

TREATMENT OF LEPRO REACTION AND ACUTE NEURITIS AND ARTHRITIS WITH NERVE BLOCK AND INTRAVENOUS ADMINISTRATION OF PROCAINE

PRELIMINARY REPORT

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With the development of the sulfone drugs a great advance was made in the treatment of leprosy. Neuritis, arthritis and "lepra reactions" still occur, however, and they do not respond to those drugs. At the Kalaupapa Settlement, Molokai, regional and intravenous methods of anesthesia have been used to treat these complications, and their use is the subject of this report.²

REGIONAL ANESTHESIA ; NERVE BLOCKING

Leprosy patients, as represented by those at Kalaupapa, are subject to severe acute neuritis, involving principally the ulnar and peroneal nerve trunks. Although the great auricular and various other superficial cutaneous nerves are frequently found to be enlarged, comparable neuritic complaints are not seen in their areas of distribution. The reason for this selective involvement of certain of the peripheral trunks by the leprosy process is not clear. The ulnar is especially prone to be enlarged and tender. In some cases shooting pains are felt along its distribution in the forearm and wrist, and these pains are often severe. Accompanying the pain there is often seen spastic flexion contractures of the little and ring fingers. Acute neuritis of the peroneal nerve—which can be palpated easily just posterior to the proximal head of the fibula and is usually tender to the touch—causes pain and tenderness in the calf of the leg. Although the actual pathological physiology is unknown, it seemed reasonable to assume that blocking the nerve by depositing a local anesthetic near the nerve trunk proximal to the involved area should relieve the pain, at least temporarily.

In the leprosy literature there are reports of attempts to control acute neuritis, especially of the ulnar, by perineural

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² The drugs used in the work, pontocain solution and the "novocaine" brand of procaine, were supplied through the courtesy of the Winthrop Chemical Co., N. Y.

injections of various substances, including chaulmoogra derivatives, but I know of only one report of nerve blocking by a local anesthetic. That is the one by Hingson *et al.* (2) of the introduction of procaine under high pressure with the "hypospray" apparatus. Ten patients in the Carville leprosarium were so treated, with complete relief of pain in all cases from within three to five minutes, lasting for from one or two to several days.

Technique.—All of the nerve blocks were done with 0.15 per cent pontocaine solution with epinephrine 1:200,000. This drug gives satisfactory anesthesia for five or six hours. No evidence of toxicity was noted. Usually, only 10 to 20 cc. of the solution was required. Enlarged nerves are easier to block than normal ones because of their size, and the needle approach is no more difficult than with a large vein. It is not necessary to inject the anesthetic into the sheath of the nerve, but only alongside it.

Case report.—W. M., a 17-year-old Portuguese female, complained of severe shooting pains in the ulnar distribution of the left forearm, present for three weeks. Her left little and ring fingers were tender and were held in spastic flexion. The ulnar nerve was enlarged and very tender from the elbow joint upward for a distance of about 5 cm. Salicylates and demerol had not relieved the pain.

Block of the ulnar nerve was done about 8 cm. above the elbow, proximal to the tender area, using 8 cc. of the pontocaine solution. The shooting pains stopped before the needle was withdrawn, the tenderness quickly disappeared from the fingers, and they could be extended painlessly. The nerve itself remained tender to touch, but on the following day it was less so, and two days later all tenderness had disappeared. The patient was symptom-free for three months, without ulnar tenderness and with complete mobility of the ring and little fingers. At the end of this three-month period she began to have recurrence of pain and tenderness, and the block was repeated with success. Follow-up three months after the second block showed complete freedom from symptoms.

In considering this case it may be postulated that the nerve block prevented the crippling contractures of the little and ring fingers which are so common in leprosy. The fingers had become tender and flexed, and if they had been allowed to remain so they would presumably have become permanently contracted, although of course evidence is lacking to prove this assumption.

Altogether, four patients with ulnar neuritis were treated by nerve block, and relief was immediate and dramatic in every case, with no reactions of any kind. Six patients with common peroneal neuritis were treated by block of that nerve, all with immediate relief of pain; five of them had no recurrence in three months whereas in the sixth case the relief lasted for only about twenty hours, though the pain after recurrence was less severe than before.

An incidental finding was that, apparently, ulcers of the feet respond well to nerve block, and that the chronic ulcers over the head of the first metatarsal will heal quickly after medial plantar blocks. One patient with an ulcer of five months duration showed complete healing of the ulcer in seven days following two nerve blocks.

In explanation of the dramatic results obtained it may be assumed, as a hypothesis, that the involvement of a nerve trunk by the leprosy process results in a stream of painful impulses traveling proximally to the spinal cord, there causing an outflow of sympathetic impulses toward the affected extremity which results in vasospasm in the digits. The vasospasm produces ischemia, which increases the pain, and there is set up a vicious circle of reinforced pain impulses and resulting sympathetic activity and vascular constriction. Now if the pain is stopped by blocking the nerve, this vicious circle is interrupted; the sympathetic impulses diminish, vasospasm is replaced by compensatory vasodilatation, and normal circulation is restored. With the relief of pain in the fingers after ulnar block, full movement of them is achieved and contractures prevented. If the blocks are repeated as often as needed, theoretically the contractures could be postponed indefinitely.

INTRAVENOUS ADMINISTRATION OF PROCAINE

At the Kalaupapa Settlement, at the time of writing, 158 intravenous infusions of procaine have been given to 36 patients for a variety of complaints ranging from lepra reaction to muscle pains. Eleven of them had erythema nodosum-type reaction; fourteen had reactions of other kinds, ordinary lepromatous and tuberculoid; eleven had miscellaneous aches and pains.

Whatever the nature and pathogenesis of the leprosy reactions one thing is certain, namely, that the patients suffer from neuritis, arthritis, and generalized discomfort. Intravenous injections of procaine caused symptomatic relief in a majority of the total of 25 patients with various kinds of reactions. In some, the reaction would apparently subside for two or three days after an infusion and then flare up again, to be controlled by another infusion. In other patients lesions seemed to melt away, and recovery seemed to be speeded.

In the series of cases with miscellaneous aches, pains, and itching, intravenous injections of procaine have proved to be very effective in affording relief.

Evaluation of the results is difficult, not only because of the baffling nature of leprosy itself but also because some of the

patients could not speak English. In spite of our gross ignorance of the pathogenesis of lepra reaction, one fact stands out, namely, that inflammation is present, often with pain as a concomitant. Procaine administered intravenously has an affinity for inflamed tissues (1), and it relieves pain in a great many conditions (3). Therefore, purely on this basis, it would be logical to use intravenous injections of procaine in leprosy.

Technique.—All patients to be treated intravenously with procaine were first skin-tested with 0.5 cc. of a 1 per cent solution injected intradermally and observed for fifteen minutes. No signs of sensitivity to drug have been noted, but it is advisable to carry out this test. With few exceptions, the patients were given 1 gm. of procaine in 500 cc. of physiological saline solution, to which was added 2 cc. of injectable Vitamin B complex. The solution was given at the rate of 40 to 60 drops per minute. No barbiturates or premedication were given. Reactions to the drug were practically nonexistent, except for two patients who developed mild transitory nausea and vomiting. No special attention was given the patients during the infusions. They were treated as inpatients or outpatients, depending on the severity of the disease process.

ERYTHEMA NODOSUM REACTIONS

Eleven patients with reactions of the erythema nodosum type were treated. Eight of them showed subsidence of lesions, lowering of elevated temperatures, and increased mobility. Subjectively they felt much better after the treatment and were pleased with it. In one patient the reaction would seem to stop for about three days after each infusion. Three patients apparently had little or no improvement.

OTHER FORMS OF REACTIONS

Fourteen patients with other forms of reactions (classified as lepra, tuberculoid, and mixed, a distinction which cannot be elucidated here) were treated by this method. Thirteen of them reported subjective relief. The remaining patient, a Hawaiian male, had an atypical reaction complicated by an undiagnosed internal disease and was not helped by any drug. Six of the fourteen showed definite objective improvement of lesions. The results seemed to indicate a decrease in scarring following the procaine, but the number of cases is too small to warrant drawing any conclusions on that point. The following case illustrates the efficacy of this form of treatment in an atypical reaction.

Case report.—G. K., a 19-year-old Hawaiian male, was admitted to the Kalaupapa Hospital acutely and perhaps critically ill, complaining of nausea, vomiting, dyspnea, and upper abdominal pain. Icterus was pronounced and the edge of the liver was down to the level of the umbilicus; the liver was exquisitely tender even to light touch and percussion. Nausea and vomiting occurred with any attempt at oral ingestion of food, liquids, or drugs. Respirations were shallow because of severe pain on inspiration.

An attempt was made to give amino acids intravenously, but that caused more nausea and vomiting and it had to be discontinued. Demerol given intramuscularly induced the same effect without relieving the abdominal pain. On the third day in the hospital the patient was given one 1 gm. of procaine in 1 liter of 10 per cent glucose in physiological saline. One-half hour after the start of the infusion he was free from pain. Respirations became deep and regular. As soon as the infusion was discontinued he complained of being hungry, and he was able to eat a high-protein lunch without vomiting. On the following day pain was still absent although slight abdominal tenderness was noted. Nausea and vomiting had ceased and the appetite was excellent. His spirits improved so much it was difficult to keep him in bed.

On the fifth day the intravenous injection was repeated because of recurrence of pain, and for three days the patient slept most of the time. On the ninth day he was sitting up in bed playing cards. In the next six weeks following he received one procaine infusion a week. The liver edge receded slowly and icterus disappeared. He made an uneventful recovery and was discharged three months after admission. When seen six months after admission he was working, in good spirits, and asymptomatic.

This case was quite unusual in that hepatitis complicated a lepra reaction. The patient was apparently in a critical condition, yet he responded spectacularly to a procaine infusion.

MISCELLANEOUS CONDITIONS

Muscular, arthritic, and diffuse neuritic pains and aches are common at Kalaupapa. Seven patients suffering from severe pain were treated with procaine intravenously, and all reported improvement. Two were Filipinos suffering from severe deep muscle pains; salicylates and opiates gave little relief, but procaine infusions resulted in decreased pain and increased mobility. One patient had exfoliative dermatitis with severe itching; the itching was relieved by procaine.

Three patients complained of "deep itch," a phenomenon which they described as being like an itch but located too far below the skin surface to be relieved by scratching. In attacks of this condition two patients will sit and pound each other over the itching area until the skin becomes pulpy. The literature is devoid of any reference to this complication, but it is very real to the patients. It is apparently due to neuritis involving deeper nerve trunks. Procaine gave only temporary relief of this condition. The best treatment was found to be pontocaine given

in the same way, which will be discussed in another paper. It is noted later that when a peroneal nerve block was done on one patient he complained of a typical "deep itch" in his leg which lasted about one minute.

SUMMARY AND CONCLUSIONS

Nerve blocking with pontocaine was done on ten patients to relieve severe neuritic pain and tender nerves. Procaine was given intravenously to thirty-six patients for reactions, aches and pains, and itching. Illustrative case reports are presented. The following conclusions are drawn:

1. Nerve blocking with 0.15 per cent pontocaine solution gives immediate and lasting relief of neuritis in leprosy, and it may prevent digital contractures.
2. Leprosy reactions of the erythema nodosum type show dramatic improvement when treated by intravenous administration of procaine. The concomitant arthritis and neuritis are relieved.
3. Leprosy reactions of the ordinary forms seen in lepromatous and tuberculoid cases show some improvement after intravenous administration of procaine, and patients are made much more comfortable. Recovery may be hastened and scarring decreased.
4. Miscellaneous aches, and pains, including itching, respond well to the intravenous administration of procaine.

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