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<td>Yamaguchi, Michio</td>
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Incidence of Asymmetric Occipital Flattening on Cranial CT Scanning

Michio Yamaguchi

Although asymmetric occipital flattening (AOF) is frequently seen in the very younger generation, the flat occiput may hardly be observed on routine cranial CT scan in the senior population. The aim of this paper is to clarify whether the age-related difference exists on the incidence of the AOF or not. The author reviewed CT films of 877 patients. All cases were from either a local private general hospital, or a local psychiatric hospital in Kobe. As a result, the younger group of ages up to 39 years had 30 cases of AOF out of 174 (17.2%), while the older group had only 20 AOF out of 703 (2.8%). At a point between the ages of 30's and 40's, the incidence rate of AOF changed very sharply. However, the reason why the incidence in older population decreased apparently remained unclear. Both of laterality of AOF and difference by gender were insignificant. Clinically no distinct manifestation have been observed on the individuals with the flat occiput which was accidentally evidenced on cranial CT. AOF is considered to be an unharful condition in the adult population. Additional diagnostic procedure may not be required if any evident symptoms come out.

Key Words
Occipital flattening, Age, CT, Asymmetric skull.

INTRODUCTION

Cranial X-ray CT scanning is now very widely and routinely used in the clinical practice in these decades. Some clinically asymptomatic but observable findings may appear on those CT pictures, like the asymmetric occipital flattening, the cyst of the septi pellucidi, the cyst of cavum Vergae, rather strongly calcified basal ganglia, or the clinically arrested hydrocephalus may become to be discriminated whether the normal or abnormal. These findings may be described on the neuroradiologist’s report chart as “Originally abnormal findings but practically needs no medical or surgical treatment, if followed carefully”.

The author will introduce one of these condition, asymmetric occipital flattening of adult, in this paper. This condition may not be a harmful one. By statistics, the incidence of this condition decreased sharply at their 30’s of age. The author hopes that this report may add some knowledge on the routine procedure of CT diagnosis.

MATERIALS AND METHODS

From September 22, 1990 to Octo
ber 10, 1991, 900 patients were examined by cranial CT scan at two local private hospitals located in Kobe city. Psychiatry service was open at one hospital, Minatogawa, and services for medicine, surgery, orthopedics, gynecology, and rehabilitation were open at Maikodai hospital. Two hundred and sixty six patients were examined at the former and 634 cases had cranial CT taken at the latter. Number of male patients was 425 and of female was 475. All films were reviewed by the author and any additional information for the radiological diagnosis was collected and filed. After careful checking on 900 films, 23 cases were excluded by incomplete information of their clinical condition. None of the patients had signs of bone metastasis of malignant tumors or other bone diseases. Ages of the patients who had their CT taken range from one to 97. Twenty six of them were under 9 year of age. All films were observed carefully on the CT slices including the pineal body and two more upper planes to find out the asymmetric occipital flattening. A typical picture was shown in Figure 1.

Incidence of the skull deformity in the whole sample was compared by \( \chi^2 \) test between the younger group (up to 39 years old) and the older group (40 years or over).

RESULTS

The incidence of the occipital flattening in the male population of this series was shown in Table 1. Twenty four cases out of 416 male patients (5.8%) showed the occipital flattening on routine CT scan. In the female group, 26 cases out of 461 (5.6%) also had the asymmetric occiput as shown in Table 2. Difference between male and female groups was not observed on the incidence rate of the occipital flattening visible on the cranial CT.

As shown in Tables 1 and 2, young generation may have more skull deformity when compared with that of older one. The incidence of the occipital flattening at each age classes was introduced in Figure 2. On this graph, a significant decrease of the incidence rate of the occipital flattening occurred between their 30's and 40's generations on both sexes.

Since a turning point was suggested on the incidence rate curve of the asymmetric occipital flattening, a statistical confirmation was carried out as shown in Table 3. The group of 39 years old or younger cases had 30/174 deformity of the skull (17.2%). The group of 40 or over age involved only 20 cases of the asymmetric occipital flattening out of 703 individuals (2.8%). This difference was compared by \( \chi^2 \) test and the significantly \((P = 0.0001)\) abundant cases with the skull asymmetry were found in the younger group when compared with those of 40 years age or over.

In Table 4, the side of the asymmetric occipital flattening was compared on the whole 50 cases. No marked difference was observed on the laterality of the skull deformity in this sample.

DISCUSSION

Using CT picture, Madeline et al.\(^1\) chronicled the complex process of
skull base development. They reported that the occipito-mastoidal, petro-occipital, and sphenoid-occipital synchondroses remained partially open into the teenage years. By this report, it became clear that the synchondrosis of the cranium takes place even in the adolescent stage, and probably in later stage in some individuals. Therefore, an abundant incidence of the skull deformity is observed in the period from infancy to teenager. In my suspect, the process of the final synchondrosis may take place more lately than expected by Madeline et al. 1)

As described in the result section, the percentage of AOF is significantly lower in individuals of 40 years old or above, when compared with those below 40 years old. Therefore, the final shape-repairing process may occur on skull at 30 to 40 years of age. But no supporting evidence for

<table>
<thead>
<tr>
<th>Age Group</th>
<th>*AOF</th>
<th>No AOF</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 19</td>
<td>6</td>
<td>30</td>
<td>36</td>
</tr>
<tr>
<td>20-29</td>
<td>7</td>
<td>23</td>
<td>30</td>
</tr>
<tr>
<td>30-39</td>
<td>5</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>40-49</td>
<td>2</td>
<td>42</td>
<td>44</td>
</tr>
<tr>
<td>50-64</td>
<td>2</td>
<td>115</td>
<td>117</td>
</tr>
<tr>
<td>Over 65</td>
<td>2</td>
<td>157</td>
<td>159</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td><strong>392</strong></td>
<td><strong>416</strong></td>
</tr>
</tbody>
</table>

*AOF: Asymmetric Occipital Flattening

<table>
<thead>
<tr>
<th>Age Group</th>
<th>*AOF</th>
<th>No AOF</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 19</td>
<td>4</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>20-29</td>
<td>4</td>
<td>23</td>
<td>27</td>
</tr>
<tr>
<td>30-39</td>
<td>4</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>40-49</td>
<td>3</td>
<td>37</td>
<td>40</td>
</tr>
<tr>
<td>50-64</td>
<td>6</td>
<td>116</td>
<td>122</td>
</tr>
<tr>
<td>Over 65</td>
<td>5</td>
<td>216</td>
<td>221</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>435</strong></td>
<td><strong>461</strong></td>
</tr>
</tbody>
</table>

*AOF: Asymmetric Occipital Flattening
this hypothesis was available at this
time. Further study may be expected
on this mechanism in future.
Asymmetric skull like the occipital
flattening have been more discussed
in the field of pediatric neurology.
Yamori et al. 2) estimated the skull
asymmetry by the cranial CT and re­
ported a prevalence of right sided
flattening in the infant groups of the
cerebral palsy or in the related condi­
tion. Myslobodsky et al. 3) suggested
the asymetric occipital flattening and
handedness may be related to the
turning direction of the infant head.

Table 3. Incidence of AOF in Young
and older Groups.

<table>
<thead>
<tr>
<th>Age Group</th>
<th><strong>AOF</strong></th>
<th>No AOF</th>
<th>Total</th>
<th>% of AOF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 39</td>
<td>30</td>
<td>144</td>
<td>174</td>
<td>17.2</td>
</tr>
<tr>
<td>Over 40</td>
<td>20</td>
<td>683</td>
<td>703</td>
<td>2.8</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>827</td>
<td>877</td>
<td>5.7</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 53.77 \quad P = 0.0001 \]

**AOF: Asymmetric Occipital Flattening

Yamori et al. reported 23 out of 30
infant cases of the cerebral palsy
(76.7%) showed right occipital
flatness 2) . Fulford and Brown also
showed 84.2% of the cerebral palsy
had the right-sided occipital
flatness 4) . Damaged brain in their
pediatric period may have relation­
ship between the site of lesion and the
skull deformity. However, my sample
of 50 cases showed no laterality of
the occipital flattening . No distinct
abnormality like a history of the cere­
bral palsy was described in the clinical
chart. So, the author could not
find any factors influencing laterality
of the occipital flattening in the pre­
sent communication.

Faglioni and Scarpa 5) compared the
incidence of the skull deformity and
the incidence of apraxia. They con­
cluded that no relationship was found
between the incidence. Myslobodsky
et al. 6) checked EEG abnormality and
cranial asymmetry on 20 cases.
Asymmetry of EEG had no relation to
the side of the cranial deformity.

Since the arteriovenous malforma­
tion (AVM) sometimes increases the
cerebral blood flow, the size of the
cranium might change to some extent.
Kido et al. 7) reported that 30% of
their cases had cranial asymmetry.
This incidence was apparently higher
than that of my sample. Although no
clinical sign of AVM was observed in
my 50 cases, some cases with the
moderate asymmetric skull may be re­
commended to have further investiga­
tion by magnetic resonance angiogra­
phy (MRA), if desired by patient.

Table 4. Laterality of Asymmetric
Occipital Flattening.

<table>
<thead>
<tr>
<th>Side</th>
<th>*AOF</th>
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<tr>
<td></td>
<td>Moderate</td>
<td>Slight</td>
</tr>
<tr>
<td>Right</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Left</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

* AOF: Asymmetric Occipital Flattening
REFERENCES