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Progressive Double Arcuate Scotoma is a Rare Presentation in Falx Meningioma Cerebri

***Abstract* —** A 77-year-old woman with multiple comorbidities, who is a glaucoma suspect, presented with a progression of a double arcuate visual field defect over a five-month period. The intraocular pressure was within normal limits, and the cup-to-disc ratio was between 0.6 and 0.7 in both eyes. A computed tomography (CT) scan of the brain revealed a large, well-circumscribed hyperdense mass in the right occipital lobe, with heterogeneous enhancement post-contrast and obliteration of the third ventricle. Magnetic resonance imaging (MRI) showed a well-defined, extra-axial, rounded mass in the right parieto-occipital region, with a cerebrospinal fluid cleft, a dural tail sign and broad base consistent with a right parieto-occipital falx meningioma. The patient was advised to undergo surgical removal of the mass; however, she declined due to her advanced age and the absence of neurological abnormalities, except for the visual field defect.

In conclusion, a high index of suspicion is warranted in patients who are glaucoma suspects and present with progressive visual field defects. A progressive double arcuate field defect may indicate an underlying silent occipital pathology.

***Keywords* —Falx meningioma, glaucoma-suspect, visual field defect, arcuate scotoma**

1 INTRODUCTION

Falx or falcine meningioma, as defined by Harvey Williams Cushing [1], is an intracranial meningioma arising from the falx cerebri and is completely concealed by the overlying cortex. Nine percent of all intracranial meningiomas are falx meningiomas. Falx meningiomas usually grow in one hemisphere of the brain but can frequently be bilateral. In some cases, the tumour extends into the inferior margin of the sagittal sinus.

Common presentations of falx meningioma include headache, unilateral motor weakness, a history of seizures, and changes in personality or behaviour [1]. However, about 6% of patients are asymptomatic, and their brain tumours are detected incidentally [1]. Homonymous hemianopia is a common visual symptom associated with falx meningioma. Other types of visual field defects that have been described include central scotomas, peripheral constriction, non-congruous hemianopia, and bitemporal hemianopia [2].

We report a rare case of falx meningioma that presented with double arcuate scotoma. Double arcuate scotoma appears as an arc or bow-shaped visual field defect that arcs around but does not cross the midpoint of the visual field. It is permanent and usually caused by glaucoma, potentially leading to significant visual impairment.

2 CASE PRESENTATION

A 77-year-old lady with comorbidities including diabetes mellitus, hypertension, ischemic heart disease, and seropositive rheumatoid arthritis was followed up as a glaucoma suspect. Her visual acuity was 6/9 bilaterally. Intraocular pressure was within the normal range, and the anterior segment examination was normal. Fundus examination showed an increased vertical cup-disc ratio (CDR) of 0.6 to 0.7 bilaterally. Humphrey visual field assessment revealed early superior bi-arcuate scotoma in the left eye and a superior arcuate scotoma in the right eye at initial presentation (Figure 1). Optical coherence tomography (OCT) of the optic nerve revealed a normal thickness of the retinal nerve fibre layer (RNFL). She was followed up with close monitoring of the visual field. Her rheumatoid arthritis was in remission, and she was on regular methotrexate 7.5 mg once a week, in addition to taking oral hypoglycaemic

agents and antihypertensive medications. There was no family history of glaucoma.

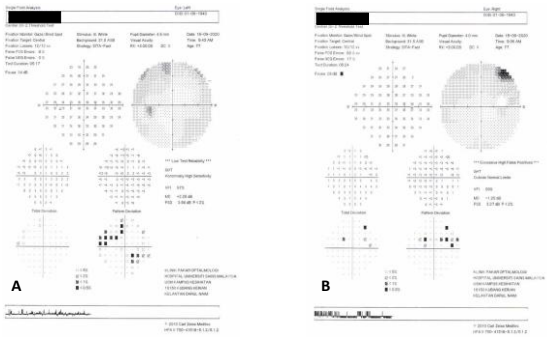

Figure 1: Humphrey's visual field showed early superior bi-arcuate scotoma in the left eye (A) and superior right arcuate scotoma in the right eye (B) during the first presentation.

After five months from the first presentation, the visual field progressed to a double arcuate scotoma in both eyes, which was more severe in the right eye than in the left eye (Figure 2), despite normal intraocular pressure. Otherwise, her vision remained stable, and there were no symptoms of increased intracranial pressure such as headache, nausea, or vomiting. There was also no history of gait instability, limb weakness, slurred speech, reading difficulties, or memory issues.

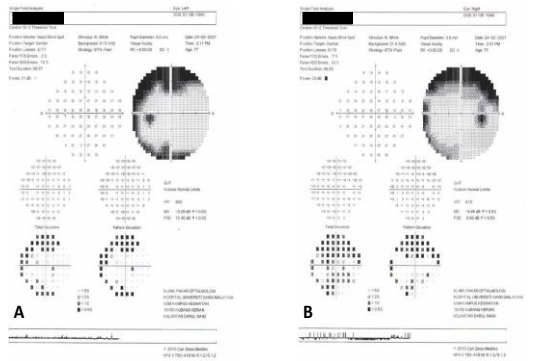

Figure 2: Humphrey's visual field showed superior arcuate scotoma in both eyes which were more severe in the right eye (B) than in the left eye (A) at 5 months follow-up.

Considering the rapid progression of the visual field defect, a computed tomography (CT) scan of the brain was performed to exclude any brain or neurological disorders. The CT scan showed a large, well-circumscribed hyperdense mass in the right occipital lobe, measuring 3.6 x 3.7 x 3.8 cm, with obliteration of the third ventricle (Figure 3).

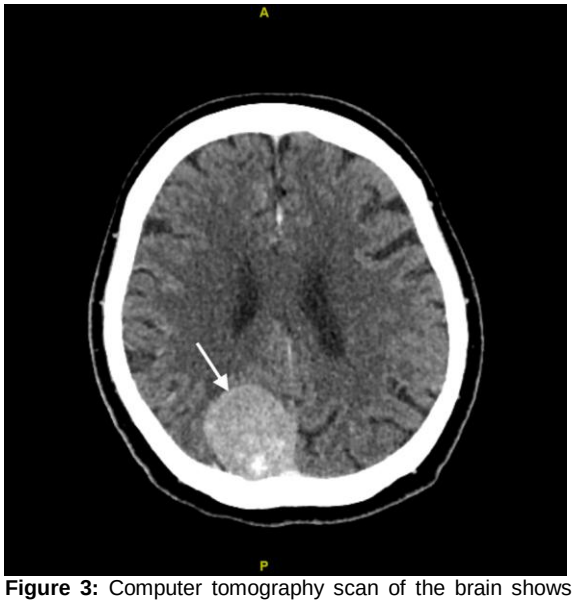

Figure 3: Computer tomography scan of the brain shows a hyperdense area at the right side of occipital lobe (white arrow) with obliteration of the third ventricle.

The mass showed heterogeneous enhancement post-contrast, suggestive of a falx occipital meningioma. However, there was no evidence of hydrocephalus. Subsequently, magnetic resonance imaging (MRI) was performed and revealed a well-defined, extra-axial, rounded mass in the right parieto-occipital region, measuring 3.7 x 3.7 x 3.9 cm, with a cerebrospinal fluid cleft, a dural tail sign and broad base consistent with a right parieto-occipital falx meningioma (Figure 4).

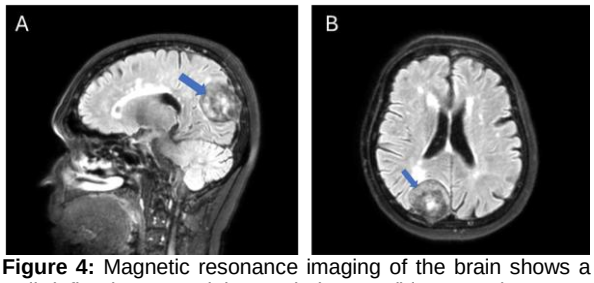

Figure 4: Magnetic resonance imaging of the brain shows a well-defined, extra-axial, rounded mass (blue arrow) seen at the right parieto-occipital region with cerebrospinal fluid cleft, dural tail sign and broad base (best seen on sagittal view) consistent with a right parieto-occipital falx meningioma. A: sagittal view, B: axial view.

The patient was referred to the neurosurgical team and advised to undergo surgical removal of the mass. However, due to her advanced age and the absence of neurological abnormalities except for the visual field defect, both the patient and her family declined the surgical option. After one year of follow-up, there was no deterioration

in visual acuity or the visual field defect, and no neurological deficits were noted.

3 DISCUSSION

Meningioma is the most common primary cerebral nervous system tumour [3]. However, falx meningiomas account for 8.5% of intracranial meningiomas [1]. Meningiomas are more common in females, with a male-to-female ratio of 1:2.1. The peak occurrence is in the seventh decade of life [1,3], as presented in this current case report. Many patients present with headaches, while other presentations include unilateral motor weakness, a history of seizures, and personality changes. Chung et al. reported that there were various presentations of meningiomas include headaches (30%), unilateral motor weakness (16%), a history of seizures (7%), personality changes (7%), and 6% of patients are asymptomatic, with their brain tumours detected incidentally [1]. In our case report, the patient presented only with an isolated visual field defect without other symptoms.

Arcuate scotoma is one of the characteristic visual field defects in glaucoma and is associated with thinning of the retinal nerve fibre layer (RNFL), which may also occur in patients with normal tension glaucoma. Although our patient demonstrated bilateral optic disc cupping, her arcuate scotoma did not correspond with RNFL thinning or loss, making a diagnosis of glaucoma unlikely. Toxic effects of methotrexate causing visual field defects to have also been reported previously; however, those patients demonstrated RNFL loss, and it is considered a diagnosis of exclusion. The progression of arcuate scotoma without any evidence of glaucomatous optic neuropathy should raise concerns about intracranial pathology. Although rare, posterior cortical atrophy has been identified in patients with progressive arcuate visual field defects.

Imaging plays an important role in excluding intracranial pathology. CT scans are widely used as a first-line neuroimaging modality. In CT scans, the morphology of falx meningiomas can be either globose, demonstrating a rounded body growing inward from the dura with a wide dural base and a dural tail, or en plaque, growing diffusely along the dura [4]. Meningiomas are derived from arachnoidal cells, which are most abundant near the venous sinuses, and are most commonly found in the parasagittal region, sphenoid wing, middle cranial fossa, cerebellopontine angle, and olfactory groove [5]. In this patient, a CT scan of the brain showed a hyperdense area on the right side of the occipital lobe with obliteration of the third ventricle, and the lesion was suggestive of a falx meningioma.

On the other hand, MRI provides detailed anatomic and functional information due to its high soft tissue contrast and resolution [6]. Meningiomas typically show pronounced, homogeneous enhancement after contrast injection; however, they may also exhibit regions of necrosis or calcification that do not enhance. In this patient, MRI revealed a well-defined, extra-axial, rounded mass located at the right parieto-occipital region with a CSF cleft, dural tail sign, and broad base which is consistent with a right parieto-occipital falx meningioma. A biopsy is not mandatory if the diagnosis by radiological imaging is strongly suggestive of meningioma [7].

There are a few treatment options for falx meningiomas, depending on the size and location of the tumour. Conservative treatment with close observation is applied to small meningiomas that do not develop too close to crucial nerves or blood vessels, and that do not irritate the brain [7]. Routine neuroimaging is recommended to monitor the progression of the falx meningioma's size every three to six months during the first year [7]. Our patient had stable visual function with no further progression of the visual field defect after one year. She declined surgical intervention due to the preservation of her good visual functions and her advanced age. Total resection is the method of choice if surgery is indicated [8]. Radiation therapy is useful for treating minor remnants of the tumour after surgical intervention, and it can also be utilized in patients who are too ill to undergo surgery [9]. Chemotherapy is a rare option and is only used to treat atypical or malignant subtypes of meningioma that cannot be adequately managed with surgery and/or radiation therapy [9].

It has been reported that parasagittal and falx meningiomas recur more frequently than other types of intracranial meningiomas. The recurrence of falx meningiomas is considerably more common after non-radical tumour excision. However, the chance of recurrence is greatly reduced with radical excision. Aggressive surgical therapy certainly carries some risks and may increase the likelihood of an unsatisfactory outcome.

4 CONCLUSION

A high index of suspicion should be maintained in patients who are glaucoma suspects and present with progressive visual field defects. A progressive double arcuate field defect may indicate an underlying silent occipital pathology. A falx meningioma may gradually increase in size, causing neurological deficits and further deterioration of visual functions. Regular visual field monitoring is important, as it may indicate further progression that warrants surgical intervention.

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