Chronic expanding intracerebral hematoma

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The cases of 10 normotensive patients with chronic intracerebral hematomas are reported. The patients’ median age at diagnosis was 42 years. The median duration of symptoms was 22 days. Seizures were the presenting symptom in 50% of the cases. Computerized tomography almost consistently demonstrated ring-shaped lesions with mass effect and perifocal edema. Arteriography revealed that all but one of the lesions were avascular. All patients had superficial white matter lesions, mostly in the frontoparietal region. All patients were treated surgically. Most of the hematomas were encapsulated and contained blood in various stages of organization. The thick capsule consisted of an outer layer of collagenous tissue and an inner layer of granulation tissue. Occult cerebrovascular malformations were detected in two instances.

There were two deaths, both related to recurrent postoperative hemorrhage. This entity can present much like a brain malignancy and should be considered in the differential diagnosis of ring-shaped lesions whatever the clinical presentation. Strategies of treatment are discussed.

KEY WORDS  • intracerebral hematoma  • computerized tomography  • arteriovenous malformation

INTRACEREBRAL hematomas (ICH’s) generally present with readily recognizable clinical signs as well as virtually diagnostic computerized tomography (CT) findings. Nonoperated clots are usually absorbed with minimal scar formation, and follow-up CT studies reveal decreased parenchymal density and focal atrophy.2,4,13 Recently, instances have been reported of ICH’s behaving like slowly expanding lesions, with progressive neurological deficits, a confusing CT appearance, and thick encapsulation at operation. This entity, referred to as a chronic ICH, probably occurs more frequently than the number of reported cases would suggest.1,3,6,10,12

Our experience, consisting of 10 patients with chronic ICH encountered during the last 6 years, has been analyzed with regard to clinical presentation, radiological appearance, operative findings, and pathological features.

Summary of Cases

During the past 6 years, 10 patients with chronic ICH’s that resembled brain malignancies clinically and radiographically have been seen at our institution. There were six males and four females, with a mean age of 42 years (range 11 to 66 years). The patients presented with seizures (five cases), frontal syndrome (one case), headache and vomiting (two cases), and progressive hemiparesis (two cases). Papilledema was noted in two cases. One patient (Case 5) gave a history of head trauma following an epileptic seizure. None of the patients was hypertensive. The duration of initial symptoms prior to definitive diagnosis varied from 3 months to 1 week, with an average of 22 days. The clinical summary of these 10 cases appears in Table 1.

Computerized tomography was the initial diagnostic procedure performed in each patient. All patients had superficial white matter lesions (six frontal or frontoparietal, two temporal, two parieto-occipital): this figure differs considerably from that of hypertensive ICH. A ring-like blush of enhancement surrounding an area of mixed density was the most constant CT finding. Midline shift and mass effect due to perifocal edema were seen in eight cases. Calcifications were noted in two patients (Table 1). Figures 1 to 4 show typical CT scans from these patients. Angiography showed avascular mass lesions in all cases except one (Case 10), where a peripheral ring-like blush was present.

All patients were operated on with a diagnosis of a brain tumor. A tough capsule surrounding clots in various stages of organization was found in seven cases; these findings suggested that bleeding had occurred repeatedly. In two patients a liquefied hematoma was
TABLE 1
Clinical summary of 10 patients with intracerebral hematomas

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age (yrs), Sex</th>
<th>Symptoms</th>
<th>Computerized Tomography Findings</th>
<th>Surgical Findings*</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>66, F</td>
<td>headache, papilledema</td>
<td>Density</td>
<td>mixed</td>
<td>Ring Blush</td>
</tr>
<tr>
<td>2</td>
<td>11, M</td>
<td>seizures</td>
<td>mixed</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>3</td>
<td>16, F</td>
<td>aphasia, rt hemiparesis</td>
<td>hyperdense</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>4</td>
<td>36, M</td>
<td>seizures</td>
<td>mixed</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>5</td>
<td>40, M</td>
<td>seizures</td>
<td>mixed</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>6</td>
<td>31, F</td>
<td>seizures</td>
<td>hypodense</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>7</td>
<td>62, F</td>
<td>frontal syndrome, papilledema</td>
<td>mixed calcification</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>8</td>
<td>65, M</td>
<td>headache</td>
<td>mixed</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>9</td>
<td>44, M</td>
<td>seizures, rt hemiparesis</td>
<td>mixed</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>10</td>
<td>57, M</td>
<td>lt hemiparesis</td>
<td>mixed calcification</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

* AVM = arteriovenous malformation.

encountered. One patient (Case 7) had a multilocular hematoma consisting of fresh and old hemorrhages separated by thin membranes. The capsule consisted of granulation tissue containing thin-walled blood vessels and had fibrous tissue at the periphery (Fig. 5). A cryptic vascular malformation was found in two cases. The remote possibility of bleeding into a brain tumor could be excluded on the basis of accurate histological studies.

There were two deaths (20%). Both were due to recurrent hemorrhage in the early postoperative period. The follow-up period ranged from 4 months to 5 years (mean 2 years). Seven patients recovered completely, and one patient remains disabled.

Discussion

Chronic ICH can be a puzzling entity, in fact, the initial symptoms, if present, may escape medical attention and the affected patients are often evaluated for late irritative or slowly progressive neurological symptoms mimicking a brain tumor. In addition, at the time of presentation, a chronic ICH cannot be definitely distinguished by CT scan from other space-occupying processes.

On the basis of previous reports and our own expe-
Chronic expanding intracerebral hematoma

Fig. 3. Case 4. Postinfusion computerized tomography scan showing a ring of enhancement encircling a mass with a hyperdense core in the right temporal region. Mass effect is absent.

Fig. 4. Case 10. Postinfusion computerized tomography scan demonstrating a peripheral ring of enhancement surrounding a frontoparietal mass containing foci of calcification.

Fig. 5. Photomicrograph of the capsule of a chronic intracerebral hematoma. There is fibroblastic granulation tissue with thin-walled blood vessels in the inner side and thick collagenous tissue on the outer side. H & E, × 50.

cloth. It is known that, as hematomas age, the diagnostic specificity of CT scanning decreases, and without a previous scan for comparison the diagnosis of a resolving ICH may not be possible.

In the phase of reabsorption of an ICH, a well-formed ring of contrast enhancement appears on CT scans, representing both "luxury perfusion" of the surrounding brain and peripheral vascular granulation tissue. When compared to scans of ordinary resolving hematomas, CT scans of a chronic ICH often demonstrate perilesional edema and mass effect. These are the most confusing factors in the preoperative diagnosis, since the absence of these signs is a useful clue to the diagnosis of a hematoma.

The ring-like blush evident at angiography in our Case 10 must be regarded as extremely unusual, but it can be further misleading in the neuroradiological evaluation. It does not indicate neovascularity but rather represents hyperperfusion in the adjacent brain as a result of loss of autoregulation. The incidence of verified vascular malformations both in our own and in other series seems to be low. Although previous trauma, anticoagulant medication, and obscure causes may play a role in some cases, we are inclined to believe that occult self-destroying cerebrovascular malformations constitute the major factor responsible for the initial hemorrhage.

Chronic ICH's are found in children as well as adults. Four cases, including two of our patients (Cases 2 and 3), are reported in the literature. This finding constitutes another point in favor of a vascular malformation origin.

Common surgical findings in chronic ICH include a thick peripheral capsule surrounding central clots in various stages of resolution. Loculation is frequent. A capsule was present in seven of our cases and was composed of two layers: the outer layer consisted of thick collagenous tissue and the inner layer contained...
fibroblastic granulation tissue with neovascular channels. The existence of some factor leading to encapsulation and self-perpetuation remains a debated issue. Hirsh, et al., suggested that the capsule presumably originates from fibroblasts related to the abnormal vessels of an occult vascular malformation, and advocated a thorough search for a cryptic angioma whenever a thick fibrous capsule is encountered at operation. More probably, the capsule simply results from an overabundant proliferation of the vascular granulation tissue usually found in resolving hematomas after 3 to 4 weeks. Lin, et al., found feeding arteries in the capsule and presumed that these vessels were the origin of slow continuous bleeding.

Reid, et al., reported a series of chronic expanding hematomas in a variety of locations, and suggested that the self-perpetuating expanding nature of the lesion appeared to be caused by exudation or bleeding from capillaries in the granulation tissue. Whether recurrent hemorrhage and expansion depend on macrocapillaries with large endothelial gap junctions similar to those found in the capsule of chronic subdural hematomas awaits further studies with electron microscopy. Two patients in our series had recurrent postoperative bleeding which adversely influenced the outcome: both the capsule with its fragile vessels and the luxury perfusion of the peripheral brain tissue may predispose to further hemorrhage as a result of surgical trauma. Our dismal experience with these two cases is not supported in the few available reports, but it may show that particular attention is necessary when dealing with these lesions.

Equivocal appearance on the CT scan and a non-ictal and pseudotumoral clinical course are the reasons why most patients were considered as harboring brain tumors. Increasing awareness of chronic ICH as a clinical and pathological entity is necessary to select the proper treatment for lesions that appear ring-shaped on CT scanning. Once a chronic ICH is suspected, the main question is whether surgery is indicated or not. If the patient's clinical condition permits, an expectant policy may be a reasonable therapeutic option. Serial scans may be obtained over an adequate interval of time to assess the possibility of eventual disappearance of the ring-like blush and the decrease in attenuation and size of the lesion consistent with hematoma resolution. However, the expanding nature of the lesion by recurrent hemorrhages from the capsule and/or underlying occult vascular malformations indicates surgery in most cases.

References


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