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Traumatic encephalocele in the nasal cavity after 6 years of trauma: a case report

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Abstract

Background Encephalocele refers to protrusion of the meninges and brain tissue through a skull bone defect. It results from congenital, traumatic, neoplastic, or spontaneous reasons. Traumatic encephalocele occurs because of the posttraumatic fracture of the skull bone or iatrogenic causes. The manifestations vary a lot, such as rhinorrhea, seizures, headaches, and focal neurological deficits.

Case presentation A 20-year-old Syrian male presented to our department with the complaint of clear cerebrospinal fluid drainage from his right nostril, which started 6 years ago after a head trauma, moderate headache, and episodes of tonic–clonic seizures without any response to medical treatment. Then, 2 months ago, the patient had meningoencephalitis, so he was admitted to the intensive care unit and treated for a month until he was cured. The patient underwent radiological investigations, which showed that he had a base fracture with an encephalocele in the nasal cavity. The brain tissues with the meninges herniated through the skull base fracture with a significant expansion of the subarachnoid spaces in the right hemisphere. He was advised to undergo surgical repair at that time, but he refused the surgery. During this visit, surgery was indicated. The surgery was done by a specialist who returned the herniated brain tissues to their normal location, repaired the meninges, and reconstructed the skull base with bone cement and bio-glue. The patient's recovery after the surgery was uneventful.

Conclusion Traumatic encephalocele is a rare and unexpected complication of trauma, but we should keep it in mind when the patient comes with head trauma because of its life-threatening consequences. This complication can happen after years of trauma if the patient refuses treatment, therefore, we must educate patients about the dangerous results of neglecting cerebrospinal fluid leakage and skull fractures.

Keywords Traumatic encephalocele, Cerebrospinal fluid leakage, Meningitis, Seizures, Fronto-ethmoidal bone, Case report

Introduction

The term "encephalocele" refers to protrusion of the meninges and brain tissue through discontinuity in the skull bones [1–3]. It results from congenital, traumatic, neoplastic, or spontaneous reasons. Traumatic encephalocele occurs because of posttraumatic fracture of the skull bone or iatrogenic causes [1, 3, 4]. The incidence rate of acquired traumatic encephaloceles is 96% of all encephalocele cases [1, 4]. The manifestations of traumatic encephalocele are several and mainly associated with the size and position of the herniation, such as rhinorrhea, seizures, headaches, and focal neurological deficits [3]. Traumatic encephalocele can be treated conservatively, or through cerebrospinal fluid (CSF) drainage, or surgically [1, 4, 5]. Late diagnosis or treatment of this condition may lead to severe complications,

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including meningitis, CSF leakage, seizures, and tension pneumocephalus [1, 5]. In this paper, we discuss a patient's case who presented after trauma with only CSF leakage and refused to repair it, which led to complications, such as meningitis and seizures. Finally, he ended up with a traumatic encephalocele in the nasal cavity after 6 years of trauma. Encephalocele as a late complication is a scarce condition in medical literature that encourages us to highlight this interesting case.

Case presentation

A 20-year-old Syrian male presented to our department with the complaint of clear yellow CSF drainage from his right nostril, which started 6 years ago after a head trauma, moderate headache, and episodes of tonic-clonic seizures without any response to medical treatment. The patient's medical history showed that he suffered from CSF leakage 6 years ago after a motor vehicle accident; he was conscious and responsive after the accident and did not have any additional injuries. Therefore, he decided not to take any treatment and was discharged from the hospital at his own risk. Then he started suffering from persistent headaches and seizures that had increased even with the medical treatment. Then, 2 months ago, the patient had meningoencephalitis, so he was admitted to the intensive care unit and treated for a month until he was cured. The patient underwent brain non-contrast computed tomography (CT) and brain magnetic resonance imaging (MRI), which showed that he had a base fracture with an encephalocele in the nasal cavity. The brain tissues with the meninges herniated through the skull base fracture with a significant expansion of the subarachnoid spaces in the right hemisphere (Figs. 1, 2). He was advised to perform surgical repair at that time, but he refused the surgery. The surgical, family, and psychosocial histories were uneventful. The physical examination of other systems and the laboratory tests were normal. During the present visit, the brain MRI was identical to that from 2 months ago. Thus, surgery was indicated. The patient's written consent was taken and the medical consultations before the surgery showed no objection to performing it. The surgery was done by a specialist in neurosurgery who returned the herniated brain tissues to their normal location, repaired the meninges, and reconstructed the skull base with bone cement and bio-glue. The patient's recovery after the surgery was uneventful and he was discharged from the hospital after 2 days. The follow-up in the second month after the surgery was normal; the patient's physical examination revealed that the CSF rhinorrhea, headache, and convulsive seizures disappeared, and the MRI imaging showed complete repair of the encephalocele, the expansion of the subarachnoid spaces in the right hemisphere disappeared, and the brain

Fig. 1 (Magnetic resonance imaging before surgery) magnetic resonance image of the coronal plane shows an encephalocele in the nasal cavity. The brain tissues with the meninges herniate through the skull base fracture with a significant expansion of the subarachnoid spaces in the right hemisphere

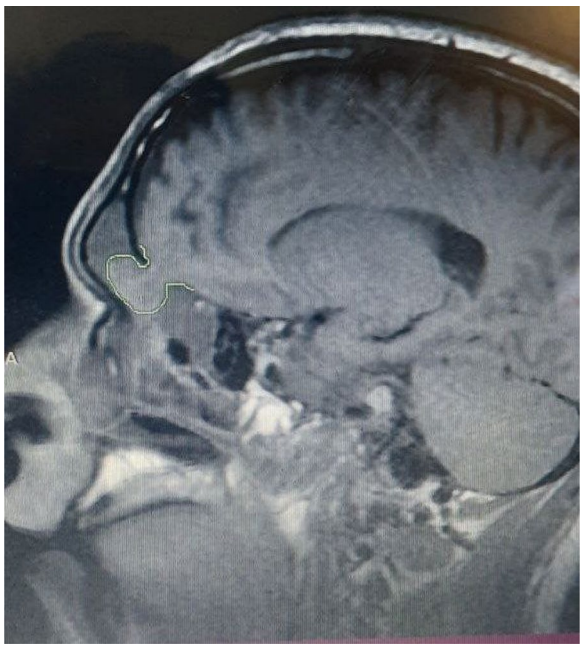

Fig. 2 (Magnetic resonance imaging before surgery) magnetic resonance image of the sagittal plane shows an encephalocele in the nasal cavity. The brain tissues with the meninges herniate through the skull base fracture with a significant expansion of the subarachnoid spaces in the right hemisphere

returned to its normal size (Figs. 3, 4). Other visits were unremarkable.

Discussion

Traumatic brain injuries form an important and effective problem in public health, they can be a result of many accidents, such as falling from a height or vehicle accidents. Their outcomes vary a lot and they can cause persistent and irreversible complications, so accurate and urgent diagnosis and treatment are essential [3]. One of the most important complications is cephalocele, which is defined as a herniation of the brain contents through an imperfection in the skull bone, its components may include CSF, meninges, brain tissues, or all of them together [1–3]. Cephaloceles can be classified into primary (where the cephalocele is responsible for the skull bone discontinuity) or secondary (where a previous event, such as trauma or surgery, causes the bone defect and the cephalocele) [2, 6]. In addition, they can be classified according to the anatomical region into the head dome, fronto-ethmoidal, occipital, and basal cephalocele; this classification has an important role in surgery [1]. The patient in our case had traumatic encephalocele, which was detected in the nasal cavity so we classified it as basal meningoencephalocele or an intranasal meningoencephalocele. These two terms indicate that the defect is in the ethmoidal cribriform plate, which allows the brain tissue to protrude through it into the nasal cavity [2, 7]. The clinical manifestations of the traumatic encephalocele vary a lot depending on its size and location; they include clear fluid rhinorrhea, seizures, headaches, and focal neurological deficits [3]. Traumatic CSF leakage constitutes 80% of all cases followed by iatrogenic ones (16%) as a result of the surgery on the nasal and paranasal cavities and the skull base, while spontaneous leakage forms only 3–4% of all cases [5, 8]. Many studies indicate that only 10–30% of skull base fractures develop CSF leakage, so its absence cannot deny the fractures in the skull [5]. The diagnosis of traumatic cephalocele depends on physical examinations, radiological investigations, and laboratory tests; all these methods are crucial in the systematic diagnosis of the cephalocele and its complications [3]. The most important laboratory investigation is β-2 transferrin, which helps us in the diagnosis of CSF rhinorrhea [1]. Radiological imaging is a valuable procedure to detect the fistula of CSF and it contains MRI, MRI cisternography, thin-section CT, CT cisternography, and radionuclide cisternography [1, 4]. CT scan in the coronal axis shows the defect in the skull bone and the protrusion of the brain tissues. It also distinguishes the

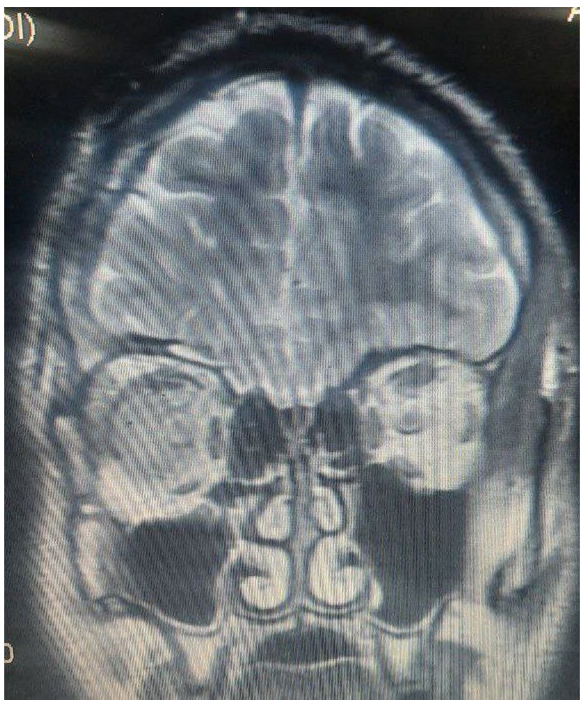

Fig. 3 (Magnetic resonance imaging after surgery) magnetic resonance image in the coronal plane shows complete removal of the encephalocele, the expansion of the subarachnoid spaces in the right section disappears, and the brain returns to its normal size

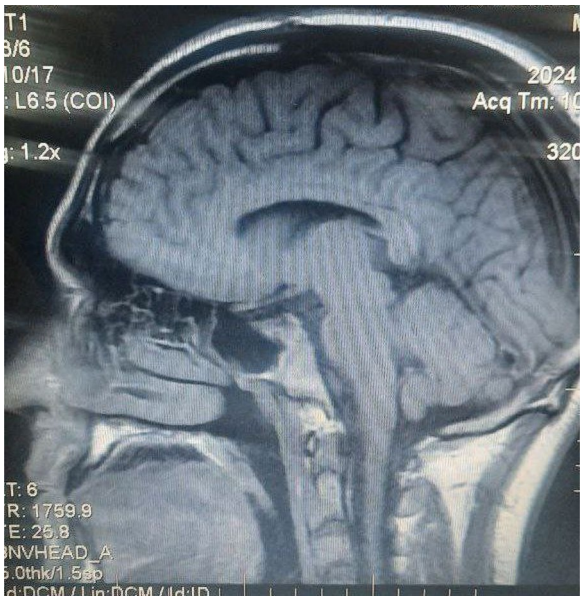

Fig. 4 (Magnetic resonance imaging after surgery) magnetic resonance image in the sagittal plane shows complete removal of the encephalocele, the expansion of the subarachnoid spaces in the right section disappears, and the brain returns to its normal size

masses in the nasal cavity from the herniated brain tissue. In the sagittal axis, the CT scan can distinguish the masses in the nasal cavity from the herniated brain tissue through the density, but it does not help determine the defect in the bone; similar, in this situation, to the MRI [7]. Some studies prefer MRI because the patient is not exposed to radiation and because of its soft tissue contrast resolution, while other studies prefer fine-slice CT because it can show the bone defect [7, 8]. Some researchers encourage using the Glasgow coma scale in patients with skull base fracture and CSF leakage to determine the prognosis; when the patient is conscious, the prognosis is better and the meningitis is less likely to happen as a complication. The treatment of such cases depends on the patient's manifestations and situation when he/she presents with only CSF leakage without encephalocele, the first line in treatment is conservative measures, which includes bed rest in an upright position and avoiding coughing, sneezing, and nose blowing to prevent encephalocele development. It turns out that two-thirds of traumatic CSF leakage resolves spontaneously during 1 month. The second line is CSF drainage, which is indicated if the CSF leaks do not resolve within 72 h; it is done for 7–10 days with an average of 100–150 ml/day [5]. The third and terminal line in treating CSF leakage is surgical repair through returning the brain tissue to its normal location, closure of the dura mater, and reconstruction of the bone deformity [1, 3]. There are many indications of surgery, such as (1) CSF leakage with intracranial injuries or infection, (2) CSF leakage for more than 7–8 days, (3) CSF leakage with a sizable defect in the skull base (comminuted, compound, depressed, or largely extended craniofacial fractures), (4) fracture of the posterior wall of the frontal sinuses, (5) fracture with more than 1 cm displacement, (6) CSF leakage with injuries in any cranial nerve, and (7) when there is an encephalocele [5, 8]. Using the prophylaxis antibiotics is still controversial [5]. Traumatic encephaloceles lead to many dangerous and life-threatening complications, such as CSF fistula, meningitis, seizures, and tension pneumocephalus [1, 5]. Meningitis happens in 10–50% of patients who suffer from traumatic CSF leakage, and it may cause other infectious complications, such as cerebral abscesses or empyema [5]. This dangerous complication, meningitis, can decrease from 85% to 7% if the dura is repaired [8]. The patient in our case refused to repair the CSF leakage after the accidents, which led to many complications, such as meningitis, and seizures, before he finally suffered from encephalocele about 6 years after the trauma. Encephalocele is usually an urgent complication or result of trauma, which is a rare case around the world, but in our case, this complication came after a long period of trauma that made it one of the most interesting and rare case reports in medical literature.

Conclusion

Traumatic encephalocele is a rare and unexpected complication of trauma, but we should keep it in mind when the patient presents with head trauma because of its life-threatening consequences. This complication can happen after years of trauma if the patient refuses treatment; therefore, we must educate patients about the dangerous results of neglecting CSF leakage and skull fractures.

Abbreviations

CSF Cerebrospinal fluid
CT Computed tomography
MRI Magnetic resonance imaging

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Author contributions

KT was the first author and the corresponding author; AQ and ASS were the second authors;. NSA was the neurosurgeon, supervisor, and reviewer.

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Availability of data and materials

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Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images and videos. A copy of the written consent is available for review by the editor of this journal.

Competing interests

The authors declare that they have no competing interests.

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