Diagnostic Evaluation of Degenerative and Vascular Dementia*

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SUMMARY The accuracy of the Ischemic Score (IS) of Hachinski in the differential diagnosis between senile dementia (SDAT) and multi-infarct dementia (MID) is evaluated in this study.

Sixty-nine percent of patients with SDAT and 94% of patients with MID had an Ischemic Score in agreement with the diagnosis established by CT scan.

With the purpose of improving the accuracy of the I.S., a modified ischemic score consisting of five items (abrupt onset; history of strokes; focal symptoms; focal signs; focal (single or multiple) CT-low density areas) is proposed as a useful tool in the differential diagnosis between SDAT and MID.

THE TWO MOST FREQUENTLY encountered types of dementia are the senile dementia of the Alzheimer type (SDAT), which accounts for approximately 50% of all patients with dementia, and the so-called multi-infarct dementia (MID), comprising about 15–20% of the total.

The remaining 15–20% have probably both disorders, and are labelled as mixed forms of dementia (MIX). Other less common diseases, such as normotensive hydrocephalus, supranuclear palsy, Huntington’s Disease, account for the remaining cases of dementia.

Therefore, in the vast majority of cases (from 80 to 90%), the problem arises of the differential diagnosis between degenerative senile dementia, multi-infarct dementia, and mixed forms.

Hachinski et al. selected 13 signs and symptoms classically known and broadly indicated by Mayer Gross et al. as signs of vascular dementia. A point value was assigned to each feature, and the final summation of points resulted in an Ischemic Score (I.S.).

In patients with dementia, a score of 4 or less point to a diagnosis of SDAT, while scores of 7 or higher point to a diagnosis of MID (table 1).

As Rosen et al. pointed out, the accuracy of the I.S. in the clinical differentiation between SDAT and MID can be verified only by histopathological controls. In the absence, however, of a suitable number of histologically verified cases, CT studies can reliably validate the I.S. in a sufficiently large case material.

This paper aims at evaluating the accuracy of the I.S. in a group of demented patients. The diagnosis of dementia rested upon the obvious correlation between history, clinical features, and the results of ancillary diagnostic procedures. In allocating each patient to the SDAT or MID group, decisive stress was placed upon the CT investigation.

Material and Methods

Out of 101 patients with dementia admitted to the Department of Neurology at the University of Genoa from January 1st, 1975 to February 1st, 1982, 94 were selected. These were 51 men and 43 women with a mean age of 66 ± 9. Seven patients with a dementia attributable to causes other than SDAT, MID and MIX (i.e. normotensive hydrocephalus, Creutzfeldt-Jakob disease, Huntington’s Disease) were excluded from the study.

Each patient underwent routine blood and radiological examinations, evaluation of thyroid functions, and determinations of B12 and folic acid levels. Ancillary neurological examinations (CSF, Doppler ultrasonography, EEG, angioscintigraphy, RHISA cisternography) were performed when necessary. Psychometric evaluations included WAIS and Wechsler memory tests, Benton test, Color naming, Culture free, and Corsi test. All patients underwent CT scan.

The value of CT in the diagnosis of dementia is acknowledged, although the comparative evaluation of the CT scan features between demented patients and non demented controls over 60 years of age, showed a considerable degree of overlap, represented by approximately 17% incorrect predictions.

The patients entering this study were considered demented on the basis of history, clinical features and the results of the ancillary diagnosis procedures. They were thereafter subdivided, on the basis of CT features, into the following subgroups:

1) CT-SDAT subgroup (65 cases), in which the CT examination showed ventricular enlargement with widening of the sulci. The degree of cerebral atrophy was evaluated by a neuroradiologist who rated the ventricular size and the cortical atrophy according to the score suggested by Jacoby and Levy. In spite of the obvious limitations of the CT scan in the assessment of cerebral atrophy, this subgroup of patients with dementia without signs attributable to cerebral vascular involvement was considered as affected by SDAT.

2) CT-MID subgroup (18 cases), in which CT showed...
the existence of multiple areas of reduced density attributable to ischemic lesions.

3) CT-VASC subgroup (11 cases), in which CT showed a single ischemic lesion and the patient was considered affected by a dementia of vascular origin, possibly multi-infarct dementia.

Results

There were no differences in age, sex, duration of illness and general physical and laboratory examinations among the three subgroups, with the exception of hypertension, which prevailed in CT-MID with respect to CT-SDAT ($p < 0.05$) and ECG alterations (signs of previous or present necrosis, signs of ischemia arrhythmias) which prevailed in CT-MID with respect to CT-SDAT ($p < 0.05$). The neurological examination showed a significant frequency of focal neurological signs in the CT-MID ($p < 0.0005$) and in the CT-VASC ($p < 0.001$) subgroups, and of pseudobulbar signs in the CT-MID ($p < 0.0005$) and in the CT-VASC ($p < 0.0005$) ones. The dementia score of Hachinski was significantly lower in the CT-MID than in the CT-SDAT subgroups ($p < 0.025$).

Ischemic Score Ratings

The total score in the three subgroups was as follows:

- The CT-SDAT (65 cases) subgroup showed an I.S. equal to 5–6 in 16 patients (25%) and equal or higher than 7 in 7 patients (11%).
- The CT-MID (18 cases) subgroup had an I.S. equal or lower than 4 in 1 patients (6%) and equal or higher than 7 in 17 patients (96%).
- The CT-VASC (11 cases) subgroup showed an I.S. equal or lower than 4 in 2 cases (18%), equal to 5–6 in 2 cases (18%), equal or higher than 7 in 7 cases (63%).

The mean value of the I.S. showed: $3.3 \pm 2.1$ in cases with CT-SDAT; $9.5 \pm 2.4$ in cases with CT-MID, and $8 \pm 2.8$ in cases with CT-VASC with a significant level of $p < 0.0005$ (table 2).

In summary, nineteen patients (20%), of which 16 of CT-SDAT, 1 of CT-MID and 2 of CT-VASC subgroups, had an I.S. of 5–6 which we considered not discriminant to avoid overlap of different types of dementia, thereby rendering the classification more flexible.

Moreover, 4 patients with CT-SDAT had an I.S. pointing to a diagnosis of MID, and 2 patients with CT-VASC had an I.S. $\leq 4$ pointing to a diagnosis of SDAT.

The statistical comparison of the various items of I.S. among the three subgroups yielded significant differences, since items 1 (abrupt onset), 10 (history of stroke), 11 (focal neurological symptoms), 12 (focal neurological signs), prevailed in CT-MID and CT-VASC subgroups with respect to CT-SDAT subgroup ($p < 0.0005$) (table 3).

Comment

The validation of I.S. by CT scan features was successful, since 69% of patients with SDAT and 95% of patients with MID had an I.S. in agreement with the diagnosis established by the CT scan.

Nineteen patients with a non-discriminant score ($= 5–6$) and 9 patients with only one hypodense lesion (CT-VASC subgroup) had equivocal ischemic scores: the 19 cases with a non-discriminant score of 5–6, and the other 9 patients with score of different values, 2 cases pointing to a SDAT and 7 cases to a MID diagnosis.

On the whole, 28 patients (30%) could not be conveniently classified according to the ischemic scale of Hachinski.

Four features (i.e. abrupt onset, previous history of stroke, focal symptoms and focal signs) were found most relevant to a diagnosis of multi-infarct dementia.

We suggest therefore a modified version of the Ischemic Score of Hachinski using 4 items of Hachinski’s I.S. plus CT findings, as a suitable tool for the diagnosis of vascular dementia. Such a modified ischemic score (MIS) could comprise 5 items, that is, 4 relevant items of I.S. and the CT features (isolated or multiple low density areas) (table 4).
A full 9–10 point score points to the existence of old or recent cerebrovascular lesions, simple or multiple. If one employs such a MIS in evaluating our 94 patients, the following is found:

1) out of 65 patients, probable SDAT cases, 62 (95%) had a MIS of 0–2; 2 patients of 3–4 (3%), 1 patient of 5 (2%).
2) out of 18 patients, probable MID cases, 18 had a MIS of 5–10 (100%).
3) out of 11 patients, in whom vascular dementia was suggested, 3 had a MIS of 0–2, 2 of 3–4, and 6 of 5–9.

Therefore, a MIS from 0 to 2 points to a diagnosis of SDAT, from 5 to 10 to a diagnosis of MID, while a 3–4 MIS score leaves the question unsettled (table 5).

In about 15% of the cases, the differential diagnosis is not feasible.

The proposed modified ischemic score (MIS), therefore, on the basis of our experience, represents a diagnostic tool which increases the discriminating power of the I.S. of Hachinski in the differential diagnosis between SDAT and MID.

### Table 4 Modified Ischemic Score (M.I.S.)

<table>
<thead>
<tr>
<th></th>
<th>MIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Abrupt onset</td>
<td>2</td>
</tr>
<tr>
<td>2. History of stroke</td>
<td>1</td>
</tr>
<tr>
<td>3. Focal symptoms</td>
<td>2</td>
</tr>
<tr>
<td>4. Focal signs</td>
<td>2</td>
</tr>
<tr>
<td>5. CT-Low density areas</td>
<td></td>
</tr>
<tr>
<td>isolated</td>
<td>2</td>
</tr>
<tr>
<td>multiple</td>
<td>3</td>
</tr>
</tbody>
</table>

Maximum Score = 10

### Table 5 Modified Ischemic Score (M.I.S.) of 94 Patients with Dementia

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Cases</th>
<th>≤ 2</th>
<th>3–4</th>
<th>≥ 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT-SDAT</td>
<td>65</td>
<td>62</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(95.4%)</td>
<td>(3.1%)</td>
<td>(1.5%)</td>
</tr>
<tr>
<td>CT-MID</td>
<td>18</td>
<td>=</td>
<td>=</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>=</td>
<td>=</td>
<td>(100%)</td>
</tr>
<tr>
<td>CT-VASC</td>
<td>11</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(27.3%)</td>
<td>(18.2%)</td>
<td>(54.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>94</td>
<td>65</td>
<td>4</td>
<td>25</td>
</tr>
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</table>

References

Diagnostic evaluation of degenerative and vascular dementia.
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