SUTURE OF THE POSTERIOR TIBIAL NERVE BELOW THE KNEE, WITH A FOLLOW-UP STUDY OF THE CLINICAL RESULTS

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INTRODUCTION

SUTURE of severed peripheral nerves as early as possible after wounding has been one of the chief objectives in neurosurgery during World War II. This objective has been achieved in the large percentage of peripheral nerve injuries when permissible under the exigencies of war. As a result of early careful nerve suture many cases of excellent regeneration and recovery of function have been followed in the various Neurosurgical Centers in the Zone of the Interior.

One group, however, has been neglected in early nerve suture, and that is the group where the posterior tibial nerve has been severed below the origin of the motor branches to the gastrocnemius and soleus muscles; that is, below the knee.

In cases of nerve paralysis admitted to this hospital, 50 per cent of the patients with paralysis of the peroneal nerve had already had nerve suture, whereas only 7.5 per cent of those admitted with paralysis of the posterior tibial nerve had been recognized previously and had the nerve repaired. There are a number of reasons for this neglect. Many of these cases have been misdiagnosed as partial paralysis because of the presence of normal function of the gastrocnemius and soleus muscles, and in some instances the branches to the flexor hallucis longus and flexor digitorum longus have also been intact. Other cases have been recognized but ignored. In some of the latter anesthesia of the sole of the foot and loss of function of the intrinsic muscles of the foot were noted, but operation on the nerve was felt unnecessary because the patient could plantarflex and invert his foot and plantarflex his toes. In the remainder, suture of the nerve had been considered technically impossible.

Consequently a number of these patients were referred for nerve grafts. In 2 cases in this series it will be noted that nerve graft had been done on previous occasions without success and that ultimately direct nerve suture was accomplished by the method to be described in this report (Table 1). As a result of such errors in diagnosis and faulty reasoning, a considerable number of these patients have been sent back to duty or to convalescent hospitals. Thus much valuable time has been lost from the time of wounding until the patient is finally sent back to a Neurosurgical Center and the nerve suture accomplished.

The importance of carrying out nerve suture in these cases cannot be overemphasized. Normal sensation on the sole of the foot (supplied by the
<table>
<thead>
<tr>
<th>Case No.</th>
<th>Time Between Wounding and Nerve Suture (months)</th>
<th>Preoperative Deficit</th>
<th>Gap Between Nerve Ends</th>
<th>Miscellaneous Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Before Section (cm.)</td>
<td>After Section (cm.)</td>
</tr>
<tr>
<td>1</td>
<td>12</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>6.5</td>
<td>11.5</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>2.5</td>
<td>7.3</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>3.5</td>
<td>8.9</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>Anesthesia of lateral half of ball of foot and undersurface of 3rd, 4th &amp; 5th toes. Incomplete loss of intrinsic muscles of foot.</td>
<td>0</td>
<td>2.2</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>3.5</td>
<td>4.5</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>1.0</td>
<td>6.0</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>1.5</td>
<td>6.5</td>
</tr>
<tr>
<td>9</td>
<td>21</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles. Trophic ulcers on sole of foot.</td>
<td>0</td>
<td>7.0</td>
</tr>
<tr>
<td>10</td>
<td>18</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>4.3</td>
<td>6.3</td>
</tr>
<tr>
<td>11</td>
<td>5</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>3.0</td>
<td>11.0</td>
</tr>
<tr>
<td>12</td>
<td>6</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles. Trophic ulcers of sole of foot under heads of 1st &amp; 5th metatarsals.</td>
<td>5.0</td>
<td>9.0</td>
</tr>
<tr>
<td>13</td>
<td>3</td>
<td>Hypesthesia of ball of foot &amp; undersurface of first 3 toes.</td>
<td>0</td>
<td>5.0</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>1</td>
<td>5.5</td>
</tr>
</tbody>
</table>
TABLE 1—continued

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Time Between Wounding and Nerve Suture (months)</th>
<th>Preoperative Deficit</th>
<th>Gap Between Nerve Ends</th>
<th>Miscellaneous Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Before Section (cm.)</td>
<td>After Section (cm.)</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>Partial anesthesia of sole of foot—lateral half.</td>
<td>0</td>
<td>4.5</td>
</tr>
<tr>
<td>16</td>
<td>8</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>2.0</td>
<td>8.0</td>
</tr>
<tr>
<td>17</td>
<td>6</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>3.5</td>
<td>8.5</td>
</tr>
<tr>
<td>19</td>
<td>29</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>0</td>
<td>16.0</td>
</tr>
<tr>
<td>20</td>
<td>13</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>1</td>
<td>6.5</td>
</tr>
<tr>
<td>21</td>
<td>8</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>3.5</td>
<td>7.0</td>
</tr>
<tr>
<td>22</td>
<td>25</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles. Trophic ulcers of sole of foot.</td>
<td>7.0</td>
<td>9.5</td>
</tr>
<tr>
<td>23</td>
<td>4</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>0</td>
<td>5.0</td>
</tr>
<tr>
<td>24</td>
<td>9</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>0</td>
<td>6.5</td>
</tr>
<tr>
<td>25</td>
<td>6</td>
<td>Anesthesia sole of foot. Loss of intrinsic muscles.</td>
<td>0</td>
<td>5.5</td>
</tr>
</tbody>
</table>

posterior tibial nerve) is of importance for two reasons. In the first place, trophic ulcers on the sole have been noted in several of these patients who had gone for months without nerve repair. Secondly, the sensation as though "walking on air," of which these patients complain, is definitely a handicap to them. Moreover, the loss of function of the intrinsic muscles supplied
by the posterior tibial nerve is a deficit which is important, since not only
is it incapacitating so far as balance and finer movements of the foot are
concerned, but the integrity of the intrinsic muscles of the foot is essential in
maintaining the stability of the arches and in providing soft-tissue support
for the angular prominences of the bones.

From 19 February 1945 until 8 September 1945, neurorrhaphy was per-
formed in this hospital in 435 cases. Of this total there were 25 cases (5.7
per cent) in which nerve suture was done for paralysis of the posterior tibial
nerve below the origin of the muscle branches to the gastrocnemius and
soleus muscles. The study presented in this paper is based on data collected
from these 25 cases. In addition to stressing the importance of carrying out
early nerve suture, there is detailed description of the operative technique
that has enabled us to overcome large gaps in the nerve which until recently
had been regarded as technically unsurmountable. The first nerve sutured
by the technique to be described was one with a gap of 8.9 cm., which was
made up with ease. It was noted that a gap of 11.5 cm. could be made up
without tension. This served as a stimulus to the making up of even larger
gaps between the nerve ends. In one case there was an incredibly large gap
of 16 cm. (Fig. 6) and in three other instances the gaps were 11 cm. or more
in length.

The basic principles of the technique are not original, although several
refinements have been made in the experience with this series. In Table 1
the important salient features in each case are summarized. It may be seen
that an unusually long period of time elapsed between the date of wounding
and the time of final direct nerve suture. The average time interval for the
total series was 8.8 months. In 2 cases the interval was more than two years.
However, in both these cases nerve grafts had been attempted previously
and had failed. Nevertheless, among the 23 remaining cases there were 5
in which this time interval was one year or over, and only 2 patients were
operated upon during the optimum interval of three months after wounding.

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Plate 1*

Fig. 1. Exposure of neurovascular bundle (posterior tibial artery, vein, and nerve, together with
branches) by retracting gastrocnemius and detached soleus muscle en masse laterally.

Fig. 2. Beginning mobilization of posterior tibial nerve below popliteal space. (A) Detached medial
origin of soleus muscle retracted laterally. (B) Gastrocnemius muscle. (C) Posterior tibial nerve below
popliteal space. (D) Posterior tibial nerve above popliteal space.

Fig. 3. Motor branches of posterior tibial nerve before interfascicular separation. Median head of
gastrocnemius muscle here is detached from its origin in order to demonstrate anatomic details more
clearly. In the operation, the median head of the gastrocnemius muscle need not be detached. The
photograph shows entry of the motor branches into muscles they supply: (1) medial head of gastroc-
nemius; (2) lateral portion of median head of gastrocnemius; (3) lateral head of gastrocnemius; (4)
soleus; (5) popliteus and plantaris; (6) posterior tibial; (7) flexor digitorum longus; and (8) flexor hallucis
longus muscle. (9) Main trunk of posterior tibial nerve continuing down into foot.

* We are indebted to the Department of Medical Photography at Halloran General Hospital for
kind cooperation in the work herein presented.
SUTURE OF POSTERIOR TIBIAL NERVE BELOW THE KNEE

Plate I
SUTURE OF POSTERIOR TIBIAL NERVE BELOW THE KNEE

TECHNIQUE

The following detailed description of the operative procedure is representative of the entire group. However, certain modifications and variations are needed when indicated, and will be mentioned later.

The skin incision is begun on the medial aspect of the lower leg, about 2 cm. posterior to the medial edge of the tibia, at the level just proximal to the medial malleolus. The incision extends proximally to the inferior border of the medial condyle of the tibia, then curves laterally and proximally across the flexion crease of the popliteal space, and then upward in the midline of the thigh in its midportion. The incision then is extended downward into the deeper structures and the deep fascia is incised in the direction of the incision. The cleavage plane between the flexor digitorum longus and the posterior tibial muscles anteriorly, and the soleus and the gastrocnemius muscles posteriorly, then is separated in the lower half of the leg. The attachment of the medial border of the soleus muscle is dissected free from the posterior surface of the tibia and from the popliteal line of the tibia. The soleus and the gastrocnemius muscles then are retracted en masse laterally. The neurovascular bundle thus is readily exposed as it lies under the deep layer of the fascia cruris on the posterior surface of the posterior tibial muscle, in the groove between the flexor digitorum longus and flexor hallucis longus muscles.

The main trunk of the posterior tibial nerve may be picked up distally with ease at the anteromedial border of the tendon Achilles, just above the internal malleolus as it lies lateral to the posterior tibial vessels enclosed with them in a rather delicate fibrous tissue sheath. Stimulation of the nerve at this point below the site of injury is then carried out to determine whether or not sensory conduction is present.

The nerve then is picked up proximally in the popliteal space, and stimulation at this level is done to determine the integrity of motor conduction to the muscles of the lower leg normally innervated by motor branches of the posterior tibial nerve. The proximal portion of the nerve then is freed distally through the space under the junction of the two heads of the gastrocnemius muscle into the lower portion of the leg, joining the dissection from below.

The proximal neuroma and the distal glions then are resected and the stumps of the nerve cut back serially to good fascicles. The resulting gap must then be overcome by further dissection in order to accomplish suture of the ends without tension.

By interfascicular dissection, the muscular branches coming off the proximal portion of the posterior tibial nerve then are carefully dissected from the parent nerve as far proximally across the popliteal space into the lower thigh as is necessary to gain enough length to

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**PLATE II**

**FIG. 4.** Interfascicular separation of motor branches of posterior tibial nerve has been accomplished proximally to point “X” above the popliteal space. This is the most important step in the procedure. (1) Sciatic nerve. (2) Common peroneal nerve (not in its normal position), which has been mobilized. (3) Posterior tibial nerve in lower part of thigh. (4) Posterior tibial nerve below point to which its motor branches have been mobilized. (5) Common trunk containing branches to the two heads of gastrocnemius, to soleus, and to popliteus muscles. This common trunk has been mobilized to point “X.” (6) Branches to posterior tibial muscle and flexor digitorum longus in a common trunk mobilized to point “X.” (7) Branch to flexor hallucis longus mobilized to point “X.”

**FIG. 5.** The two severed ends of the posterior tibial nerve here are brought together with the knee flexed. The nerve can be seen to lie subcutaneously in its entire extent and is medial to the median attachment of the soleus muscle; 16 cm. of resected nerve also is shown.

**FIG. 6.** Specimen from Case 19 in which removal of frozen-dried nerve homograft and resection of proximal and distal stumps created a deficit of 16 cm. in posterior tibial nerve. *Upper:* Cross sections of proximal and distal stumps representative of ends finally sutured, and median longitudinal section of the graft and proximal stump. *Lower:* External view of the graft with separate cables bound together by ingrowing fibrous tissue, and, at extreme right, median longitudinal section of distal stump.
TABLE 2
Follow-up study of clinical results

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Time from Operation to Last Examination (months)</th>
<th>Advance of Tinel's Sign (cm.)</th>
<th>Sensory Evaluation* (graded 0–4)</th>
<th>Skin Resistance† (graded 0–2)</th>
<th>Clinical Appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>40</td>
<td>1</td>
<td>1</td>
<td>Good sensory return to sole of foot.</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>35</td>
<td>1</td>
<td>1</td>
<td>Good sensory return to sole of foot.</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>55</td>
<td>1</td>
<td>1</td>
<td>Good sensory return to sole of foot.</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>40</td>
<td>2</td>
<td>2</td>
<td>Nearly complete sensory return. Evaluation difficult because only $\frac{3}{4}$ of nerve sutured.</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>45</td>
<td>1</td>
<td>1</td>
<td>Beginning sensory return; patient able to judge when foot is on ground.</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>25 Practically complete distal advance.</td>
<td>2</td>
<td>1</td>
<td>Good sensory return.</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
<td>Complete distal advance.</td>
<td>2</td>
<td>1</td>
<td>Excellent sensory return.</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>50</td>
<td>2</td>
<td>1</td>
<td>Excellent sensory return.</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>Complete distal advance.</td>
<td>2</td>
<td>1</td>
<td>Excellent sensory return.</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>Too early for sensory return to appear.</td>
</tr>
<tr>
<td>11</td>
<td>6</td>
<td>only 10</td>
<td>0</td>
<td>0</td>
<td>X-ray suggests separation of nerve ends at suture site.</td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>Tinel's completely advanced.</td>
<td>2</td>
<td>1</td>
<td>Excellent sensory return in sole of foot.</td>
</tr>
<tr>
<td>13</td>
<td>9</td>
<td>Tinel's 45 cm. (practically completely advanced).</td>
<td>2</td>
<td>1</td>
<td>Very good sensory return in sole of foot.</td>
</tr>
<tr>
<td>14</td>
<td>10</td>
<td>35 (practically complete).</td>
<td>1</td>
<td>1</td>
<td>Good sensory return.</td>
</tr>
<tr>
<td>15</td>
<td>6</td>
<td>35 (practically complete).</td>
<td>1</td>
<td>1</td>
<td>Good sensory return.</td>
</tr>
</tbody>
</table>
TABLE 2—continued

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Time from Operation to Last Examination (months)</th>
<th>Advance of Tinel’s Sign (cm.)</th>
<th>Sensory Evaluation* (graded 0-4)</th>
<th>Skin Resistance† (graded 0-2)</th>
<th>Clinical Appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>6</td>
<td>45</td>
<td>1</td>
<td>1</td>
<td>Good sensory return.</td>
</tr>
<tr>
<td>17</td>
<td>6</td>
<td>40</td>
<td>1</td>
<td>1</td>
<td>Deep cutaneous pain in sole of foot.</td>
</tr>
<tr>
<td>18</td>
<td>9</td>
<td>35 (Nearly complete)</td>
<td>2</td>
<td>1</td>
<td>Good sensory return.</td>
</tr>
<tr>
<td>19</td>
<td>6</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>No sensory return. X-ray reveals intact suture site. Leg is completely straightened.</td>
</tr>
<tr>
<td>20</td>
<td>6</td>
<td>40</td>
<td>1</td>
<td>1</td>
<td>Good sensory return.</td>
</tr>
<tr>
<td>21</td>
<td>6</td>
<td>35</td>
<td>1</td>
<td>1</td>
<td>Good sensory return.</td>
</tr>
<tr>
<td>22</td>
<td>3</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>No sensory return yet. X-ray reveals intact suture site. Too early to expect return.</td>
</tr>
<tr>
<td>23</td>
<td>3</td>
<td>22</td>
<td>0</td>
<td>0</td>
<td>Too early for sensory return.</td>
</tr>
<tr>
<td>24</td>
<td>3</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>Too early for sensory return.</td>
</tr>
<tr>
<td>25</td>
<td>3</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>Too early for return. X-ray reveals suture site to be intact.</td>
</tr>
</tbody>
</table>

* Sensory Evaluation (usual modalities):
  0—absence of sensibility in autonomous zone.
  1—recovery of deep cutaneous pain in autonomous zone.
  2—recovery of some degree of superficial pain and touch in autonomous zone.
  3—return of pain and touch in autonomous zone without over-response.
  4—recovery as in 3 with two-point discrimination in autonomous zone.

† Skin Resistance:
  0—persistent area of increased skin resistance.
  1—diminution of area of increased skin resistance.
  2—normal skin resistance.

make up the gap between the cut ends of the nerve. After mobilization of the proximal portion of the nerve together with its muscular branches, stimulation of the nerve proximally reveals the presence of normal motor conduction of the muscular branches that have been freed from the parent nerve. The parent posterior tibial nerve is pulled down and, with the knee flexed to 90 degrees, the ends may be brought together without tension.

The ends of the nerve are sutured together with interrupted .003 tantalum sutures in the epineurium, and a narrow cuff of tempered tantalum foil, 1.0 cm. in length, is placed about the anastomotic site.

The attachment of the soleus muscle then is sutured back to the popliteal line of the tibia.
with a few interrupted 0000 silk sutures, and the wound closed in layers with interrupted
0000 silk sutures in the deep fascia, subcutaneous tissue and skin.

A firm pressure dressing is applied, using an Ace bandage, and the knee is maintained at
90 degrees flexion by means of a plaster of Paris double hip spica.

Variations and modifications of the above-mentioned technique of the operation have
been used where indications have arisen. In some cases a different skin incision was made in
the region of the popliteal space. Thus, instead of crossing the flexion crease in the popliteal
space at an angle, the incision was extended proximally and continued up the medial aspect
of the popliteal space, thus avoiding the flexion crease entirely. In such cases the skin flap
was undercut to the popliteal fascia and the flap reflected laterally. This variation has
proven entirely satisfactory. However, in none of the cases where the line of incision crossed
the flexion crease was there any web contracture of the skin. Of course, care was taken to
curve the incision in the line of the flexion crease and not to cross it at a right angle.

In some cases where the gap between the cut ends of the nerve was considerable (Case 19),
it was necessary to pull the proximal parent nerve upward through the space under the two
heads of the gastrocnemius muscle and place it subcutaneously across the popliteal space
and downward along the medial border of the soleus muscle. In such cases also it has been
necessary to free the muscular branches from the parent nerve upwards into the midthigh
and even further proximally. In this case the sciatic nerve also was freed up to the level of
the lower edge of the gluteus maximus muscle. In some cases the common peroneal nerve
then was likewise separated from the sciatic nerve in order to aid in mobilizing the posterior
tibial nerve.

For the purpose of illustrating the technique in mobilizing the posterior tibial nerve in
order to overcome a large gap, dissections on the cadaver were done (Figs. 1-5). Thus it can
be seen that 16 cm. of the nerve can be removed, and the intervening gap made up by the
mobilization and the remaining cut ends of the nerve brought together. This essentially
was the technique used in Case 19, in which there was a final gap of 16 cm. (see Fig. 6 for
the specimen removed in this case).

The essential steps in the procedure are indicated in the series of photographs. Fig. 3
is included to illustrate the motor branches that come off the parent nerve below the popliteal
space and the muscles that they innervate. Fig. 4 shows these same branches freed from the
parent nerve to a point above the popliteal space by interfascicular dissection. This is the
most important step in the operation in order to gain length in the nerve and still preserve
the motor conduction of these branches.

The other details are given in the legends accompanying the various photographs.

FOLLOW-UP STUDY OF CASES REPORTED

Follow-up studies on all nerve sutures done are made at intervals of
three months after operation. Enough time has now elapsed following nerve
suture in the cases herein reported to appraise their clinical results. These
have been tabulated in Table 2. Thus it will be noted that all cases show
satisfactory progress with one exception (Case 11). Roentgenologic exami-
nation in that case revealed evidence of separation of the suture site. The
apparent distal advance of 10 cm. of Tinel’s sign, with no subsequent distal
advance, might be explained on the basis of transmission from the proximal
end of the separated nerve.

The remaining cases are gratifying in their results. All show definite
sensory return except 7, and these have not been observed long enough for
return to be possible. Some of the patients have been returned to civilian
life and it is felt that their improvement will continue. The questions as
to whether the function of the intrinsic muscles of the foot will return to nor-
mal and whether there will be achievement of two-point discrimination in sensory recovery, are unanswered at the time of this writing. Doubtless, a considerable further period of time must elapse before these questions will be solved.

SUMMARY AND CONCLUSIONS

1. A series of 25 cases of neurorrhaphy of the posterior tibial nerve below the popliteal space is presented.

2. The importance of suture of the posterior tibial nerve in cases where it has been severed below the popliteal space, and in which the chief deficit is loss of sensation of the sole and of the function of the intrinsic muscles of the foot, is emphasized.

3. In one case in this series there was a gap of 16 cm. between the ends of the sectioned nerve, and in 3 other cases gaps of 11.0 cm. or more were overcome.

4. Cadaver dissection to illustrate the technique by which large gaps between the sectioned ends of the nerve can be overcome was carried out, and photographs of the dissection are included.

5. Postoperative follow-up studies at intervals of three months reveal satisfactory sensory return.