EFFECT OF BRAIN INJURY ON SOCIAL ADAPTABILITY

Longitudinal Study on Frequency of Criminality

M. VIRKKUNEN, A. NUUTILA AND S. HUUSKO

The study tried to clarify social adaptability of persons with brain injuries by using a long-term criminal development as a criterion. Randomly chosen 507 subjects whose open injury originated from the Second World War were followed up for about 30 years. The criminal acts committed by 29 (5.7\%) of these subjects were so severe that they led to imprisonment. Criminality was not found in the subjects with fronto-temporal injuries more often than in those with injuries to the other areas. Subjects with injuries to the dominant hemisphere appeared to have more criminality than subjects with injuries to the non-dominant hemisphere. The criminal acts were often very accidental and had happened only after several decades following the head injury.

Key words: Brain injury – social adaptability – criminality – brain lobes – brain hemispheres.

Especially earlier, frontal brain injuries have been considered to cause, for example, lack of adaptability, decline in morals and decrease in control, irritability as well as lack of perseverence (e.g., Heygster (1949), Lindenberg (1951), Faust (1955, 1960), Lishman (1968)). Similar observations have also been made before regarding persons with temporal injuries. Particularly this area has been linked with violent behaviour (e.g., MacDonald (1958), Mark & Erwin (1970), Mark & Neville (1973)). Generally, the observation has been based on only short-term post-traumatic follow-up or on EEG changes in persons with psychically aberrant behaviour.

Lately in particular, papers have been published partly disproving the earlier prevailing concepts of the crucial part played by injuries in these parts of the brain. Instead, usually the holistic nature of the brain has been stressed (already by, e.g., Goldstein (1944, 1952), Bleuler (1951), Wolff & Chapman (1959)). For instance, it has been observed that, contrary to the earlier beliefs, persons with injuries to the temporal area are not, after all, especially prone to commit violent acts (e.g., Goodan & Medvecky (1963), Guerrant et al. (1962), Small et al. (1966), Stevens (1966), Gloor (1967), Rodin (1973), Coleman (1974)). Nor has there
been any confirmed reliable evidence of a frontal injury being a causal factor in criminal behaviour (e.g., Goodan & Medvecky (1963)).

On the bases of neither of these groups of patients can any fully reliable conclusions be drawn as to how a brain injury in a previously healthy person is going to affect him in the long run. Will he have, for example, more lack of adaptability or psychic illnesses? And, on the other hand, there is the methodological problem of how this adaptability can be measured. In general, the significance of pre-traumatic personality has, in fact, been emphasized in a person's ability to cope (e.g., Hoch & Davidoff (1939), Moros (1944), Kozol (1946), Hillbom (1951), Gruvstad et al. (1958), Hillbom (1960)). Here, of course, the influence of socio-economic conditions is also present (e.g., Adler (1945), Kozol (1945)).

The different parts played by the two different hemispheres of the brain in psychic disturbances and also in criminality as well as in other evidences of lack of social adaptability have not been treated in the literature to any great extent. Hillbom (1960), however, found on examining patients with war-time injuries that the majority of psychic disturbances were associated with left-side traumas. Lishman (1968) also observed that the left cerebral hemisphere was more associated with psychic disturbances than the right, and that, on the whole, the connection between psychic disturbance and the extent of brain injury was closer in the left than in the right cerebral hemisphere.

MATERIAL AND METHODS

In the present study the ability to cope of men with war-time injuries has been followed up. When injured these men were young and healthy. Since, in our opinion, conclusions can be drawn only on the bases of an extended follow-up period, the information gathered on these subjects dates from the Second World War, covering 30 years on the average. We have chosen imprisonment sentences passed by courts as a criterion for lack of adaptability. Using this method we were naturally not able to gather any reliable information about, for example, difficulties within the family, which even by other means can hardly be reliably measured. Receiving Government Pensions these subjects' socio-economic position has been secure, especially in the 1960's and 1970's, and consequently reasons of this kind have had an insignificant effect on proneness to criminality.

Five hundred and seven men from Finland with open injuries dating from the Second World War were randomly selected as subjects. During the War from 1939–1944 these open injuries totalled 1,653, and thus our series represents about 31 % of the injured. Of these injured men, 144 (28.4 %) had frontal injuries, 117 (23.1 %) temporal, 191 (37.7 %) parietal and 55 (10.8 %) occipital.

RESULTS

Post-traumatic criminal acts were found in only 29 (5.7 %) subjects. The localization of the subjects' injuries in the different lobe areas is seen in Table 1.
Table 1. The localization of injuries in different lobes and hemispheres of the brain of those who committed crimes after injuries

<table>
<thead>
<tr>
<th></th>
<th>Frontal lobe injuries</th>
<th>Temporal lobe injuries</th>
<th>Parietal lobe injuries</th>
<th>Occipital lobe injuries</th>
<th>All together</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>All criminals</td>
<td>6</td>
<td>4.2</td>
<td>9</td>
<td>7.7</td>
<td>8</td>
</tr>
<tr>
<td>All violent offenders</td>
<td>1</td>
<td>0.7</td>
<td>2</td>
<td>1.7</td>
<td>3</td>
</tr>
<tr>
<td>Criminals injured in the dominant hemisphere</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

Here the number of injuries in the occipital area, which exceeds the average, is conspicuous, even though the comparison between this and the injuries covering the other areas did not lead to any statistically significant difference ($P > .01$).

Nor on comparing criminal acts in subjects with fronto-temporal injuries with those in subjects with injuries in other areas did any statistical difference emerge ($P > .01$). For the fronto-temporal areas the cases represented 5.7% of the sample, and the same percentage applied for the other areas of the brain.

A majority of all the crimes had been committed by the subjects with injuries to the dominant hemisphere. Nineteen (67.8%) of the subjects with these injuries had committed criminal acts. Nevertheless, no statistically significant difference ($P > .01$) emerged because of the smallness of the present series.

As many as 19 (65.5%) of all subjects with a crime record had committed only one criminal act, seven (24.9%) had committed two and only three subjects (10.3%) had committed more than two criminal acts. As many as ten of the subjects with one criminal act had committed the crime in the 1960's or 1970's, and additionally six subjects had committed the crimes in the 1950's.

**DISCUSSION**

The results of the present study do not support the view according to which persons with frontal or temporal injury adapt themselves poorly to society. Rather, it appears that criminal acts, violent acts in particular, are committed more often by persons with injuries to the occipital area than by persons with injuries to the other localizations. Furthermore, injuries to the dominant hemisphere seem to encumber a person's ability to adapt himself.

Many of the criminal acts had occurred after a long time had elapsed from the injury, i.e., in advanced years, and as is also clinically known, resources of compensation gradually fail in advanced age. On the basis of the present study no reliable connection can be established between these two phenomena, though our results from rehabilitation show an increase in subjective symptoms.
and a clear decrease in capacity to endure strain explicitly in the aged who have brain injuries.

REFERENCES


Received July 21, 1975

Matti Virkkunen, M.D.
Arto Nuutila, M.D.
Psychiatric Clinic of the
Helsinki University Central Hospital
00180 Helsinki 18
Finland

Simo Huusko, M.D.
Sultia Rehabilitation Center for
Brain Injured Veterans
Suntio
Finland