

Use of Deep Procaine Injection for the Relief of Localized Pain*

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ADAMS¹ recently stated that "pain, in its severer forms, as for example, trigeminal neuralgia, migraine, or the various colics, is one of the heaviest crosses the human race has to bear—persistent pain, whether mild or severe, over weeks, months or years can produce serious and far-reaching sequelae which affect the patient's work, play and sleep, alter their personalities and produce changes in every phase of their daily lives." He goes on to emphasize that "until recent years physicians as a whole tended to minimize the importance of persistent pain, particularly, if the cause was not readily apparent." In discussing Adams' paper Dr. R. H. Barrett says, "The sympathetic nervous system is a dominant factor in pain. Except for direct nerve trauma, ischemia or localized hypoxia, it is probably the basis of most pain."

The character of pain in the segmental neuralgias² caused by irritation of the extraspinal or paraspinal elements that constitute the segmental distribution may vary from stabbing, tearing, shooting or cramp-like to a milder aching, sore, drawing, pulling, dragging type of pain. Painful areas which are localized "and are tender to the slightest touch, or brushing of wearing apparel or bed clothes, and are associated with burning suggest a causalgic type of pain which is sympathetic in origin." The term atypical neuralgia is used to differentiate it from segmental neuralgia on the one hand and to indicate its sympathetic component on the other.

As a history of trauma cannot be elicited in all cases of headache, migraine, occipital neuralgia, neuralgia of the chest simulating angina pectoris, backache and sciatica, postherpetic neuralgia and pain from sprains along the costal margin and xyphoid, the term atypical

neuralgia would be more appropriate than Livingston's³ "post-traumatic pain syndrome" such as occurs in whiplash injuries⁴ or in musculofascial pain.⁵

Livingston³ mentions atypical facial (or buccal)⁶ neuralgia to call "attention to the fact that trigger points may develop in the face, neck and scalp just as they do in the extremities or in the back; that they seem to be capable of initiating pathologic reflexes as do other trigger points, and the fact that they sometimes yield to simple measures suggests that irritation from peripheral sources may play some part in the development of pain syndrome involving the head area."

Peripheral nerves⁷⁻⁹ have been shown to contain, besides somatic fibers, sympathetic motor (vasomotor, sudomotor, pilomotor) and afferent sympathetic fibers conveying pain impulses.

If one considers the location of pain in headaches, the trigger points, which intensify the pain on compression, are frequently found as a point of deep tenderness beneath the skin of the scalp, or in the occipital and neck muscles and their fascia, or at the ends of the transverse processes of the cervical vertebrae or beneath the superficial layer of skin. (Figs. 1 and 2.)

In describing the method of injecting trigger spots with 2 per cent procaine, I wish to emphasize the most accurate identification and painstaking injection of the sensitized areas. The trigger points are located by making pressure first with the rounded end of a ball pen and then its tip, progressing tangentially toward maximum sensitivity. The trigger points are rechecked several times, making pressure in the same direction, and finally are marked so that when the fine No. 25 needle with a very short bevel is introduced, exactly the same direction is followed as with the pen. The deposition of 2 per cent procaine is begun just beneath the skin and made gradually deeper until all trigger

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spots have been reached. Usually from 2 to 5 cc. are injected in each area and not more than 40 or 50 cc. are injected at a visit.

Hematologic studies have been found to be normal in these patients who bruise easily and since a hematoma at the site of injection

depletion of the patient's adrenal cortex in particular, and frequently also the anterior pituitary, as evidenced by their excessive perspiration or tendency to cry easily.

In restoring impaired endocrine glands such as the anterior pituitary and adrenal cortex, a

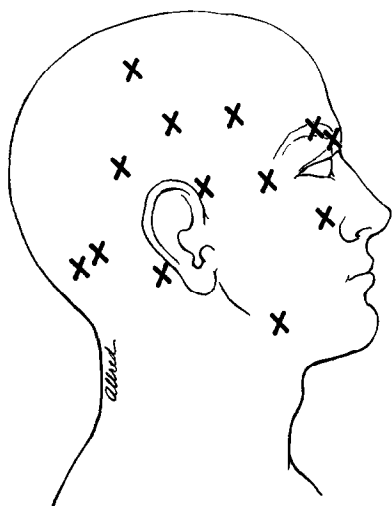


FIG. 1. The cross marks indicate the location of the usual trigger points. (Modified from Sobotta's Atlas of Human Anatomy, Philadelphia. W. B. Saunders Co.)

vitiates the success of the treatment, 10 mg. of vitamin K are injected subcutaneously before treatment and $\frac{1}{2}$ gr. of phenobarbital is given by mouth at least twenty minutes before the injection is started.

No patient receives an injection of procaine, no matter how small in amount, without first receiving a barbituate which reduces the toxicity of procaine about five times. Patients who are known to be sensitive to procaine receive $\frac{1}{2}$ gr. of phenobarbital orally three hours, two hours, one hour and one-half hour before treatment. An ampul containing 2 gr. of sodium phenobarbital is always available, half to be given intramuscularly if a patient should have a reaction to the 2 per cent procaine. Adrenal cortex extract, $\frac{1}{2}$ cc. subcutaneously, is also given.

Many of the patients have learned that alcohol will, in the course of two to six hours, cause a return of their headache or pain. It is felt important to instruct all patients about the probable effect of taking alcohol in any form after injections.

The long-continued pain has furnished the alarm reaction, as described by Selye,¹⁰ with

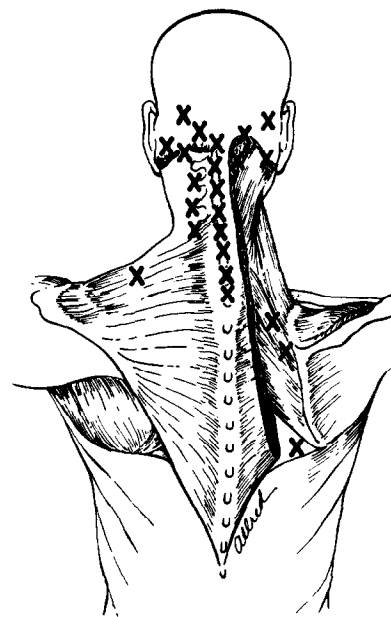


FIG. 2. The cross marks indicate the usual trigger points. The vertical cross marks are between the cervical spinous processes where the torn ligamentum nuchae makes a "bowstring." (Modified from Sobotta's Atlas of Human Anatomy, Philadelphia. W. B. Saunders Co.)

high protein, high vitamin C diet is essential. Multivitamins and minerals are given. Since salicylates interfere with the absorption of vitamins (and many patients were taking salicylates for pain) the digestive enzymes, pancreatin and bile salts are given before a meal with the vitamins, along with a 3 gr. suprarenal cortex tablet. For exhaustion, one or more suprarenal cortex tablets are given during the day, and for perspiration or weeping tendency, one or more 5 gr. anterior pituitary tablets are sucked until relief is obtained. Potassium chloride, 15 gr., is given daily to protect the cellular potassium from the effects of these hormones. Calcium is given in some form by mouth or injection to reduce the excitability of the neuromuscular apparatus. Since June, 1954, I have found that the tendency to cry or to have profuse perspiration could be relieved by the action of the Rauwolfia root or its alkaloid, reserpine.¹¹ This substance at least

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partially suppresses the sympathetic predominance at the hypothalamic level.

Migrainous headaches¹² may come in attacks initiated by fatigue, menstruation, food idiosyncrasy and other exciting causes. The underlying neurologic mechanisms which produce hemicrania and other disturbances such as hemianopsia, paresthesia, lachrimation and nasal congestion indicate involvement of the sympathetic nervous system.

In occipital neuralgia a history of soreness or stiffness in the neck with limitation of motion may precede or be associated with the headaches which usually begin in the occipital area, radiating to the frontal or supraorbital region. The headaches are steady and vary from a mild ache to a severe throbbing bursting pain worse on stooping or straining at stool. At times the frontal headache is so predominant that painful symptoms referable to the occipital region or neck are submerged, but sensitive areas are readily formed across the occiput or along the spines or transverse processes of the upper cervical vertebrae. (Figs. 1 and 2.)

When the pain from sensitized spots of the head has been sufficiently long in intensity and duration, a painful contraction of the skeletal muscles of the head, neck, shoulders and even the erector spinae group in the lumbar region may develop and produce further involvement.

After trauma other than sprains from a whip-lash injury, such as slipping and trying to prevent a fall, the occipital and neck muscles may be strained; and after certain infections, notably virus diseases, influenza and rheumatic fever, the sympathetic nervous system can become sensitized. An injury may be produced such as a strain to the cervical paravertebral ligaments, to the fascial attachments of the short rotator capitis muscles, to the vertebral processes or to the trapezius and rhomboid attachments to the vertebrae and scapula. Tenderness between the cervical spines or near their transverse processes is frequently found. (Fig. 2.) Another source of irritant sympathetic nerve fibers is in the interspinous ligament localized between the vertebral spinous processes. (Fig. 3.) Trauma to the head and neck, often having occurred in childhood and long since forgotten, may tear loose the ligamentum nuchae from the cervical spinous processes. When the head is bent forward this shredded ligament forms a bowstring from the occiput to the last cervical or first thoracic spine.

Trigger points are to be found in this ligament or deeper between the spinous processes or at the ends of the ligament. (Fig. 2.)

Studies by Rinzler and Travell¹³ in 1948 on the somatic component of cardiac pain have shown that in some patients with angina

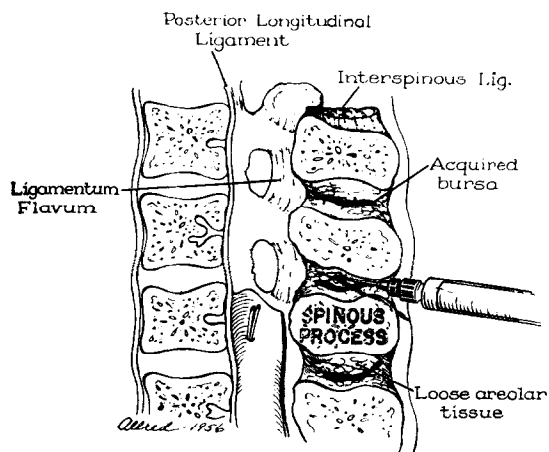


FIG. 3. The location of the ligamentum flavum, the interspinous ligament with its bursa. The needle for procaine injection penetrates between the spinous processes into the interspinous ligament and bursa, down to the transverse arch or the ligamentum flavum. (Modified from J. C. B. Grant's Atlas of Anatomy. Baltimore, 1947. Williams & Wilkins Co.)

pectoris and acute myocardial infarction pain is relieved by blocking secondary trigger areas in the skeletal muscles of the chest. They emphasize¹⁴ that the main source of irritation in the pain syndromes involving the chest are sprains and strains at the origins of the pectoralis major and minor muscles, and sometimes at their insertions as well. (Fig. 4.) That these thoracic pain syndromes¹⁵ do occur makes their recognition important, otherwise invalidism may result or a diagnosis of psychoneurosis may affect the patient's entire outlook on life. Trauma of strains, long forgotten, may have been the irritant initiating the pain cycle, and illness with concomitant vitamin and endocrine imbalance may so increase the patient's susceptibility to pain that the syndrome develops. Thirty patients with such pains have been referred for surgical relief of cervical herniated disk or for thoracic sympathetic interruption for angina. A few internists have recognized the syndrome as a neuralgia and have located trigger spots which intensify the pain upon compression.

In a report on the treatment of post-thoracotomy neuralgia in ten patients,¹⁶ the most important trigger points for injection with 2 per cent procaine are into the interspinous ligaments at least two above the intervertebral processes and two below where the rib cage was

creatitis or acute intestinal obstruction. Tenderness was present and at times rigidity could be elicited. However, in the absence of fever and leukocytosis, exploration was rarely done.

On examining these patients during their attack, the pain and tenderness is actually at

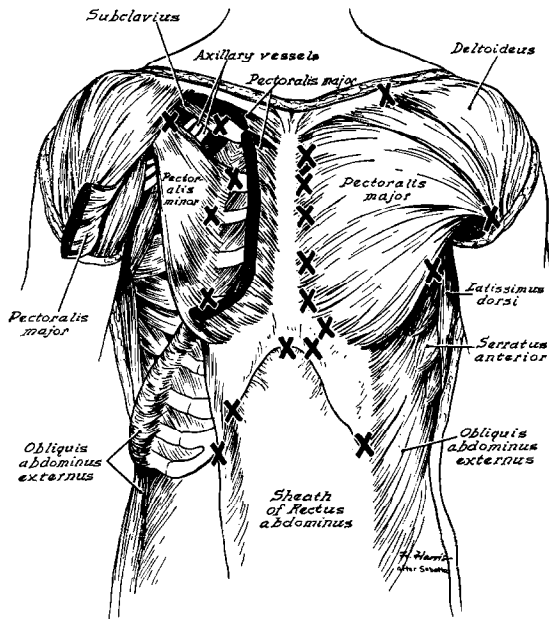


FIG. 4. The cross marks indicate the location of the usual trigger points in the atypical neuralgias of the chest simulating angina pectoris. (Modified from Sobotta's Atlas of Human Anatomy. Philadelphia. W. B. Saunders Co.; Reichert, F. L., *Am. J. Surg.*, 88: 399, 1954.)

forcibly separated. Strained or traumatized origins and insertions of the pectoralis major and minor muscles are additional important trigger areas, as is also the xyphoid.

Some thirty patients comprising the costal margin and abdominal group are of interest because, again, their complaints, often occurring in paroxysms of pain lasting from two to four days at a time, had been puzzling from a diagnostic viewpoint. Again, the continuance of the pain over the years prompted them to seek relief with the result that many negative gastrointestinal series of roentgenograms, as well as intravenous and retrograde pyelograms, had been made. As this pain was usually in the upper abdomen, either epigastric or in the right or left upper quadrant, referred at times to the right and left back, it was diagnosed as acute biliary colic, renal colic, chronic duodenal ulcer, splenic infarction, recurrent pan-



FIG. 5. Incisions carried down to deep structures to divide sympathetic fibers involved in postherpetic neuralgia. (Reichert, F. L., *Stanford M. Bull.*, 13: 357, 1955.)

the xyphoid¹⁷ or along the costal margin and not deep in the abdomen. The tip and either side of the xyphoid, as well as the costoxiphoid junction, may have numerous trigger points which when extremely accurately located and pressed upon elicit the identical pain of which the patient complains. (Fig. 4.) The irritating lesion is probably from scar compression following the sprain or strain of the attachments of the rectus abdominis, internal oblique or transversus abdominis fascia to the costal cartilages and xyphoid. Slipping during bowling or other activities, jarring or falls during horseback riding or other accidents, or compression of the tissues by retractors in exposure during an operation may have been the traumatic irritant.

Low back pain, with or without sciatica, has been attributed to dental caries, a misplaced uterus, osteoarthritis, slipped sacroiliac articulation and herniated intervertebral disk. Favorable reports in the literature are based on the correction of these etiologic factors. Certainly, muscle spasm seems to play a part no matter what may be considered the etiologic factor. Very frequently immediate relief has been

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produced by injecting procaine into trigger points in the muscles or muscular attachments to the transverse processes of the vertebrae, the ilium and sacrum, to the trigger points along the sacroiliac junction and into the lumbar and upper sacral interspinous ligaments.

The location and surgical removal of a herniated intervertebral disk in the lumbar region is assured when, neurologically, findings are obtained of segmented numbness of the leg and foot with absent or diminished reflexes and definite motor weakness in the foot. If the neurologic examination shows numbness with normal reflexes, or diminished or absent reflex without numbness, I have found it wise to first inject procaine into the interspinous ligaments from L₁ to S₂ and also to inject the sensitive spots of the sacroiliac articulation. In fourteen patients immediate relief of pain occurred with these injections. The numbness was gone or the reflex returned to almost normal. If the pain returned in a day or two, and again on repeated reinjection (five patients), a herniated disk was suspected and removed surgically.

Herpes zoster, or shingles, causes burning pain even before vesiculation. After the vesicles have dried, the pain either subsides or becomes chronic, persisting for months or years. This postherpetic neuralgia,¹⁸ supposedly from a viral infection involving the sympathetic ganglia, is a constant burning pain exaggerated by light touch or movement of the affected part. These patients are excellent examples of the effect of stress on the body, and in the past three years much attention has been paid to restoring depleted endocrine glands, especially the adrenal cortex and anterior pituitary, as well as in treatment of this neuralgia. In our experience when the neuralgia involved the trunk or chest, nine patients have had complete relief, two had slight relief and one was not helped by blocking the appropriate sympathetic ganglia with a 2 per cent procaine or a similar anesthetic oil (bromsalizol®). Frequently, even after ganglionic blockage, local trigger points are found which respond to procaine injections. In postherpetic "trigeminal" neuralgia, blockage of the fifth nerve or its branches gives no relief but injection of the stellate, first and second thoracic sympathetic ganglia in some instances gives relief. In the other neuralgias a more peripheral approach to the sympathetic fibers, either by injection

or by division of tissues and vessels,¹⁹ will afford some relief if not cure. (Fig. 5.) Of nine patients with neuralgia involving the "trigeminal" distribution, six have been completely relieved and three are greatly improved.

SUMMARY

The injection of 2 per cent procaine into accurately located trigger points has in general brought relief to patients suffering from chronic pain or atypical neuralgia.

Chronic pain or atypical neuralgia is due to irritation of peripheral sympathetic fibers found in subcutaneous tissue, muscles, fascia of muscles, about blood vessels and in peripheral nerves, attachments of muscles to bony structures and in the para- and interspinous vertebral ligaments.

The atypical neuralgia occurring in headaches, occipital neuralgia, neuralgia of the chest simulating angina pectoris, post-thoracotomy neuralgia, backache and sciatica, post-herpetic neuralgia and sprains along the costal margin and xyphoid furnishes the alarm reaction with stresses that frequently deplete the patient's adrenal cortex and anterior pituitary glands in particular.

Continuance of relief after procaine injections of the trigger points seems to depend on abstinence from alcohol and restoring to normal the vitamin, mineral and endocrine imbalance.

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