ELECTROMYOGRAPHIC OBSERVATIONS ON THE POSTOPERATIVE DISC PATIENT*

ERNEST W. MACK, M.D.
Reno, Nevada†

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Electromyographic studies of the sacrospinalis muscles in patients complaining of low back pain following the operative removal of a herniated intervertebral disc in the lumbar region have yielded evidence of segmental denervation. The present report comprises 18 cases, including 6 of severe lower back pain associated with sacrospinalis denervation. An attempt is made to correlate the denervation with the detailed anatomy of the posterior division of the lumbar nerve and to offer a possible explanation of the postoperative back pain on an anatomical basis.

In 1944 Weddell, Feinstein and Pattle published their observations on the electrical activity of voluntary muscle in man under normal and pathological conditions. They found evidences of denervation in the sacrospinalis muscles following laminectomy for prolapsed intervertebral disc and other conditions, i.e., the presence of fibrillation potentials, complex motor unit potentials, and diminution or absence of motor unit potentials as recorded in the electromyograph.

Their observations were based upon a study of some 25 cases and they supposed that the denervation was due to ischemic nerve block following the use of self-retaining retractors in the wound. They particularly called attention to the fact that this area of denervation was from 1 to 2 cm. lateral to the incision and that elsewhere in the sacrospinalis muscles there were sustained motor unit potentials and an absence of fibrillations. In another series of 25 cases, in which a unilateral laminectomy was performed, they observed that the denervation was present only on the operated side. Finally, in 1 case of laminectomy for prolapsed intervertebral disc in which manual retractors were used and the muscles submitted to minimal traction during the operation, they stated that 12 days after operation there was no evidence of denervation 2 cm. or more from the midline scar. Within 3 months, motor unit activity had returned to normal to within approximately 1 cm. of the scar. A little more medially fibrillation potentials were recorded, even up to a period of 1 year.

The writer has come to feel that denervation is an important factor in the syndrome of back pain in the postoperative disc patient.

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† 1155 Wells Avenue, Reno, Nevada.
Electromyographic studies were performed on the sacrospinalis muscles in 18 patients who had complained of low back pain during the postoperative period following removal of protruded intervertebral disc.

Observations were made with the electromyograph using both the loud speaker and the oscilloscope method, with the coaxial needle type of electrode.

Six of the 18 patients demonstrated reduced motor unit action potentials or absence of the same, and the presence of marked fibrillations. These findings were recorded in the sacrospinalis muscle group in an area lateral to the site of operation, extending approximately 5 cm. lateral to the operative wound and 5–6 cm. in a longitudinal direction. All patients studied had had unilateral laminectomies, and in all cases normal electromyographic recordings were observed on the side that had not been operated upon. In the 6 cases in which denervation was demonstrated, it is interesting to note that all of these patients were complaining of diffuse low back pain of moderate severity. The pain was of a different type than that experienced prior to surgery, and had its onset 15 to 30 days postoperatively. In the remaining 12 cases only very occasional fibrillations were present and active motor unit action potentials were observed throughout the area. Furthermore, these 12 patients had no pain at the time of the study.

The maximum duration of postoperative denervation was 293 days and the minimum 97, with an average of 183 days. Attempts to recapitulate the periods of postoperative pain for the group who at the time of examination had normal electromyograms resulted as follows: Three patients stated they had had some back pain for a period of 60 days postoperatively; 1 had back pain for 95 days; 1 had back pain for 120 days; and 1 had back pain for 148 days.

CASE REPORTS

Case 1. J.B., No. 1456. Diagnosis: Herniated intervertebral disc, L4. Operation: Partial hemilaminectomy with removal of herniated disc. Course: Severe pain was present 97 days after operation. Electromyographic study demonstrated absent motor potentials and presence of continuous fibrillations. At 148 days, when there was marked subjective improvement in the pain, repeated electromyogram demonstrated good active motor unit action potentials and very few fibrillations.

Case 2. E.P., No. 1340. Diagnosis: Herniated intervertebral disc, lumbosacral joint. Operation: Partial hemilaminectomy with removal of herniated disc. Course: At 205 days, electromyographic study demonstrated the presence of denervation. At 230 days, when the patient was showing subjective improvement, there was a parallel improvement in the electromyogram, with increasingly active motor unit action potentials and marked decrease in the number of fibrillations.