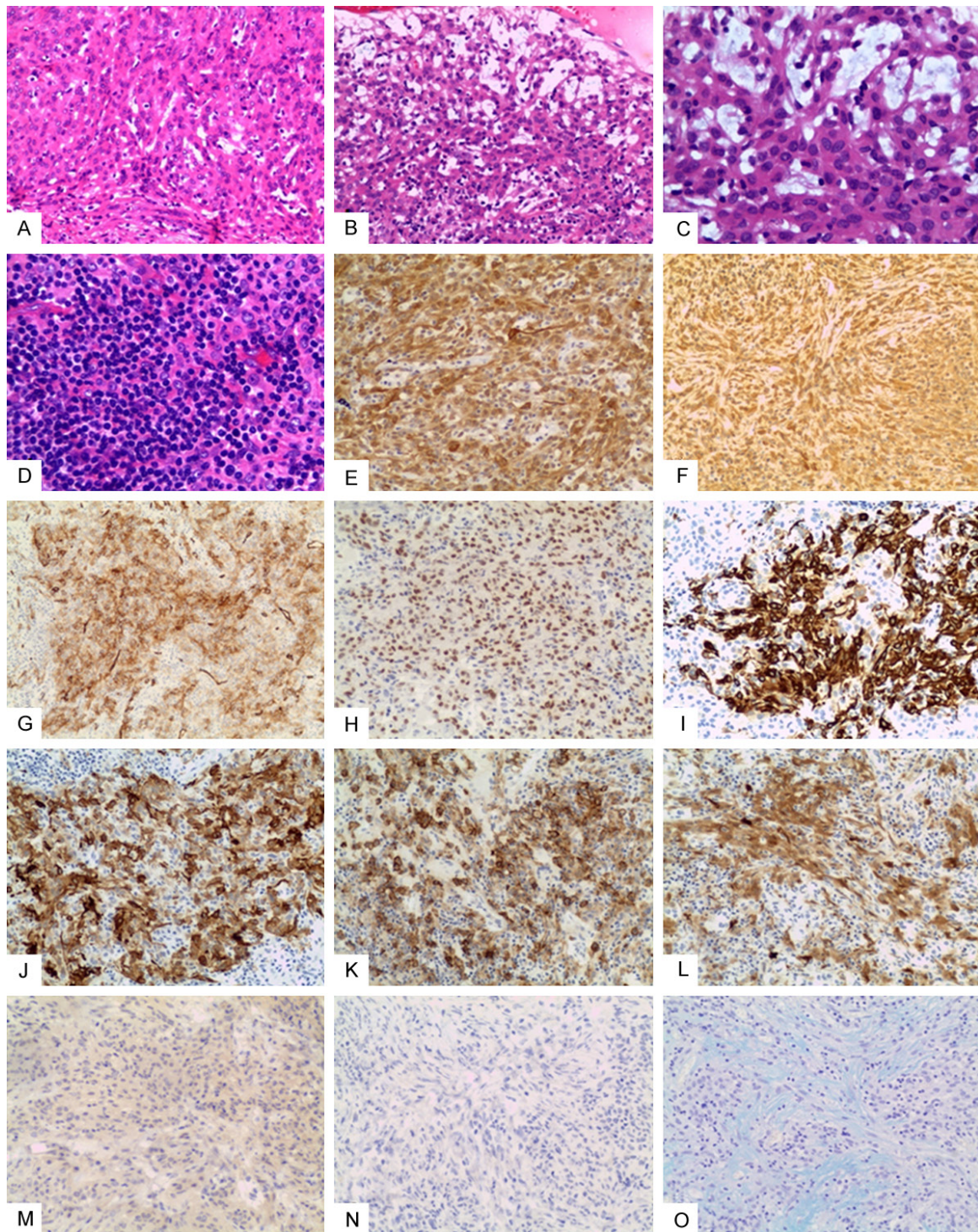


Figure 2. Histologic features of the chordoid glioma areas. The chordoid glioma areas included polygonal cohesive, epithelioid cells arranged in sheet distribution and cords. (patient 1: (A) H&E, $\times 200$, (B) H&E, $\times 200$). Higher magnification demonstrates cord like arrangement of cells in myxomatous background. (patient 2: (C) H&E, $\times 400$). Focally epithelioid tumor cells were accompanied by lymphoplasmacellular infiltrates (patient 2: (D) H&E, $\times 400$). Immunohistochemical studies demonstrated diffuse cytoplasmic reactivity for MAP-2 (E), vimentin (F), CD34 (G) and TTF1 (spt24) (H). And focal reactivity for GFAP (I), cytokeratin (J), epithelial membrane antigen (EMA) (K) and S-100 (L). No immunoreactivity for PR (M) and SSTR2a (N). Alcian Blue stain showing an abundant mucoid matrix (O).

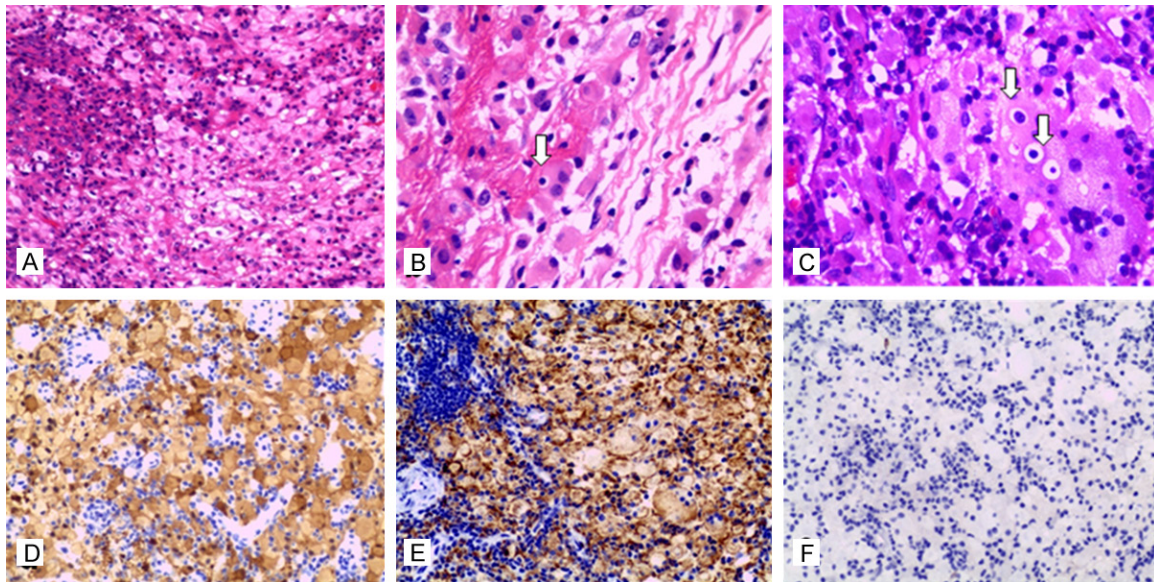


Figure 3. Histopathology of the histiocytes cells component. The histiocytes component is composed of infiltration of lymphoplasmacytic cells and histiocytic cells with foamy cytoplasm (patient 1: (A) H&E, ×200); Histiocytic cells occasionally show emperipolesis (lymphocytaphagocytosis) (arrows) (patient 1: (B) H&E, ×400, patient 2: (C) H&E, ×400); Histiocytic cells are immunoreactive for S-100 (D), CD68 (E) and negative for CD1a (F).

plasm, no mitosis, no necrosis, mild nuclear pleomorphism and no neovascularization. A lymphoplasmacytic infiltration was prominent (**Figure 2D**). And plasma cells showed frequent Russell bodies in both two specimens. The tumour cells were partly surrounded by reticulin fibers. Immunohistochemically, majority of tumor cells showed expression of MAP-2 (**Figure 2E**), Vimentin (**Figure 2F**), CD34 (**Figure 2G**), TTF1 (SPT24 clone) (**Figure 2H**) and focal activity for GFAP (**Figure 2I**), cytokeratin (**Figure 2J**) and epithelial membrane antigen (EMA) (**Figure 2K**), S-100 (**Figure 2L**). Both were immunonegative for PR (**Figure 2M**), SSTR2a (**Figure 2N**), IDH1R132H and NSE. MIB-1 labeling index was low (<5%) in both tumour. The (Alcian-blue) AB-(periodic acid-Schiff) PAS-positive myxoid stromal changes were focally apparent (**Figure 2O**). Thus, on the basis of these features, the lesions were diagnosed as CG (WHO II).

The other part was composed of predominant clusters of histiocytes cells (**Figure 3A**). Some histiocytes showed sheet-like arrangement. The cytoplasm of those histiocytes was foamy. The nucleus of histiocyte was not folded. The infiltration of lymphocyte/plasma cells and plasma cells were found in the background. The histiocytic cells occasionally showed emperipolesis (lymphophagocytosis) (**Figure 3B**,

3C). Immunohistochemical analysis showed that most of the histiocytes were diffusely positive for CD68 (**Figure 3D**), S-100 (**Figure 3E**) and negative for CD1a (**Figure 3F**). The pathologic features were consistent with RDD. However, the proportion of the histiocytes component was different in two patients. The portion of histiocytes cells component in the tumor tissue was 40% in patient 1 and 15% in patient 2.

Discussion

CG is a type of extremely rare low-grade glial tumor which tends to occur in the third ventricular system, with the median age of 46 years and female predominance [4]. In our cases, two patients of CG were 45 and 38 years old respectively, similar to previous studies. Clinical presentations were various, including headache, nausea, visual impairment and sometimes endocrinological disturbances. Radiologically, classic CG is characteristic of well circumscribed and solid mass which was isointense on T1WI, hyperintense on T2WI and homogeneously contrast enhanced [7]. Our two cases showed classic MRI appearances of CG. However, the definite diagnosis of these neoplasms can only be achieved by histopathological and immunohistochemical results. The CGs

Concurrent occurrence of chordoid gliomas with Rosai-Dorfman component

Table 1. Summary of 4 collision tumors of CG and the other different histological component

Cases	Age	Sex	Signs and symptoms	Tumor location	The other histological component	Treatment	Follow-up
Lee HW et al. [5]	48	F	Headache and dizziness	Sellar and suprasellar, displacing the floor of the third ventricle	Rathke's Cleft Cyst	Gross total resection	5 months after resection: no recurrence noted
Poyuran R et al. [6]	45	M	Multiple episodes of generalized tonic-clonic seizures, memory loss	Hypothalamus and the third ventricle	Epidermoid Cyst	Subtotal resection	12 days after resection: died of postoperative complications
Our case 1	45	F	Memory decline, calculation decrement, sleepiness, dizziness and headache, visual blurring of the left eye	Anterior third ventricle, suprasellar region	RDD	Gross total resection	4 months after resection: no recurrence noted
Our case 2	38	M	Headache	Suprasellar	RDD	Gross total resection	6 months after resection: no recurrence noted

shows a uniform histopathological feature. Clusters and cords of epitheloid cells with eosinophilic cytoplasm are embedded in a mucinous matrix with prominent lymphoplasmacytic infiltrations. The mitoses, necrosis or microvascular proliferation are often absent [8]. Immunohistochemically, tumor cells manifest strong and diffuse reaction to GFAP/vimentin/CD34 and focal reaction to EMA/cytokeratin/CD99 and synaptophysin occasionally. Our cases manifest diffusely positive reaction to MAP-2/Vimentin/CD34, and focally positive reaction to GFAP/S-100/cytokeratin/EMA. All the patients reported, including our cases, show a low Ki-67 index. The biggest difficult in differential diagnosis is chordoid meningioma which is presented with nuclear inclusions as well as cellular whorls histopathologically. Moreover, chordoid meningioma shows positive reaction to EMA, SSTR2a and PR, but negative reaction to GFAP. All these pathological features could help to distinguish chordoid meningiomas from CG. TTF-1, which is a homeodomain transcription factor expressed in the ventral forebrain during embryonic development and adulthood, was diffusely positive in most tumor cells (>60%) in 16/17 cases [9]. Although TTF-1 is not specific to CG, it has been proposed as a good marker for CG in differential diagnoses [10]. Both our two cases also showed TTF-1 expression. Therefore, both microscopic findings and immunohistochemical results point to the diagnosis of CG.

However, there are some striking differences between our cases and the typical CG reported in the previous studies. In addition to CG component, some histiocytes were scattered within the tumor cells, with 40% in patient 1 and 15%

in patient 2. The histiocytic cells present with foamy-like cytoplasm and occasionally manifest emperipolesis. Furthermore, some lymphoplasmatoid cells and plasma cells were also found in the background. These histiocytes were immunohistochemically positive for S-100 and CD68 and negative for CD1a, which are features of histiocytes lineage and suggested the diagnosis of RDD. RDD is a rare, idiopathic, histiocytic proliferative disease. It could involve most organs in the body, such as gastrointestinal tract, skin, skeleton, thyroid and central nervous system. Isolated intracranial RDD is rare and reported in approximately 5% of cases [11]. And older patients (mean 39.4 years) demonstrate greater risk than young patients to systemic RDD [12]. Immunohistochemically, RDD are generally positive for S-100 and CD68. Emperipolesis is characteristic of RDD and is present in 70% of cases [13]. Therefore, emperipolesis is helpful in diagnosis of RDD. The pathologic features of histiocytes in our 2 cases point to the diagnosis of RDD.

CGs are rarely accompanied by other components and only a few cases of CG coexisting with other different histological components have been reported [5, 6]. Based on the previously documented 2 tumors [5, 6], one described CG coexisting with Rathke's Cleft Cyst, the other coexisting with Epidermoid Cyst (**Table 1**), these collision tumors occur in adults with a median age of 46.5 years. Their clinicopathologic features were variable, generally related to the local mass effect of the tumor, such as headache, dizziness, seizures and memory loss (**Table 1**) and in all cases the authors have interpreted the underlying pathology as "collision tumor". The present 2 cases

are adults with a median age of 46.5 years, presented with main symptom of mass effect including headache and memory decline and they are the first 2 cases of the chordoid glioma combined with RDD.

The coexistence of CG and RDD has never been reported in previous studies. It was known that two components without histologic transitions have been known as collision tumors. The tumors in the present two patients showed apparent two separate components. Therefore, we thought they were more likely to be two concurrent, independent collided tumors. RDD is a benign, self-limiting disease with unknown etiology and pathogenesis. It has been suggested that an autoimmune process may be the cause of this disease [11]. Pathological results show that both RDD and CG exhibit infiltration of abundant lymphoplasmatoid cells, whereas the abundant lymphoplasmatoid cells are always relative to RDD. At present, one hypothesis to explain the etiologic factors of collision tumors is that the presence of the first tumor alters the microenvironment and might have initiated the other [14]. Based on these findings, we propose a hypothesis that the lymphoplasmatoid cells and plasma cell play an important role in the occurrence of this collision tumor by altering the microenvironment. However, more examples were needed for further understanding the real biology features of this tumor.

The prognosis of CG depends on several factors, such as the location, extent of resection, treatment modality, postoperative infectious diseases, hypothalamic disorders and so on. Operation is considered as the most effective treatment currently. For intracranial RDD, surgical excision is also generally considered as an important therapy for patients [15, 16]. The benefits of radiotherapy and chemotherapy after surgery for CG and RDD are uncertain [17-19]. In our two cases, the tumors underwent gross total removal without radiotherapy and chemotherapy, and no evidence of recurrence were observed after 4 and 6 months. Since the follow-up time is not long enough to understand disease progress, the prognosis of CG with RDD component is not yet fully established.

In conclusion, the present study described two rare examples of CG with RDD component. This type of mixed lesion may pose a diagnostic

challenge to the pathologist and should warrant special attention during diagnosis.

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Disclosure of conflict of interest

None.

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