Prolonged Relief of Acute Postamputation Phantom Limb Pain with Intrathecal Fentanyl and Epidural Morphine

LOUIS JACOBSON, M.D.,* CHARLES CHABAL, M.D.*

A single dose of intrathecal fentanyl 25 μg can extinguish established phantom limb pain and restore normal sensations for about 8 h.1 Acute phantom pain unmasked in an amputee undergoing elective cesarean section during epidural anesthesia, was effectively treated with two doses of epidural fentanyl (75 μg), each providing relief for 3–4 h.2 Consequently, spinal opioids were recommended for acute phantom pain associated with epidural or spinal anesthesia.2 We describe the management of an amputee with severe and intractable acute postamputation phantom foot pain refractory to conventional forms of acute pain therapy, using spinal opioids administered over an extended period.

REPORT OF A CASE

A 61-yr-old man with adult onset diabetes mellitus and hypertension presented for a right transmetatarsal amputation because of necrotic ulcers at the base of his second and third toes. He had no pain preoperatively and was not taking any pain medication. Other medications included chlorpropamide 250 mg daily and propranolol 40 mg every 6 h.

The procedure was conducted uneventfully with spinal anesthesia (tetracaine 6 mg with epinephrine 0.2 mg in dextrose). When the effects of the anesthetic receded 5 h postinjection, the patient noted severe pain in his stump and right phantom foot. It was a constant, throbbing pain that involved his whole foot from the ankle distally. It felt as if the whole foot below the ankle (including the toes) was in a vise. Frequent unpredictable paroxysms of lancinating pain were superimposed. They lasted a few seconds and radiated down the dorsal aspect of the foot into the toes, which felt as if they were clamped by a powerful, sharp pincer (“bitten by a giant crab”).

In the ensuing 48 h, a variety of pain treatments were tried without success. These included morphine 10 mg im every 2 h, meperidine 100 mg with hydroxyzine 50 mg im every 3 h, iv patient-controlled analgesia (PCA) with morphine (incremental bolus 1.5 mg; lockout 6 min), and oxycodone with acetaminophen (percocet) two tablets every 4 h.

After obtaining written informed consent, the patient was brought to the operating room area. The plan was to give a diagnostic intrathecal injection of fentanyl which, if successful, would be followed with the insertion of an indwelling epidural catheter to be used for continued morphine therapy. Using a verbal numerical pain rating system (0 = no pain and 10 = worst pain imaginable), the baseline pain score was 7/10. An iv cannula was inserted, monitoring established iv oxygen administered iv normal saline. The patient was placed in the left lateral decubitus position and the subarachnoid space located at the L2/3 level with a 22-G spinal needle inserted under sterile conditions. Fentanyl 25 μg (0.5 ml) was injected, the needle removed, and the patient placed supine.

Significant effects were present within 2 min of the injection. The patient initially noted a sensation of warmth in his lower trunk and legs. The phantom foot felt warm, relaxed and of normal proportions. By 3 min there was no discomfort (0/10). By 15 min the phantom foot sensations were absent and the stump felt warm and comfortable. There was no pruritus, nausea, vomiting, urinary retention, excessive drowsiness, or clinical respiratory depression associated with the fentanyl injection.

Spinal opioids were superior to any of the other treatments tried, and the patient expressed enthusiasm for pursuing this type of therapy. Consequently, 30 min after the fentanyl injection, an indwelling epidural catheter was inserted in the L3/4 interspace, under sterile conditions. Epidural injections were, however, withheld until the effects of the fentanyl began to recede. Four hours postinjection the patient felt a mild tingling sensation in his phantom right big toe, which by 4.5 h involved all the toes. The discomfort was mild (2/10).

Preservative-free morphine (Duramorph*, Elkins-Sinn, New Jersey) 5 mg was injected via the epidural catheter. Fifteen minutes later the patient was without discomfort (0/10) and remained so for 15 h, when he again described tingling in his phantom toes associated with mild discomfort (1/10). Subsequently, duramorph 5 mg was injected every 12 h via the epidural catheter. Urinary retention requiring catheterization for 3 days after the initiation of epidural morphine was the only adverse effect. Eleven days of therapy ensued during which time there was no recurrence of phantom pain (0/10).

The stump was healing well and the patient was ambulating and participating in physical therapy. He was being considered for a walking cast and discharge from the hospital. Therefore, slow discontinuation of the epidural morphine was initiated. One dose of epidural morphine was omitted and the pain did not recur. The epidural catheter was left in place and the patient was started on periocet two tablets every 6 h. After a further 24 h without phantom pain, the epidural catheter was removed. The patient remained in the hospital another 10 days, during which time periocet was discontinued with no recurrence of phantom pain. Subsequent to discharge he has had no phantom limb pain.

* Assistant Professor of Anesthesiology.

Received from the Department of Anesthesiology, University of Washington School of Medicine, and Veterans Affairs Medical Center, Seattle, Washington. Accepted for publication July 11, 1989.

Address reprint requests to Dr. Jacobson: Anesthesiology Service (112A), Veterans Affairs Medical Center, 1660 South Columbian Way, Seattle, WA 98108.

Key words: Analgesics, opioids; fentanyl; morphine. Anesthetic techniques; epidural; spinal. Pain; phantom.)
DISCUSSION

Lumbar intrathecal administration of fentanyl in patients with postamputation phantom limb pain can produce a dramatic response with complete relief of discomfort and positive feelings that transcend the absence of pain.\(^1\) In this instance an initial intrathecal injection of fentanyl rapidly abolished the pain, and subsequent epidural morphine maintained the excellent analgesic effect. Intrathecal fentanyl is useful for diagnostic evaluation because it produces powerful segmental spinal effects that are rapid in onset. However, epidural opioids can also produce similar, although more muted, effects.\(^1\) Therefore, we selected this route for treatment, because indwelling epidural catheter placement for repeated opioid administration is routine in our clinical practice. Duramorph was chosen because of its prolonged effect.

Spinal opioids offer the potential for effective treatment and prophylaxis of postamputation pain. Preoperative lumbar epidural administration of local anesthetic and/or morphine reduces the incidence of phantom limb pain in the first year after amputation.\(^3\) There is evidence that intrathecal opioids may provide superior analgesia to local anesthetics for postamputation pain.\(^1,4\) Furthermore, spinal opioids are not associated with the motor, sensory, and sympathetic effects noted with spinally administered local anesthetics. Consequently, spinal opioids may offer advantages over local anesthetics for phantom pain.

The distinction between acute postoperative phantom pain and acute postoperative postsurgical pain is that the latter is confined to intact body parts, whereas the former occurs in an absent limb or portion thereof. Phantom pain is thought to originate from the central nervous system.\(^5\) It has been suggested that it has a supraspinal origin with a nociceptive engram established in cerebral structures.\(^6\) However, good reasons exist for the origin of phantom pain to be in the spinal cord.\(^7,8\) After transection of a peripheral nerve, neurophysiologic changes occur centrally in the spinal cord in regions where opioid receptors are densely concentrated.\(^7,8,10\) The dramatic response of the patient to the presumed segmental spinal effects of opioids suggests that the spinal cord played an important role in the genesis of the phantom pain.

Spinal opioids relieved the phantom pain that did not recur on their withdrawal. Acute postamputation phantom pain may resolve with the passage of time. Epidural morphine probably helped restore normal sensations while the perturbations producing the phantom pain spontaneously resolved. However, the possibility exists that epidural morphine constituted the definitive curative therapy.

We conclude that, in this case, spinal opioids (intrathecal fentanyl and epidural morphine) exerted specific and unique effects on acute postoperative postamputation phantom limb pain that was not relieved by conventional doses of opioids given by the oral, im, and iv routes. This phenomenon has also been described in established postamputation phantom and stump pain.\(^1,4\) Spinal opioids have the potential to contribute to improved therapy, prophylaxis, and understanding of postamputation pain. Further investigations are warranted.

REFERENCES