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Epidural Morphine and Methylprednisolone for Low-back Pain

TERRI L. DALLAS, M.D.,* RENNY L. LIN, M.D.,† WEN-HSIEN WU, M.D., M.S.,‡ PATRICIA WOLSKEE, PH.D.§

Cohn *et al.*[1] reported that a single epidural administration of morphine and steroid (methylprednisolone acetate) produced pain relief lasting 6–12 months in post-laminectomy patients with recurrent low-back pain. Using a Visual Analog Scale (VAS), one-fourth of the patients said they were completely free of pain, one-half reported 70% pain relief, and the last fourth reported 50% pain relief. Injection of local anesthetics plus steroids into the epidural space or aimed at sheaths of the nerve root is an accepted treatment for recurrent low-back pain.[2] Also, morphine administered either intrathecally or epidurally does provide pain relief.[3] However, the implications of so great a response in such a common illness are profound. Deficits in the Cohn *et al.* study design make one question whether so great a response actually occurs. For example, the study lacked controls; also, patients and investigators were aware of the protocol. Therefore, we wanted to determine if we would obtain the same results as Cohn *et al.* if we were to use a double-blind and cross-over design.

METHODS AND MATERIALS

We obtained institutional approval and informed consent to study six male and 14 female post-laminectomy patients who had chronic low-back pain; age ranged from 27–71 yr (mean, 47.8 yr). Diagnosis was established by physical and neurologic examination, and electromyographic, radiographic, and antinuclear antibody studies. Routine hemoglobin, hematocrit, and blood chemistries were also determined. The Minnesota Multi-Phasic Personality Inventory and psychological evaluation excluded patients with severe depression or major psychological disorder.

To determine the baseline level of pain, patients completed the VAS before the study. After patients fasted overnight, and, without administering analgesics for 24 h before the study, we inserted an epidural needle. We used a midline approach at the L3-4 or L4-5 level interspace to insert the needle, and both the loss-of-resistance technique and guidance of an image intensifier to advance the needle. We injected contrast medium (metrizamide) to visualize the epidural space, inserted the catheter, and reconfirmed the location of the catheter in the space.

Patients were randomly assigned to receive either physiologic saline (PS) or morphine sulfate (Duramorph PF) 8 mg/8 ml of saline, given in equal volumes epidurally. All participants were unaware of which solution was being given. After epidural injection of either morphine or saline, the patient was taken to the recovery room for continued monitoring. Sixty minutes later, 80 mg of methylprednisolone acetate was injected through the catheter; the catheter was then flushed with 1 ml of saline and withdrawn.

The VAS score was obtained at this time and again at 0.5, 2, and 16 h. When the patient was discharged after 24 h, he or she was instructed to evaluate pain (VAS) weekly for the first month and bi-weekly during the second month until the second injection. Functional activity was evaluated by the physician at the time the VAS was obtained by determining the ability for flexion, extension, side bending and rotation of the torso, straight leg lifting, and the ability to resume daily activity.

Eight weeks after the first sequence of injections, patients underwent epidural catheterization and the second sequence of injections. This time they were given the solution (morphine or saline) that was not given during the first sequence. One hour later, 80 mg of methylprednisolone was administered. Again, participants did not know which solution was being given. Patients were assessed for functional activity and VAS at this time; at 0.5, 2, and 16 h; weekly for the first month; bi-weekly during the second month; and monthly thereafter for 6 months.

* Anesthesiology Pain Management Fellow. Currently Assistant Professor of Anesthesia and Critical Care, The University of Chicago Hospitals.

† Assistant Professor, Co-Director, Pain Management Center.

‡ Professor and Chairman of Anesthesiology; Director, Pain Management Center.

§ Psychologist, Pain Management Center.

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Address reprint requests to Dr. Dallas: The University of Chicago, Department of Anesthesia and Critical Care, 5841 South Maryland Avenue, Box 428, Chicago, Illinois 60637.

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TABLE 1. Data Regarding Pain Relief in Nine Post-laminectomy Patients with Recurrent Low-back Pain (Group A)*

Diagnosis	Sex	Age (Yr)	Duration of Relief (M + S)	Duration of Relief (PS + S)	Side Effects	Educational Level	Compensation for Injury
Degenerative disc disease	F	62	0	0		College	Disability
Radiculopathy/deg arth	M	27	0	0		12th grd	Litigation
Bulging disc deg arth	M	46	2 wks		P, U, N/V	12th grd	Litigation
Deg disc osteoarthritis	F	41	2 days	0	P, U	12th grd	Disability
Bulging disc deg facet joint	M	38	1 wk	0		12th grd	Litigation
Herniated disc	F	32	0	0		College	Disability
S_1 Radiculopathy	F	40	0	5 wks		12th grd	Litigation
L Radiculopathy S_1 sprain	F	55	0	0	P	College	Disability
Unstable vertebrae	M	43	1 day	0		12th grd	None
# patients having total relief		4	1				

Deg arth = degenerative arthritis; Deg disc = degenerative disc disease; P = pruritus; U = urinary retention; N/V = nausea and vomiting.

* These patients (group A) were given epidural injection of morphine sulfate followed 60 min later by epidural injection of the steroid methylprednisolone acetate (MS + S). Eight weeks later, they were given epidural injection of physiologic saline, followed 60 min later by epidural injection of methylprednisolone acetate (PS + S).

No exercise program or physical therapy was undertaken after injection. After the study, the code was broken, and data were analyzed according to treatment group. Group A was said to consist of those given morphine sulfate and steroid (MS + S) for the first sequence, followed by physiologic saline and steroid (PS + S) 8 weeks later. Group B was said to consist of those given PS + S first and then MS + S. Data from the two patient groups were analyzed by calculating the average percentages of pain improvement of 50% or more, as judged subjectively by the patient 24 h after the injection. Other areas studied were sex, age, pending litigation, and financial compensation.[5] The McNemars test was used for statistical comparison, $P < 0.05$ being considered statistically significant.[4]

RESULTS

Pre-therapy CT scans and electromyographic and radiographic studies revealed a wide variety of lesions, including degenerated discs, lumbosacral radiculopathies, spinal stenosis, recurrent herniated discs, osteoarthritis, spondylosis, and facet joint syndromes (tables 1, 2).

TABLE 2. Data Regarding Pain Relief in 11 Post-laminectomy Patients with Recurrent Low-back Pain (Group B)*

Diagnosis	Sex	Age (Yr)	Duration of Relief (M + S)	Duration of Relief (PS + S)	Side Effects	Educational Level	Compensation for Injury
Spinal stenosis/deg disc	M	70	2.5 wks	6 wks	P, N/V	12th grd	Pension
Sciatica/deg disc	F	43	4 mos	0		College	Disablity
Herniated disc/deg disc	F	33	0	0		College	Litigation
L/S Radiculopathy/S_1 Sprain	F	36	0	1 day		College	Disability
L/S Radiculopathy	F	69	1 day	1 wk	P	12th grd	Pension
Facet J Syndrome/L_5 Radiculopathy	M	37	0	2 wks	U, N/V	College	Disability
Facet-S_1 joint pain	F	49	0	6 wks	U, N/V	12th grd	None
Spinal stenosis	F	67	0	3 wks	P	College	Disability
Low-back pain, cause unknown	F	50	2 days	1 wk		12th grd	Disability
Low-back pain, cause unknown	F	46	0	2 wks		12th grd	Disability
Cervical Spondylosis/ Osteoarthritis	F	71	0	2 wks	P, B	College	Pension
# patients having total relief			4	9			

Deg disc = degenerative disc disease; L/S = lumbosacral; P = pruritus; N/V = nausea and vomiting; U = urinary retention; B = bradycardia.

* These patients (group B) were given epidural injection of physiologic saline, followed 60 min later by epidural injection of the steroid methylprednisolone acetate (PS + S). Eight weeks later, they were given epidural injection of morphine sulfate, followed 60 min later by epidural injection of methylprednisolone acetate (MS + S).

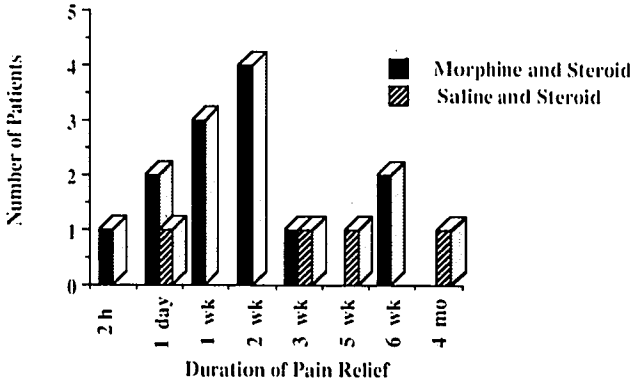

FIG. 1. The length of pain relief provided by epidural injections of morphine and steroid, and of saline and steroid, in post-laminectomy patients with recurrent low-back pain increased with time, reaching a peak 2 weeks after the last injection.

TABLE 4. Relationship of Compensation for Injury and Response to Treatment of Recurrent Low-back Pain in 20 Post-laminectomy Patients

	No. of Patients	No. of Patients Reporting Pain Relief of ≥50%	% Pain Relief Reported	*P* Value
Litigation pending				
Yes	5	3	60	NS
No	10	10	67	
Compensation received for injury				
Yes	10	7	70	NS
No	10	6	60	

NS = not statistically significant ($P \leq 0.05$).

Of the nine patients given morphine sulfate and steroid (methylprednisolone) as the first sequence of injections, four had pain relief lasting 1 day to 2 weeks. After the saline and steroid sequence 8 weeks later, only one of nine patients had pain relief which lasted 5 weeks. Those patients who had had relief from the earlier morphine-steroid sequence did not respond to steroid alone.

Of the 11 patients given saline and steroid first, four had a decrease in pain lasting 1 day to 4 months. Eight weeks later, after treatment with morphine and steroid, nine of the 11 patients had pain relief lasting 1 day to 6 weeks (table 2). Three of the four patients who had pain relief from their earlier saline and steroid injections also responded to the morphine and steroid injections. Although a larger percentage of patients responded to the saline-steroid/morphine-steroid sequence (group B), the differences between the responses of group A and group B were not statistically significant.

Data for the two groups then were combined and reevaluated. That is, the response to morphine and steroid was compared with the response to saline and steroid without regard to the order of administration. More patients had pain relief after morphine and steroid injections than after the saline-steroid injection ($P < 0.03$). Also, the number of patients having at least 50% pain relief increased as the time after injection increased, the number being the highest at 2 weeks (fig. 1).

TABLE 3. Relationship of Age, Sex, and Response to Treatment of Recurrent Low-back Pain in 20 Post-laminectomy Patients

Sex	No.	No. of Patients Reporting Pain Relief ≥50%	% of Pain Relief Reported
Men	6	5	83
Women	14	8	57
Age (yr)			
20–29	1	0	0
30–39	5	3	60*
40–49	7	5	72
50–59	2	1	50
≥60	5	4	80

* Not statistically significant ($P < 0.05$).

Sixty percent of patients (*i.e.*, 83% of the six men and 57% of the 14 women) had pain relief for at least 24 h (table 3). Although older patients (≥60 yr) had a somewhat higher success rate than younger patients (mean, 47.8 yr), differences were not statistically significant (table 3). Response rate did not differ between patients who had legal action pending and those who did not. The response rates were similar for patients who were injured at work and receiving financial compensation and patients who were not receiving compensation (table 4).

Morphine produced some degree of analgesia in 65% of the patients within 1 h. None, however, had greater than 50% pain at 1 h. Any side effects occurring after morphine began within 2–3 h of injection. Seven patients reported pruritus; all but one responded to naloxone.[1,2] Four patients had mild nausea and vomiting, two male and two female patients had urinary retention,[6] and one patient had profound bradycardia. Respiratory depression did not occur.

Functional activity was reported as 50% improved in only one patient. No specific disease appeared to be associated with a greater response than other diseases.

DISCUSSION

Our protocol was designed to match that of Cohn *et al.*, who reported that epidurally administered morphine sulfate and steroid produced pain relief in all

their subjects (post-laminectomy patients with low-back pain), and that pain relief appeared within a few minutes and lasted 6–12 months. Our data do not support these observations. Although morphine combined with steroid was more effective in the relief of post-laminectomy low-back pain than steroid alone ($P < 0.03$), only 65% of our patients reported pain relief, regardless of the sequence of administration of morphine-steroid and saline-steroid. In addition, the pain relief lasted only 1 day to 6 weeks. Thirty-five percent of our patients with pain sources similar to those reported by Cohn *et al.* did not have any pain relief at all. Although irritation and inflammation do respond to epidural steroids,[7] post-laminectomy pain can also be caused by localized arachnoiditis from surgery[8] or from dye used in the myelogram[9] and perineural scar formation.[10] These latter etiologies may not respond to steroid treatment, but may have confused the etiology of pain in a large group of our patients.

We conclude that epidural morphine sulfate plus methylprednisolone will not relieve pain in all patients with chronic recurrent post-laminectomy pain. Furthermore, the effectiveness of steroid injections in relieving pain does not appear to be a good predictor of the effectiveness of morphine coupled with steroid. Morphine combined with steroid may relieve pain in patients who appear resistant to epidural injections of steroid alone. Also, a second administration of morphine and steroid may be even more effective if given within 2 weeks of the initial dose. We believe that other factors influence the response to epidural steroid treatment, and should be further explored. These include differences in climate, occupation, educational level, family and employment stresses, duration of the pain problem, the use of analgesics and psychological factors.[6]

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Percutaneous Inguinal Block for the Outpatient Management of Post-herniorrhaphy Pain in Children

ALLEN J. HINKLE, M.D.*

With an increased emphasis on ambulatory surgery, especially in the pediatric age group, innovative postoperative pain management can effect a smoother transition from the hospital into the home environment. Children undergoing surgery for inguinal hernia repair represent a large volume of ambulatory pediatric surgical cases.

The traditional use of narcotics for pain control is associated with a high incidence of nausea and vomiting postoperatively in children.[1] Besides stressing surgical repair, retching and vomiting can delay discharge from the ambulatory surgical unit, and may necessitate hospital admission if severe.

Caudal epidural blocks can achieve groin incisional analgesia, but the technical aspects can be time-con-

* Assistant Professor of Surgery (Anesthesiology) and Maternal and Child Health.

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