EFFECTIVENESS OF VARIOUS OPERATIONS FOR TRIGEMINAL NEURALGIA*

WALLACE B. HAMBY, M.D.†
University of Buffalo, School of Medicine, and Buffalo General Hospital, Buffalo, New York
(Received for publication October 5, 1959)

The history of trigeminal neuralgia gives eloquent testimony of the deadly, mutilating and disabling extremities to which patients and their surgeons have gone in the attempt to relieve this frightful pain. Much progress has been made, but the continuous development of new procedures shows that perfection has not been attained. With temporal rhizotomy pain could be relieved with a minimal rate of mortality, but at the cost of facial anesthesia, paralysis of the masseter and the risk of corneal ulceration.

Sensory rhizotomy and later partial rhizotomy by the suboccipital route diminished these hazards, but at the risk of surgical safety. Later by the temporal approach preservation of the motor root was perfected, leaving facial anesthesia the major hazard. This risk was reduced greatly by partial sensory rhizotomy, but preserving sensory fibers increased the rate of recurrence and the need for secondary operations.

In Busch’s Clinic, Taarnhøj discovered a new technique by which pain was relieved without anesthesia; this was accepted gratefully everywhere. Unfortunately, this operation also proved to offer less than ideal results, recurrences of pain gradually mounting with the passage of time. Almost simultaneously in 1954 and 1955 came reports from Stender of Berlin and Shelden of Pasadena, California of a new operation so simple in performance and so baffling in mechanism that it has not enjoyed the vogue it seems to merit. Its proponents have advanced hypotheses for its mechanism of effect that are unconvincing to the average surgeon. Having long enjoyed the acquaintance of both these people and being convinced of their integrity, I have adopted their procedure on an empirical basis, leaving explanation of its mechanism to better theorists than am I. Although the presentation may be premature, it was thought that a progress report on the modest series of cases of trigeminal neuralgia from the Buffalo (New York) General Hospital might be interesting. I am indebted to my colleagues, Doctors Carl Graf and George Cohn, for permission to include their cases in the report, although the bulk of the series is my own responsibility.

The temporal rhizotomy referred to here consists of the extradural, temporal approach to the ganglion and sensory root performed on the seated patient. The greater superficial petrosal nerve and the trigeminal motor
root are preserved. As little of the sensory root as considered adequate is severed piecemeal.

Suboccipital rhizotomy refers to the partial-to-complete sensory rhizotomy via the suboccipital approach popularized by Dandy1 and simplified by Walker.6 Our series is quite small; because of hazards inherent in the approach the operation has been employed chiefly in cases in which a small etiologic cerebellopontine-angle lesion was considered possible.

After description by Sjöqvist3 of the effects of section of the spinal tract of the trigeminal, tractotomy was employed in a series of rather special cases over a 10-year period.

The operation attributed to Taarnhøj in this paper is actually its modification demonstrated by Norlén. It is done on the seated patient by the extradural approach, the porus trigemini being cut through well into the tentorium, but not into the incisura, to avoid the trochlear nerve. Dr. Taarnhøj’s indulgence is requested for applying his name to this modification.

The Shelden-Stender operation has been our primary reliance since 1955. It consists simply of exposing the sensory root as for the usual temporal rhizotomy, stripping the arachnoidal sheath widely, then manipulating the sensory-root fibers with a small dissector and nerve-hook to separate the fibers thoroughly. Stender apparently believes that manipulation of the ganglion is the important factor, while Shelden considers mild trauma to the root to be most important. We concentrate on the root rather than the ganglion, but I have no good idea of the mechanism of the effect of the procedure.

Rather than develop an elaborate critique of all possible phases of the problem at this time, it was considered worth while to present the pattern of recurrences of pain requiring reoperation in our series of patients. Subsequent operations were selected to offer the greatest predictable relief of pain with minimal cost in sensation. These have consisted of simple repetition of the original operation, extending to complete sensory rhizotomy when considered necessary. All patients are told in advance of the known possibilities and are conditioned to the idea of multiple operations when necessary. If they desire it, the sensory root is severed completely at any stage, but this has been done primarily or even secondarily in very few cases. Relief of pain has required 3 operations in only 3 of 60 instances of reoperation. Bilateral operations have been done in 6 (1.3 per cent) of 457 patients; these have been considered separate primary operations, rather than primary and secondary.

None of these 5 operations has been entirely successful; temporal partial rhizotomy has required the fewest reoperations, 7.5 per cent (Table 1). Forty-three additional such rhizotomies have been done after other primary operations, lowering the rate of failures to 6.2 per cent. Suboccipital rhizotomies required reoperation in 9 per cent of cases, tractotomy in 29 per cent,
**OPERATIONS FOR TRIGEMINAL NEURALGIA**

**TABLE 1**

*Analysis of 517 operations done for trigeminal neuralgia on 457 patients*

<table>
<thead>
<tr>
<th>Primary Operation</th>
<th>No.</th>
<th>Reop.</th>
<th>%</th>
<th>Secondary Operations</th>
<th>Total (b)</th>
<th>% Fail.</th>
<th>Dead (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporal rhizotomy</td>
<td>294</td>
<td>19</td>
<td>6.8</td>
<td>18</td>
<td>1</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>Suboccipital rhizotomy</td>
<td>34</td>
<td>3</td>
<td>9.1</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Tractotomy</td>
<td>41</td>
<td>12</td>
<td>29</td>
<td>6</td>
<td>1</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Taarnhøj</td>
<td>32</td>
<td>19</td>
<td>60</td>
<td>12</td>
<td>5</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>Shelden-Stender</td>
<td>86</td>
<td>7</td>
<td>8</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total (a)</strong></td>
<td>457</td>
<td>60</td>
<td>13</td>
<td>43</td>
<td>1</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

*In the right-hand columns, “percentage of failure” refers to cases of primary operation requiring secondary operation. The percentage is calculated on total number of original operations plus the additional operations in that category (e.g., for temporal rhizotomy: 264 original operations + 43 secondary = 307 total temporal rhizotomies; 19 of the total 307 such rhizotomies required reoperation, so the percentage of failure = 19/307 = 6.2 per cent).*

If the pattern of primary and secondary operations is plotted (Figs. 1, 2 and 3), there is no significant accumulation of the latter in the later years;

*Fig. 1. Number of trigeminal rhizotomies charted annually. Cases in which secondary operations were required are indicated in black.*

*Fig. 2. Total suboccipital rhizotomies and tractotomies performed annually. Cases in which secondary operations were required are indicated in black.*
they are spread rather evenly over the time period. This statement cannot yet be made for the Taarnhøj and Shelden-Stender operations, however; they have been done too recently. If one disregards the patients reoperated upon within the original hospitalization and plots a number of the earlier of each of the procedures for the time interval between operations (Fig. 4), it is apparent immediately that statements concerning possible permanence of effect would be extremely premature.

One might be justified in concluding from these figures that the sensation-sparing operations upon the trigeminal sensory root offer long periods of relief from pain in the majority of cases. Reoperation after recurrence of pain may be performed with another such procedure without anesthetizing the face. It has been our experience that if these facts are presented hopefully to the patient before operation, he usually will choose the more conservative procedure and will approach subsequent operations philosophically.

**SUMMARY**

1. Temporal trigeminal partial rhizotomy performed for relief of trigeminal neuralgia required reoperation in 7.5 per cent of 264 cases over a 25-year period. Including secondary operations, a total of 307 rhizotomies were done with 6.2 per cent of failures.
2. Suboccipital rhizotomy performed primarily in 34 cases between 1939 and 1951 required reoperation in 3 (9 per cent); total 35, with 8.6 per cent failure.

3. Trigeminal tractotomy in 41 cases done between 1940 and 1950 required reoperation in 12 (29 per cent); total 45, 27 per cent failure.

4. Reoperation was required in 19 (60 per cent) of 32 patients treated primarily with Norlén's modification of Taarnhøj's "decompression" between 1952 and 1955; total 40, 47.5 per cent failure.

5. Between 1954 and 1959, 86 patients were treated with the Shelden-Stender "radiculysis," 7 (8 per cent) requiring reoperation to date; total 90, 7.8 per cent failure.

6. In the 457 patients, primary operations failed in 60 instances (13 per cent), requiring reoperation by various methods, producing a total of 517 operations with an over-all rate of failure of 11.6 per cent and a total fatality rate of 1.3 per cent.

7. Apparently the last two groups of patients have not been followed sufficiently long for comparison with those who had operations performed earlier.

8. It appears that the sensation-sparing operations are well worth while as the preliminary step in therapy of trigeminal neuralgia, anticipating the
likely necessity of a later partial rhizotomy. In our experience this program is acceptable to most informed patients and is preferred to a primary rhizotomy.

REFERENCES