In our case, the history, clinical findings, negative biochemistry and CT and MIBG scans indicated that the lesion might be a non-catecholamine-secreting paraganglioma. The final diagnosis of a vascular malformation was unexpected but revealed an interesting differential diagnosis of a rare pathology. Retroperitoneal vascular malformations of the choledochus, kidney and pancreas have been described but are rare conditions which may cause digestive or urinary tract bleeding. In this case the symptoms were unrelated to the excised lesion.

**Final diagnosis**

Benign vascular malformation.

**Keywords:** paraganglioma, vascular malformation


Ring-enhancing lesions on computed tomography

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A 23-year-old man was admitted with high grade fever and headache for one week, having developed left hemiplegia two days prior to admission. He gave a history of right-sided pleural effusion a year ago that was treated as tubercular effusion. He had, however, discontinued the treatment after a few weeks. He also gave a history of sexual contact with a commercial sex worker. Clinical examination revealed a toxic, febrile, young patient with left hemiplegia but without signs of raised intracranial pressure. Other systems were normal. After preliminary laboratory tests, high doses of broad-spectrum antibiotics were started but the patient’s clinical condition deteriorated. A computed tomography (CT) scan of his brain revealed multiple ring enhancing lesions (figures 1 and 2).

**Keywords:** paraganglioma, vascular malformation


**Questions**

1 Suggest three causes of these CT appearances.
2 What is the most likely diagnosis in this case?
Answers

**QUESTION 1**
Ring-enhancing lesions may be due to a variety of causes.\(^1\)\(^-\)\(^4\)

**Pyogenic infections**
Many bacterial infections may produce meningitis and brain abscesses at any age in high risk and immunocompromised patients. These abscesses have a characteristic imaging appearance of a well circumscribed ring-enhancing lesion. Pyogenic abscesses have a smooth, thin ring enhancement. They may rupture and cause dissemination.

**Non-pyogenic infections**
Tubercular meningitis may develop as a primary tuberculous infection of the brain in an immunocompromised host. It may result from inadequate treatment of extracranial tuberculosis. Multiple ring-enhancing lesions may be tuberculomas or abscesses. In this patient the gas in the centre of the lesion and surrounding enhancement of the brain parenchyma suggest that they are abscesses rather than tuberculomas.

**Fungal infections**
Fungal infections may present as granulomas or abscesses. They are mostly seen in immunocompromised patients having opportunistic infections. They have also been seen in patients on cytotoxic drugs, long-term corticosteroid treatment and those with diabetes mellitus. Cryptococcal meningo-encephalitis with coccas are increasingly being reported in patients with HIV infections.

**Viral and parasitic infections**
Viral encephalitis may be diffuse or focal. CT scan usually reveals poorly defined areas of abnormal densities due to necrosis and haemorrhages. In addition to herpes simplex encephalitis other arboviruses may also produce multiple brain lesions. Neurocysticercosis can be diagnosed by imaging techniques. The lesions may be a solitary cyst or multiple ones, measuring from a few millimeters up to 10 cm.

These are calcified granulomas and usually have no surrounding inflammatory reactions. They may produce multiple ring-enhancing lesions.

**Miscellaneous**
Lesions such as metastatic lesions from other extracranial malignancies may sometimes produce ring-enhancing lesions on CT scan.

**QUESTION 2**
Tuberculosis.

After preliminary investigations had failed to make a diagnosis, we put the patient on high doses of broad-spectrum antibiotics and cerebral decongestion. However, he deteriorated and as soon as the CT scan was available the possibility of brain abscesses was put forward. A neurosurgical consultation was requested. The neurosurgeon aspirated 20 ml of frank pus from the larger lesion, and 10–15 ml from smaller one. The pus did not show any pyogenic organisms, fungi or acid-fast bacilli and culture did not grow any organisms. We therefore presumed that the multiple abscesses were tubercular in origin and restarted the antitubercular therapy. Following aspiration, the patient rapidly improved and has made a near complete recovery from hemiplegia. Repeat scan after four weeks revealed near complete healing of most of the lesions. The patient has been followed up for six months and is fully active without any neurological deficit.

Drainage of the abscesses may not be indicated in every case because of the inherent disadvantages of the operative procedure itself, anaesthesia and dissemination.\(^5\) The role of corticosteroids is also controversial,\(^6\) but they should be used to reduce cerebral oedema and possibly prevent adhesions.

**Final diagnosis**
Multiple tubercular brain abscesses.

**Keywords:** tuberculosis, computed tomography, abscess

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