Enlarging solitary cysticercus granulomas

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- Solitary cysticercus granulomas that produce seizures usually measure less than 20 mm in diameter and diminish in size spontaneously. Unlike live cysticercus cysts, they have not been known to increase in size. In a prospective follow-up study of 93 consecutive patients with epilepsy and small solitary lesions (< 20 mm in diameter) enhancing on computerized tomography (CT), 91 were found to have solitary cysticercus granuloma; of these, seven (7.7%) were diagnosed as having an enlarging cysticercus granuloma. Enlarging lesions were defined as those that, on follow-up CT, had increased by more than 50% of their original size but were still less than 20 mm in diameter (Group 1, three patients) or those that had increased to more than 20 mm (Group 2, four patients). Excision biopsy is recommended for Group 2 solitary lesions, regardless of the clinical progression, to eliminate the possibility of other pathologies. However, a trial of albendazole therapy with early CT re-evaluation (within 4 to 6 weeks) may be warranted in those with Group 1 lesions and in selected patients with Group 2 lesions. It is important to recognize the entity of enlarging solitary cysticercus granuloma to avoid mistaking it for a tuberculoma and treating the patient with empiric antituberculous therapy.

**KEY WORDS** - cysticercus granuloma - epilepsy - albendazole - treatment

**Clinical Material and Methods**

**Patient Population**

Over a period of 24 months, we have managed 93 patients with epilepsy and CT evidence of small (< 20 mm in diameter), solitary, enhancing lesions. At presentation, all 93 patients had the clinical and CT features described above as being typical of solitary cysticercus granuloma. All patients were managed according to a protocol that has been outlined in earlier publications. In brief, patients were treated conservatively with anticonvulsant therapy, close clinical monitoring, and a repeat CT examination 12 to 16 weeks later. Antituberculous therapy, if initiated by physicians elsewhere, was promptly withdrawn as soon as the patient came under our care.

Two patients ultimately had enlarging lesions that, on histological examination, proved to be of necrotic-cystic etiology; one had a secondary metastasis and the other a pyogenic abscess. These two patients were excluded from the study, leaving a total of 91 patients with solitary cysticercus granuloma.

**Computerized Tomography Classification**

Based on CT evidence, the lesion was categorized into two types using a classification system described previously. Type A lesions included single “rings” or “disks,” and Type B consisted of lesions with two confluent rings or disks, or a combination of a ring and
a disc. Lesions were measured on CT scans at their maximum dimension. On follow-up CT scans, enlarging lesions were subdivided into two types: lesions that had increased by more than 50% of their original dimension but were still less than 20 mm in diameter (Group 1) and lesions that had increased to more than 20 mm in diameter (Group 2).

Management

Patients with Group 1 lesions were managed conservatively either with anticonvulsant agents alone or with a combination of anticonvulsant agents and albendazole (15 mg/kg body weight for 14 days). Albendazole therapy was followed by CT re-evaluation 2 to 4 weeks later. For patients with Group 2 lesions, we advised excision of the lesion using CT-guided stereotactic techniques. A craniotomy was performed following stereotactic contrast-enhanced CT with the patient’s head fixed in the head ring of the Brown-Roberts-Wellis stereotactic system. The craniotomy flap and the cortical entry were directed by the stereotactic probe. A transsural approach and microsurgical techniques helped to achieve excision of the granuloma in one piece. In patients refusing surgery, albendazole therapy was advised; excision of the lesion was recommended for those not responding to this therapy.

Diagnosis of Cysticercus Granuloma

The diagnosis of a cysticercus granuloma was considered to be confirmed on either spontaneous resolution (disappearance or punctate calcification) or resolution following albendazole therapy of a typical lesion on CT. In excised lesions, evidence of a parasitic granuloma with or without parts of a cysticercus confirmed the diagnosis.

Results

In seven (7.7%) of 91 patients with solitary cysticercus granuloma, follow-up CT showed evidence of an enlarging lesion. Three patients (3.3%) were in Group 1 (lesion < 20 mm in diameter) and four (4.4%) were in Group 2 (lesion > 20 mm). Table 1 summarizes the clinical and CT characteristics of these patients. Four of the seven patients had had empiric antituberculous therapy initiated on the advice of referring clinicians. The enlarging lesions were diagnosed as cysticercus granuloma on the following basis: histopathological examination in three, response to albendazole therapy in three, and spontaneous resolution in one.

The enlarging solitary cysticercus granuloma exhibited two types of growth patterns on CT. In five patients, there was uniform enlargement of the lesion in all dimensions, causing an increase in size but no alteration in shape. In the other two patients, the lesion changed from Type A (single ring or disc) to Type B (two confluent rings, discs, or a ring and a disc), which resulted in an increased size of the lesion (Fig. 1). None of the seven patients with enlarging granulomas developed new neurological symptoms or signs, although most continued to have seizures in spite of anticonvulsant medications.

Discussion

A parenchymal cysticercus cyst of the brain passes through four stages in its natural evolution.12,13 Cysts that include live or active parasites are classified as the “vesicular” and “colloidal” stages. The third stage, the “granular-nodular” stage, refers to the cysticercus granulomas discussed in our study. The fourth stage is the “calcific” stage, formed by calcification of the gliotic scar that replaces the dead parasite. Granulomas and calcific residues represent the inactive forms.13 On CT, the vesicular forms appear as hypodense masses of variable size with nonenhancing walls. The colloidal forms are also of variable size but may show some irregular enhancement of their walls. The granulomas appear as small (< 20 mm in diameter) lesions that may show a uniform (disc) or peripheral (ring) enhancement with or without surrounding edema.

Size of Solitary Cysticercus Granulomas

Nearly all solitary cysticercus granulomas that produce seizures measure less than 20 mm in diameter at

<table>
<thead>
<tr>
<th>Group &amp; Case No.</th>
<th>Age (yrs)</th>
<th>Sex</th>
<th>Lesion Size (mm)</th>
<th>Type of Growth†</th>
<th>Interval Between Scans (wks)</th>
<th>Diagnostic Method</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Initial</td>
<td>Enlarged</td>
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<tr>
<td>Group 1 (lesion &lt; 20 mm in diameter)</td>
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<td>1</td>
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<td>16, F</td>
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<td>3</td>
<td>15, M</td>
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<td>11</td>
<td>18</td>
<td>uniform</td>
<td>3</td>
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<tr>
<td>Group 2 (lesion &gt; 20 mm)</td>
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<td>4</td>
<td>4, F</td>
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<td>A to B</td>
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</tr>
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* CT = computed tomography.
† A to B = Type A to Type B lesions; see text for explanation of types.
of a Type A lesion transforming into a Type B with a “daughter” nodule resulting in growth to a much larger size. It is possible that in the latter case there was in fact a small additional cyst adjacent to the enhancing cyst but, because it was nonenhancing and isodense, it was not visualized on CT. Once this daughter cyst starts involuting, it also acquires an enhancing wall which results in a change in the appearance of the lesion.

Management Options

Although only two (22%) of the nine enlarging lesions from 93 patients with solitary small enhancing lesions and seizures had a noncysticercal etiology, this diagnosis remains a major concern with enlarging lesions.

In patients with enlarging lesions less than 20 mm in diameter size (Group 1), a trial of empiric albendazole therapy may be indicated. In a study conducted by us, four of 11 patients with persistent (>3 months’ duration) solitary cysticercal granuloma and seizures responded to albendazole therapy, as evidenced by resolution or regression of the lesion on CT re-evaluation (2.5 to 6 weeks following initiation of therapy).6 Excision biopsy may be considered for lesions that do not respond to albendazole based on further growth behavior.

We recommend excision for diagnostic confirmation of all lesions that enlarge to greater than 20 mm in diameter on follow-up CT (Group 2). Albendazole therapy may be offered to selected patients (children and young adults), but a lack of response to this therapy should be followed by excision biopsy. We would like to stress that every patient with an enlarging lesion who develops new or progressive neurological deficit or features of raised intracranial pressure should have excision biopsy of the lesion without delay, regardless of the size of the lesion, as these features are not characteristic of solitary cysticercal granulomas.

Conclusions

A small but significant number of solitary cysticercal granulomas causing epilepsy show unusual growth, with some enlarging granulomas exceeding 20 mm in diameter. While histological confirmation by excision biopsy is ideal for lesions that grow to more than 20 mm in size, those less than 20 mm may be managed conservatively with a trial of albendazole therapy. Lack of recognition of the entity of enlarging solitary cysticercal granulomas may lead to empiric antituberculous therapy, as untreated cerebral tuberculomas usually enlarge and cysticercus granulomas and tuberculomas are generally found in the same population groups.

References


Fig. 1. Serial contrast-enhanced computerized tomography scans in Case 4. a: Initial scan obtained within 1 week of onset of symptoms showing a Type A lesion (“ring”) in the right occipital region (15 mm in diameter). b: Scan obtained at admission. The lesion has increased in size (25 mm). The solitary ring (Type A) has evolved into a coalesced mass of two rings (Type B). c: Scan obtained 4 weeks after completion of albendazole therapy. Two small enhancing dots are the only evidence of the lesion. d: Scan obtained at follow-up review 6 months after albendazole therapy showing two small calcified dots in the right occipital region.

the time of initial presentation. A cysticercus cyst measures from a few millimeters to 20 mm,22 and the size of the granuloma around the dying cyst usually approximates that of the live cyst. In contrast to the seizure-producing solitary cysticercus granuloma, which rarely exceeds 20 mm in diameter, symptomatic live cysts (vesicular and colloidal stages), solitary or multiple, are extremely variable in size and the larger ones may act as space-occupying lesions.3 The live cyst may enlarge when its wall loses the capacity for osmotic regulation and there is an ingress of fluid from the surrounding tissues and blood.3 These cysts can measure up to 10 cm in diameter.

As the inflammatory response in the granuloma regresses with the diminution of the irritating contents of the cyst, a gliotic scar results that may sometimes calcify. Up to 85% of lesions resolve in this manner over a period of 6 to 8 months (unpublished data).

Causes of Enlarging Cysticercus Granulomas

Enlargement of the solitary granuloma is possibly due to increasing inflammation around the cyst and its subsequent organization. This may explain one of the two CT patterns of enlarging lesions, namely, a uniform increase in the size of the lesion but no alteration in its original shape. The other growth pattern was that

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