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Case Report

Cerebral foreign body granuloma in brain triggering generalized seizures without obvious craniocerebral injury: A case report and review of the literature

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Abstract

Background: Intracerebral foreign body granuloma is rarely reported. We present the case of a male patient with a cerebral foreign body granuloma.

Case Description: Initial admission of a 67-year-old male patient was after an aphasia followed by secondary generalized seizures. Cranial computed tomography (CCT) showed a metal-dense, wedge-shaped foreign body in the range of the frontal sinus on the left side, breaking through the frontal sinus, and creating a connection to the frontal cerebral lobe. The patient did not report previous trauma or accident. A concomitant inflammatory response could not be excluded in CCT imaging. In clinical examination, the patient showed no sensorimotor deficit. Operative resection and dural reconstruction was performed. Several tiny, metal-like foreign-body fragments and one stone-like body could be detected and removed. Histopathological examination showed an intracerebral granuloma with areas of acute granulocytic inflammatory reaction.

Conclusion: Cerebral foreign body granuloma is a rare entity without initially provoking clinical symptoms, and causing clinical symptoms even years after the initial event. In most reported cases, wooden or metallic bodies are reported. In addition, hemostatic materials and non-resorbable cotton sheets can cause intracerebral granuloma. There is a high risk of infection with a high mortality rate in case of an existent intracranial abscess. In case of first presentation of seizures, a foreign body should be kept in mind if a traumatic injury cannot be reported. Therefore, possible foreign bodies provoking clinical symptoms such as seizures should always be radiologically excluded, and if present and operatively accessible, removal should be done as soon as possible.

Key Words: Cerebral granuloma, foreign body, seizures

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INTRODUCTION

Foreign body granuloma in brain is rarely reported. In a PubMed search from 1974 to 2015, only 43 cases were observed (cerebral cholesterol granulomas were excluded in the search). New onset seizures are considered to be typical manifestations, along with infections such as meningitis or cerebritis.[4]

We present the case of a 67-year-old male patient

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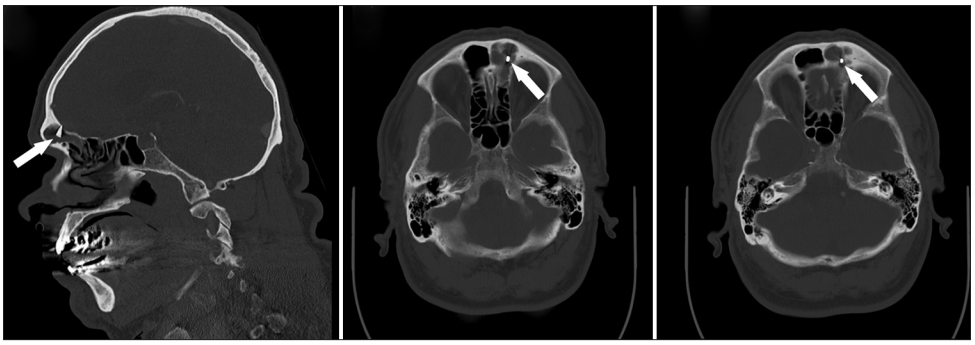

Figure 1: Preoperative imaging showed a metal-dense, wedge-shaped foreign body in the range of frontal sinus on the left side, braking through the frontal sinus and creating a connection to the frontal cerebral lobe

suffering from late-onset seizures caused by a frontal foreign body granuloma due to a foreign body breaking through the frontal sinus on the left side without obvious craniocerebral injury.

CASE PRESENTATION

Patient data

We present the case of a 67-year-old male patient. Initially, he was admitted to the Department of Neurology because of secondary generalized seizures after presenting with aphasia. An anticonvulsive medication with levetiracetam was initiated. Blood tests did not show increased inflammatory parameters, merely a mild leukocytosis. In initial cranial imaging using cranial computed tomography (CCT) with CT angiography a metal-dense, wedge-shaped foreign body in the range of frontal sinus on the left side was detected, which braked through the frontal sinus and created a connection to the frontal cerebral lobe. There was no defect of the skull. In addition, the left frontal lobe showed a hypodense area [Figure 1]. Administration of additional contrast agent showed minimal enhancement of the lesion. A concomitant inflammatory response could not be excluded in cranial imaging. A cerebral magnetic resonance tomography (cMRT) could not be performed because of the existing, presumably, metallic foreign body. For further diagnosis, lumbar punction was performed. However, in CT-controlled punction, no liquor could be attained. Prophylactic antibiotic therapy was inducted (Rocephin).

The patient was alert and reported that there had been no traumatic injuries. However, he could vaguely remember being told as a boy that there was "something" in his nose. In a cMRI (approximately 20 years ago), the foreign body arguably could be observed, however, no inspection was conducted at the time. In clinical examination the patient showed no focal deficit. Further seizures did not occur during his stay in the hospital under anticonvulsive therapy.

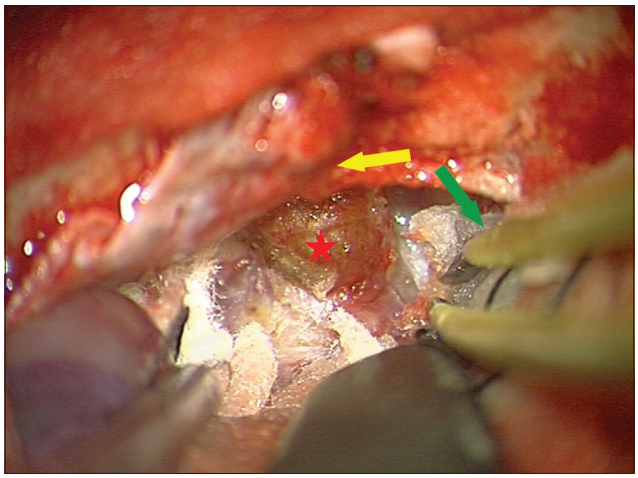

Figure 2: Intraoperative view: The left side of the frontal sinus is shown (yellow arrow). Cerebral granuloma in situ can also be seen (*). On the right side, frontal lobe can be seen (green arrow)

Because of the assumed infection (a concomitant intracerebral abscess could not be excluded) and the existing connection to the frontal cerebral lobe, surgery was recommended. Thereby, removal of the foreign body and the frontobasal covering was planned. In addition, inspection of the left frontal lobe, smear tests, and eventual clearing of the suspected intracranial abscess was planned.

Operation

We chose a small left frontobasal, paramedian (3 × 3 cm craniotomy) access path across a bifrontal cut. Thereby, the frontal galea periost was conserved for the later planned frontobasal covering. After retracting the left frontal lobe, a frontobasal lesion (1 × 1 cm) with cerebral infiltration appeared [Figure 2]. Resection followed [Figure 3]. There were no signs of an acute intracranial infection or abscess. Swab tests for microbiological testing were taken. Looking in the direction of the frontal sinus, several small, metal-like foreign body fragments could be detected and removed. Furthermore, the frontobasal part of the dura was removed and sent for histological examination. Inspection of the left frontal sinus followed. Inspection showed signs of a chronic infection. After identification and

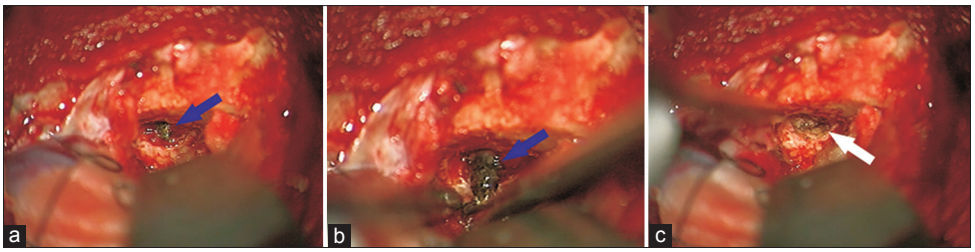

Figure 3: (a, b) After resection of granuloma, a metal-dense, wedge-shaped foreign body in the range of the frontal sinus on the left side can be seen, breaking through the frontal sinus and creating a connection to the frontal cerebral lobe, can be seen. After resection of the foreign body, direct view to the frontal sinus with a chronic inflammatory reaction is seen (c)

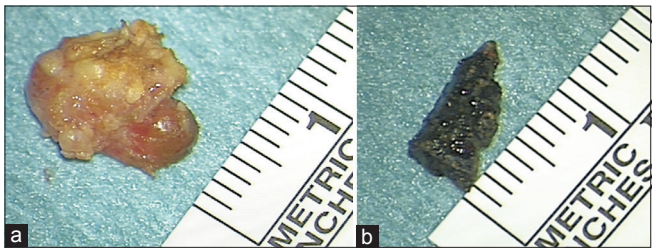

Figure 4: Resected granuloma (a) and foreign body (b)

resection of the foreign body (1 × 0.5 cm) [Figure 3b and Figure 4a,b], the chronic inflammatory suspected material in the frontal sinusal area was resected and sent for further histopathological examinations. Frontobasal covering by a frontal stemmed galea periost was performed. Patient was postoperatively supervised in our intensive care unit.

Clinical course

Postoperatively, the patient fast recovered from the operation. Intravenous antibiotic therapy was continued for at least 3 weeks. Microbiological examination of the intraoperatively obtained material from the frontal sinus resulted in the detection of *Klebsiella pneumoniae*. Antibiotic therapy was adapted corresponding to antibiotic recommendation. A systemic inflammatory response did not occur at any time during the patient's stay in our hospital. Also, no further seizures occurred. There were no signs of a postoperative frontobasal fistula. The patient was transferred to a rehabilitation center.

Histopathological findings

Histopathological examination showed intracerebral granuloma presenting parts of an acute granulocytic inflammatory reaction. Examination of the removed frontobasal dura showed an inflammation reaction with the detection of leucocytes. The material resected from the left frontal sinus showed connective tissue and a necrotic cell detritus with a lymphatic, plasma cellular, and monozytic infiltration [Figure 5a-j].

DISCUSSION

Foreign body granuloma is a rare entity. In a PubMed search, a total of 43 cases from 1974 to 2015 were noted. The most common causes of symptomatic epilepsy are brain infections and traumatic brain injuries.[2] Further causes of intracranial granuloma are tuberculosis or sarcoidosis.[9] Hence, new onset seizures are typical manifestations and are caused by gliosis or progressive secondary granulomatous changes.[2] Often intracranial foreign bodies initially provoke no clinical symptoms, and can cause clinical symptoms such as seizures or infections even years after the initial event.[8] The most frequently described penetrating pathways are the superior and lateral orbital wall, the optic canal, and the superior orbital fissure.[8] Injuries can occur more often in these locations, because of the only thin bone structure hicking through these structures is more easily possible, also without any major traumatic injuries.[9]

In most reported cases, wooden foreign bodies (such as chopsticks or pencils)[1] or metallic bodies (such as needles or bulletins in war)[5] are reported. In addition, hemostatic materials and non-resorbable cotton sheets[7] used in neurosurgical operations can cause intracerebral granuloma.[6,9]

Miller *et al*.[4] described an overall infection rate caused by intracranial wooden foreign bodies of 64% (in 14% with cerebritis or meningitis) and a concomitant mortality rate of 25% in affected patients. Furthermore, 57% of all patients suffering from an intracranial abscess caused by an intracerebral foreign body die.

Considering a reported mortality rate due to intracranial abscess caused by intracerebral foreign bodies in 57% of the affected patients, it is important to keep this rare entity in mind, especially since mortality rates can be reduced by a fast surgical therapy.

Furthermore, in times of war and violent conflicts, as well as a growing number of refugee influx in numerous parts of the world, the number of patients suffering from intracerebral granuloma caused by craniocerebral injuries may possibly increase.

CONCLUSION

Intracerebral foreign body granuloma is rarely reported. In case of seizures presenting for the first time, this possible cause should always be kept in mind, although without

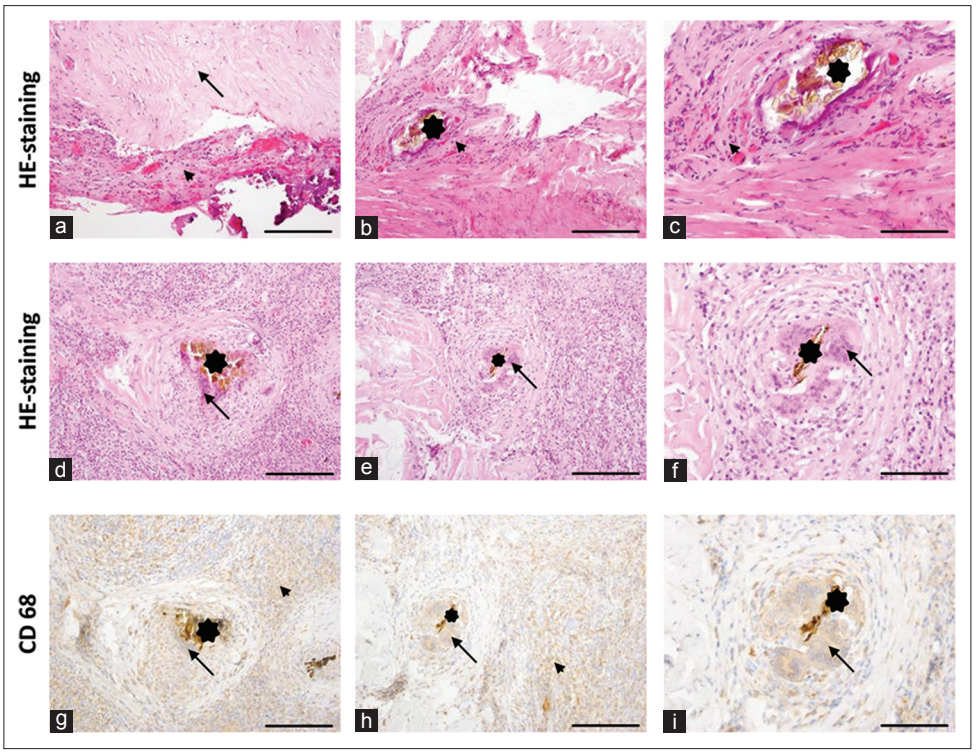

Figure 5: Histopathological findings showing hematoxylin and eosin (H and E) staining of representative areas of the dura specimens loose (a, arrow) and proliferating connecting tissue (a-c; arrow head), with only very few fragments of the alleged foreign particle (b, c; asterisk) surrounded by connecting tissue proliferations with higher vascularization (b, c; arrow head) and focal mineralization (a). (d-f) H and E staining of the representative areas of the foreign body granuloma with giant cells (arrows) surrounding fragments of the foreign body (asterisk). (g-j) Immunohistochemical staining against CD68 showing positivity of the giant cells (g-j; arrows) and surrounding macrophages (arrow heads). Similar immunohistochemistry protocols for different antibodies have been previously published.[3] Foreign body fragments are indicated by asterisks

remembering any traumatic brain injury in anamnesis. Therefore, in cranial imaging, possible foreign bodies provoking clinical symptoms should always be excluded, and in case of a detected intracranial foreign body, removal should be done as soon as possible.

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Conflicts of interest
There are no conflicts of interest.

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