Phantom Limb Pain and Spinal Anesthesia

BARRY C. SELLICK, M.B., B.S., F.F.A.R.C.S.

The exacerbation of phantom limb pain by spinal anesthesia has been described.1-5 The onset of severe pain following spinal anesthesia for inguinal herniorrhaphy is described in a male patient with an above-knee amputation who had only previously experienced very occasional, mild discomfort.

REPORT OF A CASE

A 63-year-old, 79 kg, male patient was scheduled for inguinal herniorrhaphy. Relevant points in his medical history included a history of smoking (50 pack years) with symptoms of breathlessness and occasional wheezing consistent with a diagnosis of mild chronic obstructive pulmonary disease (COPD). He had no history of angina or claudication or any other symptoms referable to the cardiovascular system. He was taking no medication, had no allergies, and had no history of gastrointestinal or genitourinary problems.

His only operation had been a left above-knee amputation performed following trauma during the latter part of the World War II about 40 years previously. He had experienced very little pain from his amputation and would only admit to occasional mild discomfort.

His arterial blood pressure was normal and there were no abnormal heart sounds. All peripheral pulses were present (down to femoral on left), and the ECG was normal. Respiratory system examination revealed slightly increased anteroposterior diameter, several rales, and occasional wheeze. Abdominal examination and neurologic examination were unremarkable. An above-knee amputation was noted. There was a well-healed scar with no signs of infection, and trigger zones could not be elicited.

The anesthesia was discussed with the patient, and he agreed with the choice of a spinal anesthetic. Oral diazepam 10 mg was given 2 h preoperatively. An iv infusion was commenced, and baseline arterial blood pressure and heart rate were recorded. The spinal was introduced with a 25-G needle at the L3–4 interspace using 1.5 ml 0.5% hyperbaric chirocaine in the sitting position. The patient subsequently was put into the supine position. Loss of temperature sensation was quickly elicited up to T8. However, on cleansing the skin for surgery the patient started to complain about severe pain in the region of his stump and "foot." The sensory level to pin prick was checked and found to be completely adequate from T7 to S5. He was also unable to elevate either his leg or stump. The patient continued to complain of severe pain that was unreleiving and did not respond to 5 mg morphine iv. The operation was postponed because of extreme restlessness, and the patient was taken to the recovery area.

DISCUSSION

Most amputees report sensations that relate to a phantom limb almost immediately after amputation.6-9 In most patients these feelings gradually subside and the phantom limb recedes into the stump. In the case of phantom limb pain, several authors report a 5-10% frequency of pain persisting at least for the first 6 months following surgery.7,8,10-12 Recent studies, however, reveal that this frequency might be between 60 and 80%.6,13,14 The initial high incidence often is greatly reduced after 1 year.15 The pain syndrome is extremely variable—pain being intermittent or continuous, lasting for seconds or days and variously described as burning, cramping, stabbing, or aching. However, there seem to be some consistent features, and Melzack characterized four major properties16: 1) pain endures long after healing of injured tissue and may persist for decades; 2) trigger zones may spread to other parts of the body; 3) phantom limb pain is more likely if the limb was painful prior to amputation and if amputation was delayed for a long period after injury; 4) the pain can be modified by temporary decreases or increases of somatic input.

The etiology of this condition is unclear, and investigators variously propose a peripheral origin,15 a spinal cord origin,6,17 or a more central origin.16 Peripheral stimuli, particularly in the presence of a neuroma, can precipitate an attack, and sometimes complete permanent relief can be gained by the injection of local anesthetic.
into the stump. Some patients exhibit autonomic dysfunction during an attack, and sympathetic has been advocated in these cases, although it has been found to be rarely effective.\textsuperscript{18}

Central mechanisms have been proposed due mainly to the observation of continued pain in patients who have total sensory anesthesia. Melzack\textsuperscript{16} believes that this is due to a decrease in the tonic inhibitory influence exerted by the brainstem reticular formation. The resultant increase in self-sustaining neural activity results in phantom limb pain. Counter irritation, either mechanical by percussion or electrical via TCNS,\textsuperscript{19,20} can produce partial or total relief by increasing the level of inhibitory input.

This case is particularly interesting in that phantom limb pain of such severity could be initiated by spinal anesthesia about 40 years later. This observation suggests that these self-sustaining neuronal loops or memory engrams have long-lasting memories. Nathan\textsuperscript{21} similarly postulates that phantom pain represents the reawakening of pain traces that were indelibly recorded in the brain by continuous afferent bombardment from the injured area at the time of the incident. The exact circumstances leading up to the amputation following the trauma were not entirely clear, but one could possibly assume a delay being present that would favor the subsequent manifestation of a phantom limb syndrome.

The pain of phantom limb pain has been found to be extremely difficult to treat.\textsuperscript{15} TCNS has been found to be useful in many cases and offers a cheap, simple, and safe technique. In this case it afforded good relief and enabled the patient to return to his ward, since it avoided the risk of respiratory complications attendant to the use of iv narcotics.

Psychologic factors also may play a part, since it is well known that emotional disturbances can trigger the onset of pain. However, it is difficult to imagine, in this case, a link between his hospital admission and the abrupt onset of pain.

In conclusion, phantom limb pain occurring under spinal anesthesia has been reported, but most reports are for patients who have had recent amputations mainly for peripheral vascular diseases. This case reports that persons with no clinical PVD and no history of phantom pain may not be immune to this distressing condition. Indeed, a history (no matter how distant) of traumatic lower limb amputation would certainly appear to represent a relative contraindication to spinal anesthesia.

REFERENCES