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## SCIATICA: TREATMENT WITH EPIDURAL INJECTIONS OF PROCAINE AND HYDROCORTISONE

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**I**NJECTION of procaine hydrochloride containing hydrocortisone acetate into the epidural space via the sacral hiatus helps to relieve sciatica. The purpose of this report is to review the history, technic, results of, and indications for this type of treatment.

### History

The use of the epidural space as a site for the introduction of a therapeutic agent is not new. In 1901, Cathelin,<sup>1</sup> reported injecting cocaine through the sacral hiatus in patients with pain of inoperable rectal carcinoma. In 1928, Viner<sup>2</sup> reported the similar use of procaine in Ringer's solution to treat sciatica. In 1953, according to Cappio,<sup>3</sup> Lièvre and his associates in France reported the introduction of hydrocortisone by the same route on 20 patients. Because of the encouraging results, there have been many published reports from abroad. Recently, Brown<sup>4</sup> in this country reported 62 cases with excellent results.

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In 1950, we began to treat sciatica with occasional success by introducing 100 ml. of isotonic saline solution through the sacral hiatus. Later on, a smaller quantity of hypertonic saline solution was submitted and procaine hydrochloride was added to reduce the pain of injection. This did not seem to improve the results, so procaine alone was used, followed by straight-leg raising exercises. During the last five years the volume of procaine solution has been reduced to 30 ml. and hydrocortisone acetate has been added with improvement in the results.

### Indications

The main indication is sciatica of a character indicating pathologic involvement of the spinal nerve roots that contribute to the sciatic nerve. The clinical picture may suggest a protruded or degenerated disk, radiculopathy, adhesions following laminectomy, arthritis, trauma, or sciatica with no demonstrable cause. Nocturnal gastrocnemius cramps, which may follow an otherwise successful operation for protruded disk, are also an indication. As is to be expected, sciatica due to carcinoma with bone metastasis, intradural or extradural tumor, arachnoiditis, postherpetic or diabetic neuralgia is not benefited by this therapy.

### Technic

The nerve roots that are responsible for pain in the sciatic distribution\* may be reached by injection of 30 ml. of a fluid into the epidural space via the sacral hiatus (*Fig. 1 A and B*). The technic of introducing the needle is the same as that for caudal anesthesia. Thirty milliliters of 1 per cent procaine hydrochloride is mixed with 125 mg. of hydrocortisone acetate. Three injections are given on consecutive or alternate days. Patients are instructed in straight-leg raising exercises while the analgesic effect of the procaine is still present (*Fig. 2*).

Complications rarely ensue from sensitivity reactions to procaine or to the corticosteroid. Accidental introduction of the procaine into the dural sac has not occurred. Aggravation of the pain during the injection usually is considered a good prognostic sign, and requires merely a reduction of the rate of injection.

### Results

Our series comprises 239 patients, the youngest of whom was 20 and the oldest 75 years of age. Patients with more than 60 per cent relief for three months or longer were classified as having good results. Those with from 40 to 60 per cent relief, as having fair results, and those who had return of pain in less than three months, or less than 40 per cent relief, were considered as having poor results. Of 239 patients, 58 per cent had good results, 8 per cent fair results, and 34 per cent poor results. Eight of those with good relief but with recurrence after three

\* For pain at a higher level, the needle may be passed between the laminae into the epidural space.

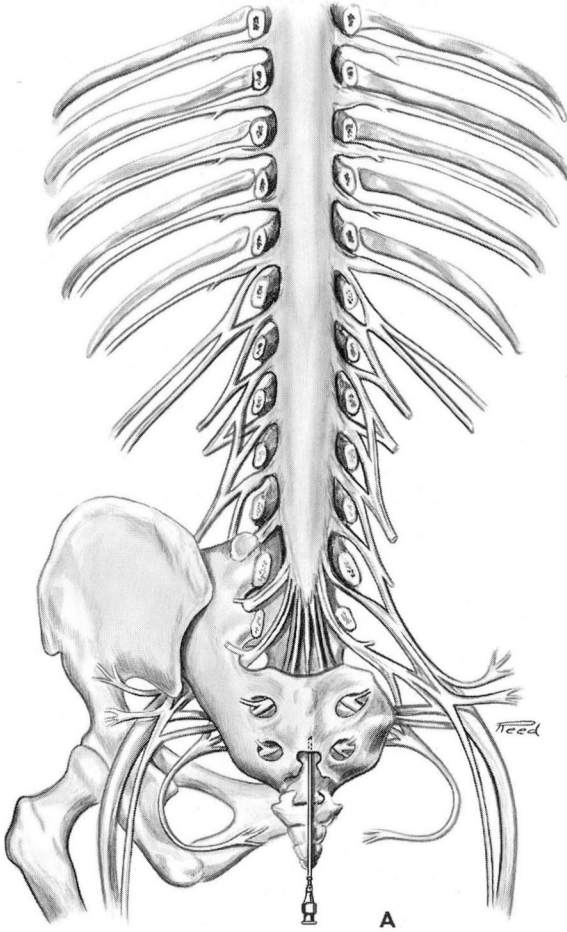


Fig. 1. A, Sketch showing placement of the needle into the epidural space through the sacral hiatus.

months had a subsequent series of injections with relief again. One hundred fifteen of these patients had one or more laminectomies before this therapy was begun. Of these, 56 per cent had good results, 11 per cent had fair results, and 33 per cent had poor results. Of the remaining 124 patients, 60 per cent had good, 8 per cent fair, and 32 per cent poor results. For analysis of results see *Table 1*.

#### Comment

In attempting to evaluate the reason for relief of pain, these facts about the pathophysiology of nerve root compression and postoperative pain were uncovered.

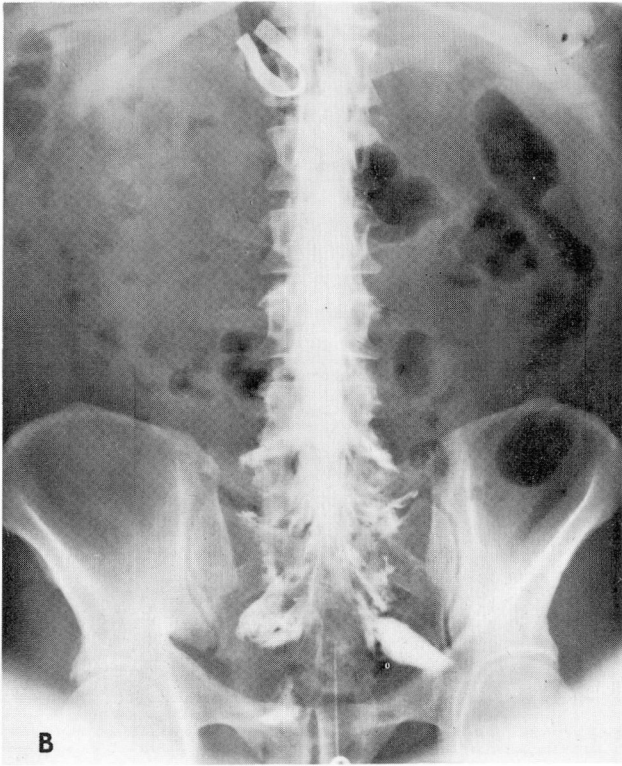


Fig. 1. B, Roentgenogram showing the distribution of contrast medium (30 ml.) after epidural injection (demonstrated in a fresh cadaver).

Lindhahl and Rexed<sup>5</sup> demonstrated by biopsy of the dorsal root that 7 of 10 patients with nerve root compression had infiltration of lymphocytes and edema of the nerve. Also it is well known that adhesions follow hemorrhage and trauma anywhere in the body; the nerve sleeve is no exception. During operation for the removal of protruded disk, by necessity the epidural fat is traumatized or removed, and fibrous tissue replaces it. This limits the normal excursion of the nerve which is produced by movement of the back and legs. Greenwood, McGuire, and Kimbell<sup>6</sup> noted on re-exploration that one third of laminectomy failures were due to extradural adhesions.



Fig. 2. Straight-leg raising after epidural injection.

Thus, we believe that sciatica that is not due to pressure on the nerve root, is due to inflammation, edema, or adhesions around the nerve sleeve. By bathing the pathologic nerve root with a solution of procaine containing a corticosteroid, the swelling and inflammation responsible for the pain can be reduced and the nerve mobilized by straight-leg raising exercises.

#### Conclusions

Data are presented to show that epidural injections of procaine hydrochloride and hydrocortisone acetate followed by straight-leg raising exercises are helpful in the relief of sciatic pain. Of 239 patients treated, more than half were benefited.

**Table 1.**—*Results in 239 patients with sciatica treated with epidural injections of hydrocortisone acetate in procaine hydrochloride and straight-leg raising exercises*

(Follow-up period—three months to five years)

Sciatica	Results, number of patients			Total numbers of patients
	Good *	Fair †	Poor ‡	
Persistent or recurrent after lumbar laminectomy	62	12	41	115
Cause undetermined	75	9	40	124
Total	137	21	81	239

\* Good—60 to 100 per cent relief

† Fair —40 to 60 per cent relief

‡ Poor —Less than 40 per cent relief, or recurrence within three months.

|| Analysis of poor results:

Subsequently relieved by removal of protruded disk	22
removal of infected disk	1
intradural injection	22
	45
Unrelieved conversion reaction	8
reason undetermined	28
	36
Total	81

Although the results are difficult to evaluate, since pain is a subjective phenomenon, we believe that the procedure outlined is effective therapy.

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