syndrome, may be treated successfully with physical therapy and trigger point injections. If symptoms persist, more aggressive treatment, such as serial sympathetic blockade, is indicated to avoid a chronic, irreversible pain syndrome.

This case demonstrates that relapse may occur and that symptoms of reflex sympathetic dystrophy may spread diffusely. Spread of reflex sympathetic dystrophy to a bilateral or ipsilateral extremity is common, but our patient represents an apparently unique case of total-body involvement.

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The Effective Use of Epidural Morphine Sulfate for Postoperative Orthopedic Pain

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Postoperative pain following arthrotomy of the knee is usually intense. Patient cooperation with physical therapy after this procedure is usually less than optimal when standard methods of producing analgesia, such as parenteral administration of narcotics, are used. We report the successful use of morphine, given epidurally, for analgesia following a knee arthrotomy. The medical management of this case took place in the Jefferson Tower of the University Hospitals in Birmingham, Alabama.

Report of a Case

A 29-year-old Caucasian woman was admitted for an arthrotomy and repair of a traumatic disruption of the right knee. Medical, surgical, and previous anesthetic histories prior to this injury were unremarkable. Her only medication was norethindrone acetate, for treatment of pelvic endometriosis. Premedication one hour before the surgical procedure consisted of diazepam, 10 mg, orally, and 30 ml of an antacid containing aluminum hydroxide, magnesium hydroxide, and simethicone. The patient had not received narcotics for more than 27 hours prior to operation.

The surgical procedure was conducted using continuous lumbar epidural analgesia with .75 per cent bupivacaine with 1:200,000 epinephrine, 20 ml. The sensory level of anesthesia was T9 bilaterally. During the first 24 hours postoperatively pain relief was achieved with 0.25 per cent bupivacaine with 1:200,000 epinephrine, 5 ml given epidurally every two hours to maintain adequate analgesia. Narcotics were not needed during this period.

Twenty-four hours after the operation the analgesia induced by bupivacaine was allowed to dissipate, and intense knee pain occurred. Morphine sulfate crystals, 10 mg, were dissolved in 10 ml of 0.9 per cent NaCl and passed through a Millipore® filter as specified by the hospital pharmacy.* Five milliliters of this preparation (morphine sulfate, 5 mg) were then administered through the epidural catheter following a negative aspiration for blood. Pain gradually decreased over the first hour, but was not completely relieved by two hours. A second dose of morphine sulfate, 4 mg (due to the loss of 1 ml, or 1 mg, in the Millipore filter), was then administered epidurally, after which the catheter was removed. Analgesia was complete an hour after the second dose,

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* The use of epidural morphine has been approved by the Human Use Committee of the University of Alabama in Birmingham. Informed consent was obtained from the patient.

and lasted 40 hours. There was no sign of central nervous system depression or sympathetic or motor block during this time. Administration of additional narcotics or non-narcotic analgesics was not necessary during the hospitalization; sleep was uninterrupted by pain, and aggressive physical therapy could be tolerated without discomfort. On the third postoperative day, the day of discharge, the pain gradually reappeared, and orally administered narcotic analgesics were needed every four hours for pain relief. The narcotic requirement was tapered, and narcotic administration was discontinued on the seventh postoperative day.

Discussion

The autoradiographic localization of opiate receptors[1,2] in both the mesencephalic central gray matter of the brain and the substantia gelatinosa of the posterior horn cells of the spinal cord has led to important research in the area of analgesia with narcotics. Analgesia has been produced by intracerebroventricular injection of morphine in rats and mice.[3] Morphine also affects[5] opiate receptors in the spinal cord, resulting in modulation of afferent nociceptive information,[4–6] without causing adverse reactions in cord tissue.[7] Spinal serotonin and norepinephrine terminals may mediate this spinal antinociceptive effect of morphine.[8]

The use of commercially available narcotic preparations in the epidural space has ben criticized because these solutions contain preservatives and stabilizers that are presumed toxic to nerve tissue, and may also have anesthetic properties of their own.[9] Morphine sulfate in its liquid form is unstable, and will lose considerable potency over a short period (<eight hours). For these reasons, morphine sulfate in its crystallized form was freshly reconstituted and passed through a Millipore filter immediately prior to epidural injection.

The efficacious use of morphine administered in the epidural[10] or subarachoid[11] space in the treatment of chronic and intractable pain in man has been well described. The practical use of epidural narcotics in labor has been less encouraging.[12] The beneficial effect of epidurally administered morphine in the treatment of postoperative orthopedic pain has not been described. In this case, the epidural administration of morphine sulfate in a total dosage of 9 mg provided complete pain relief for 40 hours and permitted pain-free rehabilitation therapy that is usually not well tolerated. Although the systemic absorption of the epidurally administered morphine may have accounted for the analgesia, we feel it is unlikely that 9 mg of morphine sulfate could have provided 40 hours of relief of an intensely painful condition such as this. The lack of central nervous system depression with simultaneous relief of acute, intense postoperative pain is additional evidence that this represented a spinal antinoceptive effect of morphine. The absence of sympathetic and motor block with this technique is also considered beneficial. Physical therapy may proceed uninhibited by pain or decreased muscular tone, while the risks of venous pooling during ambulation are reduced. It is hoped that this brief case report will stimulate investigators to conduct controlled and clinical studies in an effort to establish the efficacy of epidurally administered narcotics in the relief of postoperative pain.

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