INCIDENCE OF POSTTRAUMATIC EPILEPSY IN KOREAN VETERANS AS COMPARED WITH THOSE FROM WORLD WAR I AND WORLD WAR II*

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(Received for publication May 22, 1961)

The purpose of this presentation is to outline in part a comparative study of posttraumatic epilepsy following World War I, World War II, and Korea.

That epilepsy may follow head trauma is undisputed. The establishment of a precise relationship has been sought for the past century. This problem becomes a very practical matter in each armed conflict. With the advances in surgical and medical care and improved logistic handling of craniocerebral casualties it was hoped, if not confidently expected, that the incidence of posttraumatic epilepsy would decline. That this might not happen was suspected by Russell⁴ who found the same incidence among those with penetrating brain wounds in World War II as had been found in World War I. Another conflict having transpired, the Korean campaign, the over-all incidence of its sequela has been found not far different from that of World War II. For these reasons we have undertaken a more detailed appraisal of the common factors influencing the incidence of posttraumatic epilepsy. Original raw data from the three military engagements have been secured and reevaluated. At the outset one may compare representative studies as they have appeared in the literature to date.

World War I. Credner² in 1930 presented a study of 1990 German cases of war injuries with head trauma that had been examined at the Hechsler Institute from 1914 to 1928. Over half had been followed continuously for 5 years or more. Of the total cases, post-traumatic epilepsy was reported in 38.2 per cent.

Ascroft⁵ in 1941 made an appraisal of the initial and subsequent events in 317 cases of gunshot wounds of the head from the records of the British Ministry of Pensions. Of the total cases with entries in the records, 7 to 20 years after injury, posttraumatic epilepsy as adjudged by one or more fits was reported in 34 per cent.

World War II. Russell⁶ in 1951 reported a study of gunshot wounds with dural penetration seen initially at the Military Hospital in Oxford or at British Mobile Neurosurgical Units in the various theaters of war. Through postal inquiries and reexamination in doubtful cases by means of a Head Injury Advice Bureau and the Ministry of Pensions, sequela were detected and evaluated. In their criteria for epilepsy, a single fit, including those soon after injury, classified a case as epileptic. Attacks lacking detail were excluded. In this series of 820 men, in the first 5 years following injury, epilepsy had developed in 43 per cent.

Walker and Jablon⁷ in 1947, under the auspices of the United States Veterans Administration, began their study of head-injury casualties from World War II. Selected from rosters of Army and Veterans Administration, 739 men were examined from 7 to 8 years after their injury at one of four centers established in Baltimore, Boston, New York, and Los Angeles. All findings were returned to a central follow-up agency for analysis. The over-all incidence of posttraumatic epilepsy, based on one or more attacks, was 28 per cent.

Korea. This sequela as it has appeared in a random sample of 407 U. S. Navy and Ma-
rine Corps personnel who received cranio-cerebral injuries in combat and supporting activities during the Korean Campaign, 1951–53, has been determined by a 5-year follow-up study. *

Small-arms fire, mortar fragments, land mines and other combat missiles accounted for 214 casualties, blast for 52 and trauma unrelated to missiles for 141. These various traumata resulted in 272 injuries in which the dura mater remained intact and 135 in which it was ruptured.

These men were seen at the time of injury by Dr. Henry R. Liss, Dr. John S. Meyer, or one of us (W.F.C.) while on active duty with the U. S. Navy Medical Corps. Their subsequent course has been determined by a review of the original field and hospital records in all cases, periodic physical examinations in 25.5 per cent, additional interviews in 24.5 per cent, questionnaires in 90.6 per cent, additional correspondence in 37.5 per cent, an American Red Cross Field Study in 69.0 per cent, and a review of Veterans Administration records in 66.5 per cent. These overlapping data have given an adequate coverage of all cases, with greater detail in the records of the more seriously injured men.

The sequela of epilepsy includes any seizure thought to be related to the injury, whether single or multiple, focal or general, early or late. Excluded are syncopal episodes, giddiness, or attacks of vertigo that may be included in the "posttraumatic syndrome." From the data thus collected, the over-all incidence of posttraumatic epilepsy for the first 5 years following injury is 23.8 per cent. 2

These data, together with those from the World War I and World War II studies, are summarized in Table 1.

**FURTHER ANALYSIS OF DATA**

In an effort to make a more valid comparison, the original raw data from England and the United States were reviewed. At the onset it was evident that we had to limit the mode of injury in each series to combat missiles. The Ascroft and Russell studies were so limited from the beginning, with the Russell series being further limited to those injuries with penetration of the dura mater. Credner's series reported as "war injuries" were predominantly from missiles but also included injuries from "falls," "being buried in a trench," and the like. No further analysis of this series is possible at this time, although Dr. Credner has kindly indicated that the original German records may be made available in the future.

When the missile injuries from Walker's series and those from Korea are compared with the Ascroft study one finds a remarkable similarity in the incidence of posttraumatic epilepsy, this being between 34 and 35 per cent in each group. The incidence was far less in the excluded nonmissile and blast cases. The Russell series will be utilized whenever subgroups with dural penetration are being compared (Table 2).

**Duration of Follow-Up.** The peak in onset of fits in each series is within the first few months after injury. This is followed by a sharp decline and, with minor fluctuations, a low rate of onset over the succeeding years.

With the Ascroft series corrected for duration of follow-up, a minor difference is noted with the World War I group showing slightly less incidence at the 5-year level (Table 3).

**Pattern of Seizures.** The clinical expression of the attack will depend upon the region

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**TABLE 1**

<table>
<thead>
<tr>
<th>Series</th>
<th>No. of Cases</th>
<th>No. with Fits</th>
<th>Per Cent with Fits</th>
</tr>
</thead>
<tbody>
<tr>
<td>World War I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credner</td>
<td>1990</td>
<td>755</td>
<td>38.2</td>
</tr>
<tr>
<td>Ascroft</td>
<td>317</td>
<td>107</td>
<td>34.0</td>
</tr>
<tr>
<td>World War II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russell</td>
<td>820</td>
<td>356</td>
<td>43.0</td>
</tr>
<tr>
<td>Walker &amp; Jablon</td>
<td>739</td>
<td>207</td>
<td>28.0</td>
</tr>
<tr>
<td>Korea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caveness &amp; Liss</td>
<td>407</td>
<td>97</td>
<td>23.8</td>
</tr>
</tbody>
</table>

* Combat Head Injury Project, Follow-Up Phase, sponsored by the Office of Naval Research, Nonr 466 (28) and Nonr 2890 (60), with additional support from The Tangle Foundation, Inc.