Comparative Study of 3.0- and 1.5-T MR in the follow-up of Moyamoya Disease

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BACKGROUND
Miki [1] group researched imaging difference between 1.5- and 3.0-T MR in moyamoya disease (MMD). However, the difference of these two equipments at the point from clinical view has not been fully estimated. We evaluated the imaging findings of 1.5- and 3.0-T MR in patients with MMD to find the difference between these two equipments from the clinical assessment.

PURPOSE
To retrospectively compare 3.0- and 1.5-T magnetic resonance (MR) findings in patients with moyamoya disease (MMD), and assess the relationship and difference between those two modalities in the follow-up of MMD.

MATERIALS AND METHODS
The study included 60 (120 sides) MMD patients (15 male and 45 female patients, age range/mean age: 5 to 60/27 years, number of post/pre-operative patients: 44/16). Among the 60 patients, 25 had performed 3.0-T MR and one year interval follow-up 1.5-T MR (3.0T∼1.5T), 43 had performed 3.0-T MR and one year interval follow-up 3.0-T MR (3.0T∼3.0T), 12 had performed 1.5-T MR and one year interval follow-up 3.0-T MR (1.5T∼3.0T), and 9 had performed 1.5-T MR and one year interval follow-up 1.5-T MR (1.5T∼1.5T). No patient had performed operation during the follow-up period. We evaluated the MRA score (from 0 to 10) of each patient by using modified MRA grading method, then compared MRA score between 1.5- and 3.0-T MR of each hemisphere.

RESULTS
Upgrading rate, downgrading rate, and difference rate between upgrading and downgrading rate were shown in the table.

CONCLUSION
In 3.0T∼3.0T, the difference rate would reflect natural steno-occlusive progress of intracranial vessels. In 3.0T∼1.5T, upgrading rate might be due to both different teslas and interval progress of disease, which would cause higher difference rate than that in 3.0T∼3.0T. In 1.5T∼3.0T, both effects might be balanced. In 1.5T∼1.5T, estimation error because of less numbers or overestimating effects caused by lower tesla MR unit might be the reasons of the highest upgrading rate.

DISCUSSION
Regardless of disease progressing, we should be careful about 1.5-T MR in evaluating steno-occlusive severity of intracranial vessels in MMD for its possibility with higher overestimating rate compared with 3.0-T MR.

REFERENCES

<table>
<thead>
<tr>
<th>MR equipment</th>
<th>No. of hemispheres</th>
<th>Upgrading rate (No. of sides)</th>
<th>Downgrading rate (No. of sides)</th>
<th>Difference rate (No. of sides)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0T∼3.0T</td>
<td>86</td>
<td>12.0% (10)</td>
<td>5.0% (4)</td>
<td>7.0% (6)</td>
</tr>
<tr>
<td>3.0T∼1.5T</td>
<td>50</td>
<td>10.0% (5)</td>
<td>0.0% (0)</td>
<td>10.0% (5)</td>
</tr>
<tr>
<td>1.5T∼3.0T</td>
<td>24</td>
<td>13.0% (3)</td>
<td>13.0% (3)</td>
<td>0.0% (0)</td>
</tr>
<tr>
<td>1.5T∼1.5T</td>
<td>18</td>
<td>17.0% (3)</td>
<td>0.0% (0)</td>
<td>16.7% (3)</td>
</tr>
</tbody>
</table>

One-year follow-up 3.0-T MR revealed right middle cerebral artery discontinuity (b) compared with previous 3.0-T MR examination (a), which might reflect natural steno-occlusive progress of intracranial vessels in MMD.

One-year follow-up 3.0-T MR revealed right posterior communicating artery (PCoA) continuity (d), but previous 1.5-T MR showed right PCoA discontinuity (c), this downgrading might due to overestimation of 1.5-T MR.