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CASE REPORT: PROGRESSIVE HEADACHE IN A RARE CASE OF MENINGIOMA

Nia Citama Saragih[1*], Feda Anisah Makkiyah[1], Rosita Alfi Syahrin[2], Theodora Caroline Sihotang[2]
Universitas Pembangunan Nasional Veteran Jakarta[1]
Rumah Sakit Umum Daerah Cileungsi[2]
Corresponding author: niacitamas@upnvj.ac.id

ABSTRACT

The most prevalent primary tumour of the central nervous system is meningioma, and the incidence increases with age. This tumour can be detected through radiological examination and classified based on the results of anatomical pathology examination. A 48-year-old woman presented to the hospital with complaints of a left-sided progressive headache for several years without any other complaints. Imaging examination showed a lesion in the falx cerebri of the sinistra aspect that suggested typical meningioma. The woman decided to undergo craniotomy resection surgery and histopathological analysis. Based on the WHO classification, the histopathology results revealed a microcystic and chordoidal meningioma. The patient had significant improvement in her symptoms postoperatively, and the tumour size decreased on follow-up imaging. This case report aims to highlight the diagnostic challenges and clinical relevance of identifying progressive headaches as one manifestation of atypical meningioma.

KEYWORDS

Atypical meningioma, Brain tumor, Chrodoid, Microcystic

INTRODUCTION

Meningiomas are a diverse group of tumors originating from the meninges, the protective layer surrounding the brain and spinal cord (Alruwaili & De Jesus, 2024). They represent approximately 30% of all primary brain tumors and are thus notable for their diverse clinical presentations and outcomes (Zhao et al., 2020). These tumors are classified based on their histopathological features, ranging from benign (Grade I), atypical (Grade II) and malignant (Grade III). While many meningiomas are asymptomatic and found incidentally, others can cause specific complaints such as significant neurological deficits depending on their location and size (Maggio et al., 2021).

In Europe, the UK, and the USA, there are 5 to 12 cases of meningiomas for every 100,000 patients. Less than 5% of meningiomas are malignant or anaplastic, 15%–20% are atypical, and 80%–90% are typical (Amoo et al., 2023). Five to fifteen percent of meningiomas are atypical, meaning they are aggressive in a way that falls between benign and malignant. It falls into the WHO Grade 2 classification with a recurrence rate of 29-52% (Chunyu Cai, M.D., Ph.D., Jesse L. Kresak, M.D., Anthony T. Yachnis, 2023). Another epidemiological study classified 17 to 18% of meningiomas as atypical or grade 2 (Alruwaili & De Jesus, 2024). Headaches, convulsions, and localized neurological impairments brought on by tumor suppression are typical symptoms. Diagnosis is made by imaging and pathology of biopsy or resection specimens (Amoo et al., 2023). These tumors are characterized by prominent increased mitotic activity of the nucleoli and a higher likelihood of recurrence. Despite their relatively rare occurrence, atypical meningiomas pose significant challenges in diagnosis, treatment and long-term management (Ammendola et al., 2021).

MATERIALS AND METHODS

The research method used in this paper is a case report with a descriptive approach. The actions taken include anamnesis to assess the patient's main complaint of progressive headache, physical and neurological examinations, supporting examinations in the form of a contrast-enhanced CT scan of the head, and histopathological examination of tumor tissue to confirm the diagnosis of atypical

meningioma. The patient's clinical, radiological, and histopathological data were then comprehensively reviewed and compared with the latest literature, the WHO classification of tumors of the central nervous system, and guidelines related to the management of meningioma to assess the compatibility of the case findings with existing scientific evidence and determine the clinical implications for prognosis and recurrence risk.

RESULTS

A woman, 48 years old, came to the hospital with complaints of a headache for more than 2 years. Initially, the headache was intermittent and would go away on its own. However, in recent months, the patient felt that the headache was getting worse and interfered with her activities such as lifting heavy weights or going up and down stairs repeatedly. When the patient could not bear it, the patient used to take painkillers bought at stalls or pharmacies. Other complaints include nausea, vomiting, and visual disturbances. Hearing loss and other motoric disorders were denied. Additionally, the patient did not report any memory loss or personality changes. The patient had no history of high blood pressure or diabetes mellitus. There is no genetic disorder or history of meningioma in the family. The patient has no history of radiation exposure, birth control or head trauma.

The results of the physical examination showed that GCS 15 (E4M6V5), blood pressure 116/69 mmHg, pulse frequency 67x/minute, respiratory rate 20x/minute, temperature 36ºC, oxygen saturation 98% on room air. The patient weights 65 kg with a height of 150 cm, which means they belong to the class of obese. A head-to-toe physical examination found no abnormalities in the patient. Neurological examination found that the round pupil isochores are 2 mm/2 mm, and the right and left eyes' direct and indirect light reflexes are positive. The cranial nerve cannot be assessed, physiological reflexes are within normal limits.

Head CT scan with contrast obtained an extra-axial isodense lesion in the falx cerebri of the sinistra aspect, oval shape, size 40x52x70 mm, pre-contrast density 27 HU, post-contrast 84 HU, perifocal oedema around it. The midline was deviated to the right by 12 mm. these results suggest an atypical meningioma of the sinistra aspect of the falx cerebri with perifocal oedema causing midline shifting towards dextra (Figure 1).

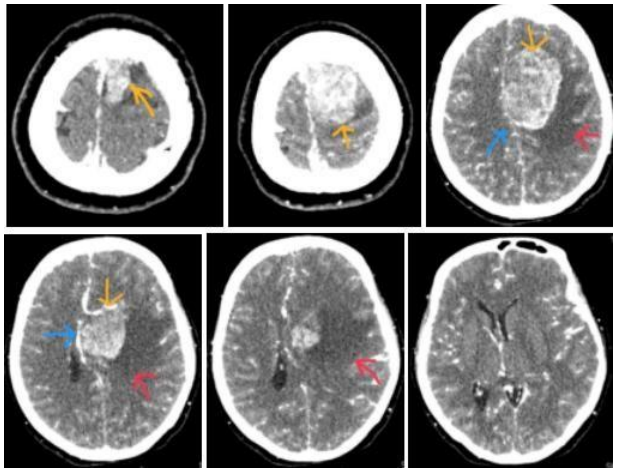

Figure1.The patient's body temperature.

After consultation and examination, the patient was given paracetamol, folic acid and vitamin C. Paracetamol is an analgesic often used to reduce pain, including headache. In meningioma patients, paracetamol may help relieve pain caused by tumour pressure on brain tissue or inflammation. Folic acid may be given, as some studies suggest that folic acid deficiency may be associated with an increased risk of some cancers. Vitamin C may help protect cells from oxidative damage, which supports nervous system health.

After the results of the head CT scan with contrast came out, a craniotomy was performed on the patient. The stages of surgery were carried out using proper procedures, starting with septic and antiseptic measures, incision of the surgical wound layer by layer until the bone was obtained, and then drilled in 6 places. The tumour was evacuated and treated with spongostan, surgicell, and bone wax.

The procedure ended with suturing the surgical wound layer by layer. The findings during surgery were soft tumour tissue in the frontal region.

An anatomical pathology examination used tissue taken from the left frontal region. Macroscopic results in irregular tissue received with a volume of 15 cc, some of which looked like a blood clot, some of which looked like jelly, ash-brown colour, partly rubbery, partly brittle. Then, the microscopic results are prepared from the left frontal region, consisting of pieces of tumour mass tissue arranged in solid and microcystic forms. Tumour cells with round/oval nuclei, spindle, fine and partially coarse chromatin, eosinophilic cytoplasm and visible "intranuclear pseudoinclusions." The stroma is fibrotic, and there are large areas of myxoid. Blood vessels were congested and hyperemic. The conclusion of anatomical pathology is microcystic and chordoid variant meningioma (WHO grade 1 and 2) (shows Figure 2).

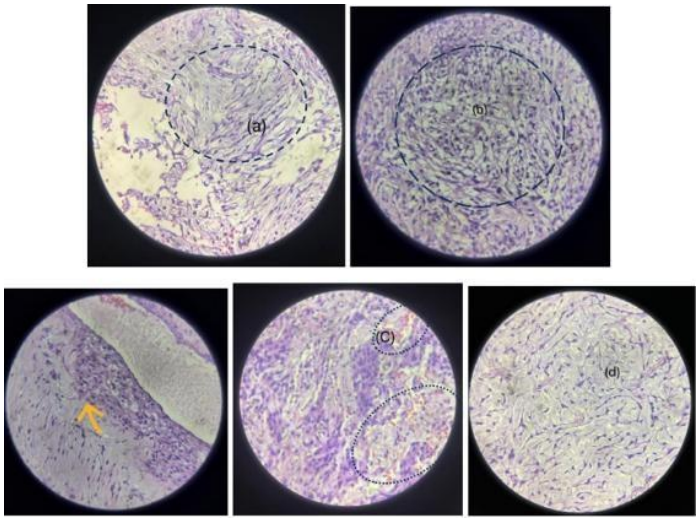

Figure2.Microscopic appearance of meningioma (a = spindle eosinophilic cells, b = vacuolated cytoplasm separated with mitotic figure, c = stroma fibrotic, d = myxoid background, yellow arrow = intranuclear pseudoinclusions).

Two months after the procedure, the patient was re-evaluated through radiologic examination. The head CT scan showed a residual extra-axial lesion on the sinistra aspect of falx cerebri, oval shape, size 13x32x39 mm, pre-contrast density 33 HU, post-contrast 77 HU, surrounding perifocal oedema. Compared with the previous results, a residual atypical meningioma was found on the left the falx cerebri with surrounding perifocal oedema (Figure 3).

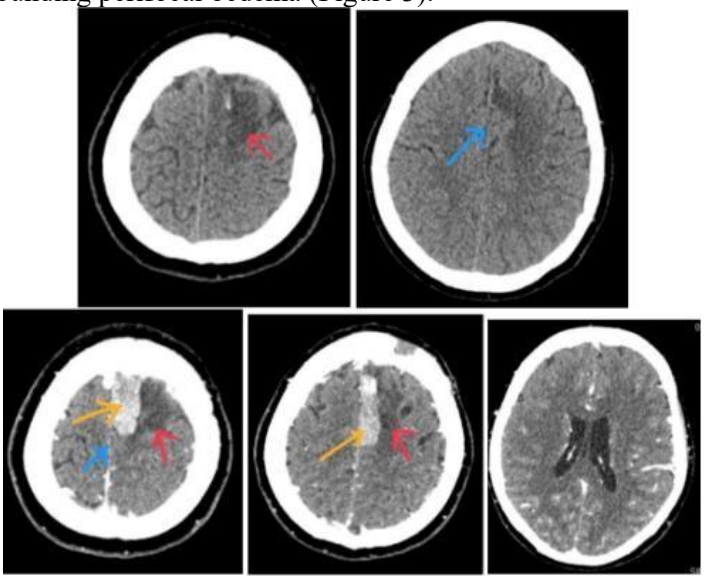

Figure3.Head CT scan with contrast post-craniotomy
(blue arrow: midline in the center; yellow arrow: tumour lesion; red arrow: perifocal edema).

DISCUSSION

Meningiomas are tumours originating from the meninges, the protective layers covering the brain and spinal cord. Meningiomas can be classified into three grades based on the World Health Organisation (WHO) grading. Grade I (Benign) is the most common, accounting for 80-85% of meningiomas. These tumours typically have a low recurrence rate and a good prognosis after surgical resection. Grade II (Atypical) represents 15-20% of cases where these tumours exhibit increased cellularity, a higher mitotic index, and sometimes atypical features, leading to a greater risk of recurrences. Grade III (Anaplastic/Malignant) is the rarest form, with the highest risk of aggressive behaviour and poor prognosis (Maggio et al., 2021). Atypical meningiomas are characterised by specific histopathological and molecular features (Ammendola et al., 2021).

The patient in this case is a 48-years old woman. As people age, the incidence rate of meningiomas rises. Based on data, 43.6% of patients suffering from meningioma are over 40 years old(Ogasawara et al., 2021). Then the incidence of meningioma is higher in women than men, with a ratio of 3:1(Maggio et al., 2021). That is why these patients have a high risk of meningioma. In addition to age, hormonal variables, ionizing radiation exposure, and genetic predisposition are risk factors for meningiomas (Amoo et al., 2023). There are risk factors that can increase the possibility of meningioma, such as radiation exposure, which can cause a 6-to 10-fold higher risk. In addition to having a larger percentage of atypical or anaplastic meningiomas and a higher recurrence rate, patients with radiation-induced meningiomas (RIM) usually present with numerous tumours (Cai et al, 2023). Occupational exposure to pesticides, allergies and diet may also be risk factors (Ogasawara et al., 2021).

In addition, obesity is also a risk factor that can increase chronic inflammation and stimulate insulin-like growth factor. Both obesity and meningiomas have higher levels of IGF-1, which may play a part in the development of both cancers (Alruwaili & De Jesus, 2024). This patient had a body mass index that fell into the obese class. Obesity is often associated with altered levels of hormones such as insulin and estrogen. Elevated insulin and insulin-like growth factors (IGFs) have promoted cell proliferation and tumour growth. Since some meningiomas are sensitive to hormonal changes, these factors might affect their development. Obesity is linked to a state of chronic lowgrade inflammation, which can contribute to tumour progression. Inflammatory cytokines produced in obese individuals could potentially influence the growth and behaviour of meningiomas (Ogasawara et al., 2021).

Clinical symptoms in patients with meningiomas vary depending on the tumour's location. In atypical meningiomas located in the frontal part, patients often complain of headache, movement disorders, and motor disorders. Approximately 30-36% of meningioma patients complain of headache; therefore, headache is a very common symptom (Ogasawara et al., 2021). Our patient in this case complained of progressive headache, where the pain has been going on for a long time and getting worse continuously. She had no other complaints. Headache pain can have many causes, not always tumours. Every day, headache complaints are usually migraines or tension headaches that can last for hours to days. What distinguishes headache pain from brain tumours is the origin and nature of the pain, accompanying symptoms, triggers and duration. Headaches caused by tumours are dull and non-specific at first. Later, the pain persists and worsens as the tumour grows (Liang et al., 2021). It is usually not triggered by stress, but may worsen with activity as it increases pressure within the head. Most tumour headaches are also accompanied by other symptoms such as nausea, vomiting, blurred vision, motor impairment, balance, body weakness and more, depending on the location of the tumour. Looking at the patient's headache complaints in this case, it is clear that the headache is progressive and caused by a tumour.

Meningiomas, as extra-axial tumours, usually arise from the meninges and exert pressure on adjacent brain structures, including the brain parenchyma and cranial nerves. This mass effect may lead to increased intracranial pressure (ICP) (Zhao et al., 2020). A growing tumour creates a local increase in pressure, which can stretch the surrounding brain tissue and dura, leading to headaches. It may displace or compress nearby brain structures, including the cortex and vascular structures. This shifting can cause stretching and irritation of the dura mater and surrounding brain tissue, resulting in headaches. The presence of a tumour often causes peritumoral oedema (Maggio et al., 2021). Oedema can exacerbate the effects of the tumour mass, leading to increased ICP and irritation of the dura, both of which contribute to headache pain. The presence of both oedema and deviation can be evidenced on a head CT scan (Jie et al., 2022).

Depending on the grade and histologic subtype, meningiomas exhibit a wide range of characteristics when examined under a microscope. In addition, many meningiomas exhibit a variety of morphologic characteristics. Some exhibit primarily mesenchymal characteristics, such as a noticeable spindle cell component, substantial collagen deposition between cells, and sporadic metaplastic alterations such as osseous or cartilaginous metaplasia. (Cai et al., 2023). The anatomical pathology of this patient showed signs of meningioma in the form of microcystic features, fibrotic stroma and intranuclear pseudoinclusions. This patient was classified as an atypical meningioma. This was characterised by microscopic findings dominated by the presence of sponges and myxoids, which are characteristic of chordoids (Barresi, 2023).

Atypical tumours have a higher tendency to recur due to their increased mitotic activity and more aggressive behaviour. Complete resection is the primary goal. However, due to the infiltrative nature of atypical meningiomas, achieving total resection may be challenging (Khan et al., 2023). The best method to prevent a recurrence is to remove the meningioma and dura completely. Five years following complete resection, the recurrence rate for WHO grade I meningiomas is 7–23%, for WHO grade II meningiomas is 50–55%, and for WHO grade III meningiomas is 72–78% (Zhao et al., 2020). Even if the initial tumour was removed entirely, there is still a 24 to 32 per cent probability that a meningioma may return within 15 years. The new meningioma forms in the same location as the original in around 95% of recurrences.

Regular monitoring for tumour recurrence and management of any residual effects are important for long-term headache control (Solomon & Pekmezci, 2020). Early detection of meningioma is crucial for improving treatment outcomes and patient quality of life. Meningiomas often grow slowly and can be asymptomatic, so early symptoms may not be apparent. Recurrence of meningioma poses a major challenge in managing this tumour, particularly for atypical and malignant variants. Patients who have undergone surgery or radiation therapy need regular monitoring with CT scans or MRIs. This monitoring enables early detection of recurrence or residual tumour growth (Jie et al., 2022)..

CONCLUSIONS

Atypical meningioma is a rare variant of meningioma, with up to 20% recurrences after tumour resection. In this patient, the diagnosis was made from complaints of progressive headache with risk factors such as age, gender, and obesity. This diagnosis is established through the appearance of a tumour lesion on a head CT scan with contrast. Histopathological results show typical results of atypical meningioma in the presence of microcystic scales, intranuclear pseudoinclusions, and myxoid areas. Medications that can be given are painkillers. However, craniotomy remains essential for definitive tumour resection. Importantly, this case underscores the need for clinicians to consider atypical meningioma in patients presenting with progressive headache in middle age, even in the absence of neurological deficits. With an integrated approach to early detection, surgical management, and vigilant follow-up, the prognosis for patients with atypical meningioma can be significantly improved. On re-evaluation after the procedure, the tumour size was found to be reduced. This case highlights the importance of maintaining a high index of suspicion for atypical meningioma in patients with progressive headache, as relying solely on neurological deficits may lead to delayed diagnosis and suboptimal outcomes.

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