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Successfully Treated New-Onset Pilocytic Astrocytoma in a Pregnant Patient

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1. Abstract

Pilocytic astrocytomas are typically pediatric brain tumors, and they are rarely diagnosed in older adults, especially in childbearing patients. However, if they present in pregnant women, they have a potentially catastrophic maternal and fetal outcome.

In our case study, we describe a case of a young pregnant patient, who initially asked medical help due to therapy-resistant worsening headache, and finally was diagnosed and successfully treated with a decompensated pilocytic astrocytoma.

We review the primary diagnostic and therapeutic options of this tumour. And, we can conclude that new-onset headaches should always been taken seriously, especially in pregnant patients.

2. Introduction

Pilocytic astrocytoma is a typical childhood cancer, seen sporadically in elderly, but can occur during pregnancy [1]. However, new-onset brain tumour decompensation is extremely rare during pregnancy, and if it presents, it can potentially lead to dramatic maternal and fetal consequences [2,3]. We report a case of a pregnant woman, who was treated successfully for her previously unknown brain tumour.

3. Case

A 31-year old, 38 weeks pregnant, female was admitted to our Emergency Department (ED) due to a therapy-resistant progressive headache and tonic-clonic seizures. Beside a thyroidectomy, she had no relevant medical history. She was carrying a healthy baby and had an uncomplicated pregnancy. However, she has been complaining for almost 10 weeks of worsening headaches, nausea and muscle weakness. For her job, she needed to wear a face shield, which was believed to provoke her headaches. As therapy, she received physiotherapy and osteopathy without significant improvements.

The night before her admission in our hospital, due to an unbearable headache, she consulted a physician in another hospital and was admitted. The next morning, her partner found her next to her hospital bed. Presumably, she had tonic-clonic seizures without loss of urine, tongue bite or postictal confusion. Following this event, she was transferred to our hospital, where a neurologist and a gynaecologist were directly consulted. During the initial clinical examination of the neurologist, the patient performed a witnessed seizure. Due to the lack of preeclampsia signs during her pregnancy, lack of urinary proteins, normal blood pressure and suggestive clinical findings, we excluded eclampsia. She was initially treated for epilepsy with levetiracetam. However, an EEG examination demonstrated no epileptic activity. A continuous follow-up of the fetus showed initially no signs of deterioration.

An urgent MRI study revealed a tumoural process with mass-effect in her posterior fossa. An opthalmological examination showed grade 2 papilledema on the left, and grade 3 papilledema on the right side. Due to progressive neurologic deterioration and repetitive seizures, we put her asleep and intubated her trachea to start artificial ventilation. In addition, we scheduled an operation for immediate tumour resection. Before the neurosurgical procedure, a caesarian section was carried out. Then, the patient was turned to her lateral side for a posterior craniotomy. On the next day following the neurosurgical procedure, she could be extubated. And she

was communicative and adequate, but could not recall any event from the previous day. A few days later, the patient and her healthy daughter could be discharged with minimal neurologic sequelae. On histological examination, the tumour was diagnosed as being a pilocytic astrocytoma. Therefore, she received further follow-up and treatment.

4. Discussion

Seizures during pregnancy are potentially life-threatening conditions both to mother and fetus. They could be triggered by neurovascular, metabolic, psychogenic, pregnancy -related or other (malignancy, drug intoxication, withdrawal, trauma, infections) factors.

The first step in the evaluation of seizures during pregnancy should be considered as eclampsia, and all seizures need to be treated as it is until we can exclude it [4].

Our patient had no history of preeclampsia, her routine laboratory examination was normal, her blood pressure was low-normal, she had no proteinuria, no previous fever, no trauma and took no epileptogenic medication but tramadol. The clinical and laboratory findings were not suggestive for an eclamptic seizure, thus we treated her with antiepileptic medication (levocitarezam). New-onset epilepsy during pregnancy is rare. However, in a Chinese study of 1041 women in their reproductive age with epileptic insults, only twenty-two (2.1%) of them had their first seizure during pregnancy.

Three of these twenty-two (16.7%) women had positive neuroimaging findings on their MRI examinations, and none had brain tumours [5]. In at least 50% of the new epileptic cases during pregnancy, EEG examination shows no signs of epileptic activity, as in our presented case [4].

Regarding further differential diagnosis, we could exclude metabolic, pregnancy-related or psychogenic causes. There were also no clinical signs of poisoning nor withdrawal.

To investigate possible neurovascular or intracranial causes, we carried out a cranial Magnetic Resonance Imaging (MRI) examination, which showed a tumoral process in her posterior fossa. In adults, the most common posterior fossa tumours are metastases [6]. Concerning primary tumours, hemangioblastoma is most frequently diagnosed, followed by astrocytoma, medulloblastoma, ependymoma, lymphoma and lipoma [6].

In our patient, the histological examination determined a pilocytic astrocytoma (PA). Pilocytic astrocytomas mostly present as solid, hyperintense components on T2 MRI images [7]. They often associated with large cysts [7], and they have the potential to infiltrate the cranial nerves [8].

These are typically seen in young patients, with 75% occurring in the first two decades of life [1]. These tumours are slow-growing and benign. They are reported extremely rare in pregnancy. Presumably, hormonal changes namely elevated progesterone and vascular endothelial growth levels might mitigate the tumour progression [3, 9].

To date, there are only three comparable cases available.

In one case, a known tumoural process decompensated and needed immediate surgical treatment. The fetus was too immature (25th week), and the resection was performed without a previous caesarian section. 12 weeks after the successful operation, the patient delivered a healthy daughter [3].

In an other case, the fetus was mature enough for caesarean section before the neurosurgical procedure, resulting in excellent maternal and fetal outcome [10].

In the third case, although the tumoural process was believed to be under control, it rapidly transformed into a high-grade hemorrhagic glioma during pregnancy. Sadly, this case ended with maternal and consequently, fetal death [9].

Given that newly diagnosed brain tumours are uncommon during pregnancy, their diagnosis can be challenging. Furthermore, if we treat them, maternal and fetal risks need to be taken into consideration [2].

The most common symptoms are progressive new-onset headache, nausea and vomiting, rapid change in consciousness and visual symptoms. 30 to 50% of these patients can develop seizures [2].

Due to better image quality and lack of ionising radiation, a MRI is the preferred imaging modality compared to Computed Tomography (CT).

If CT is used as an imaging technique, significant dose reduction can be achieved by the application of a lead apron and by shielding the abdomen [9].

Additionally, an ophthalmologic examination can provide extra diagnostic information [2].

The therapy of brain tumours can be either symptomatic or curative. Steroids have the potential to reduce vasogenic oedema surrounding the lesion and to enhance the production of surfactant in the fetus. Although the use of antiepileptic drugs is controversial, the harm of an epileptic seizure might overweight the possible teratogenic effects. If chemotherapy or/and radiotherapy are applied, fetal risks must be considered [2].

Surgical removing of the tumour might be curative, and with proper perioperative management, fetal risks can be minimalised. Although,in case of emergency neurosurgical interventions in pregnant women, maternal mortality is high, and the neonatal outcomes do not differ compared to a delivery in the second or third trimester [12].

The decision regarding the timing of the surgery and possible caesarian section should be taken by an interdisciplinary team includ-

ing neurosurgeons, gynaecologists, neonatologists and anesthesiologists [12].

When the decision is made to proceed with the surgery, general obstetric anaesthetic approaches need to be concerned [13].

Normally, there are three possible scenarios about the timing of the neurosurgical and obstetric procedures:

1. Neurosurgery is performed with the fetus in utero.
2. Caesarian delivery is performed prior to the delivery.
3. Caesarian delivery followed by later neurosurgery [14].

All pregnant patients have a higher risk of aspiration, that's why gastric acid-lowering agents, prokinetic drugs and antacids can be routinely administered [15]. Besides, rapid sequence induction is advisable to prevent maternal aspiration [14]. In an ideal situation, the induction of anaesthesia is done on the operation table, by using propofol, remifentanil and neuromuscular blocking agents [15].

Bispectral-index (BIS) and invasive arterial pressure monitoring are also recommended during the induction of anaesthesia [14].

If hypotension occurs, it should be aggressively anticipated, preferably by using fluid resuscitation and phenylephrine [15, 14].

If it is achievable, left lateral positioning is preferable to prevent aortocaval compression [14].

Both propofol and volatile anaesthetics (such as sevoflurane) are safe alternatives in maintaining anaesthesia during the procedure. A target-controlled remifentanil infusion can be added as an analgesic during the operation [14].

Because of the potential adverse effects on the fetus, fetal-heart rate monitoring should be applied during the whole procedure [15].

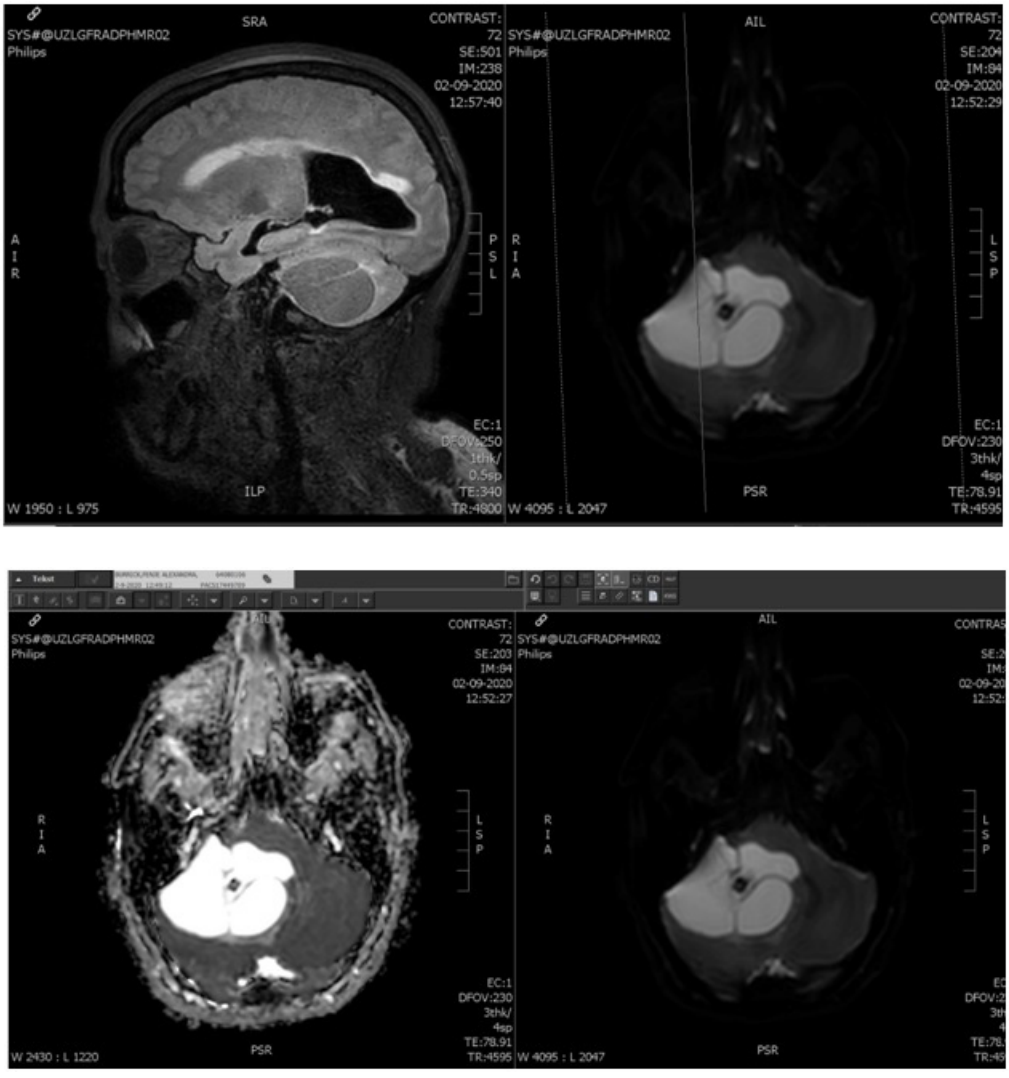

Figure 1: We see a multicystic mass in the right cerebellar hemisphere. There is secondary supratentorial hydrocephaly with transependymal oedema.

5. Conclusion

We present a case of a pregnant woman with a decompensation of a previously unknown Pilocytic astrocytoma. Although this is rarely presented during pregnancy, and if so, it potentially leads to fatal consequences. However, the tumour could successfully be removed, and both mother and child were saved. We suggest that a new-onset, therapy-resistant headache should be taken seriously, especially in pregnant patients as the potential consequences may be significant.

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