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Electric Sympathetic Block: Methods of Measurement and a Study Assessing Its Effectiveness

Robert G. Schwartz, M.D.
Department of Physical Medicine & Rehabilitation
Medical University of South Carolina
Charleston, South Carolina

ABSTRACT

Electric sympathetic block is the procedure whereby sympathetic nerve fibers are blocked by application of controlled electrical impulses via electrodes placed on the skin. Methods of measuring the extent of sympathetic blockade and a clinical study using Endosan® * to achieve electric sympathic block are presented. Fifteen of 20 (75%) patients who underwent a 1-week series of electric sympathetic blocks reported at least 75% subjective relief from sympathetically mediated pain after completion of the series.

Keywords: **electromedicine; pain; sympathetic block**

INTRODUCTION

There are at least three major categories of independent tests that can be used to determine the presence of sympathetic blockade: tests of sympathetic function, blood flow, and pain. Within these three categories there are at least 23 different studies that can be used. One of the oldest and most commonly used is the skin conductance response (SCR) test (also called impedance

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Address reprint requests to
Robert G. Schwartz, M.D.
317 St. Francis Drive
Suite 350
Greenville, SC 29601

plethysmography [IPG] and rheography). This was previously called the sympathogalvanic response test. The principle behind this test is the concept that a change in sympathetic activity is followed by a change in skin conductance that can be recorded with a simple electrocardiograph. Other common independent methods used today to assess sympathetic activity include thermography and pain score tests.[1-4]

Before sympathetic blockade, skin blood flow is similar in contralateral limbs, and both limbs show a reduction in the height of the pulse wave in response to an ice challenge test. After sympathetic blockade, however, the affected limb shows a marked increase in the slope of the upward deflection of the pulse wave and an increase in height of the pulse wave. The blocked limb shows no change in response to an ice challenge test. IPG studies have also demonstrated that the recorded response to direct mechanical stimulation is attenuated after surgical section of the chain.[1] SCR studies can also confirm the presence of sympathetic block in small unmyelinated sympathetic fibers.[5-7]

Pain score tests are other readily available independent tests that can be used to assess the presence of a sympathetic block. Visual analogue scales (a pain score test), for example, have been used to document the efficacy of electric sympathetic blocks. Published reports of studies using pain score tests have shown the electric sympathetic block to be effective in relieving sympathetically mediated pain for up to 2 years after the block, but more commonly for up to 46 weeks.[4,5] The following study was conducted in order to assess the efficacy of a device for achieving electric sympathetic blockade.

MATERIALS AND METHODS

An electric sympathetic block device (Nemectron®)* with a summated Endosan treatment current of 4000 Hz was utilized to obtain electrosympathetic analgesia.

Patients were first evaluated with a history and physical examination. Diagnostic testing was performed as necessary (electromyography, thermography, CAT scanning, myelography, magnetic resonance image testing, Minnesota Multiphasic Personality Inventory). Diagnostic categories included pain after neck/back surgery, presurgery herniated nucleus pulposus, radiculopathy, and sympathetic dysfunction syndromes. Prior to treatment with an electrosympathetic block, all patients had failed to show a satisfactory response to surgical or nonsurgical interventions, including the use of therapeutic exercise, manipulative technique, oral medications, trigger point injection, facet block, or epidural steroid injection. The procedure was explained to all patients and written informed consent was obtained prior to the first treatment. Pain score scales (0-10) were utilized to confirm the effectiveness of sympathetic block.

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The electroceutical treatment current was applied for 20 minutes. The highest amperage tolerated by the patient determined the current intensity utilized. A small electrode was placed over the ganglia to which treatment was directed, with a second larger electrode placed on the body's opposing surface. For stellate blocks, the smaller electrode measured 1" x 1/2". For blocks of the lumbar sympathetic ganglia, the smaller electrode measured 1" x 1". For all blocks, the larger electrode measured 3" x 5".

RESULTS

A total of 37 patients entered the study. Patients who reported ≥25% subjective improvement from a trial block were eligible for continuation in a 1-week (Monday-Friday) series of treatments. Pain score tests were used to record the percentage of overall relief obtained after each treatment and were repeated before the following day's treatment to assess the percentage of long-term relief obtained in comparison to baseline pain.

Twenty-six of 37 (70%) patients reported immediate improvement of ≥25% after the trial block. Six were lost to follow-up, and 20 (54%) were started on the 1-week follow-up series of treatments. Fifteen of the 20 (75%) completed the series and reported ≥75% improvement after the series and on 2-week follow-up.

CONCLUSION

Application of Endosan treatment current with a smaller electrode over the sympathetic ganglion to which treatment is directed and a larger electrode over the opposing body surface is a reliable method of achieving an electric symphatic block. Persistent sympathetically mediated pain relief can be achieved in up to 75% of those who receive daily treatments over the course of 5 days.

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