of this abnormal response have been reviewed.
It is suggested that this rigidity represents a contracture such as that seen in some patients with myotonia dystrophica after succinylcholine, and that patients exhibiting this response have undiagnosed myotonia. It is also suggested that the muscle contracture of undiagnosed myotonia is one cause of idiopathic hyperpyrexia during general anesthesia.

References

Spinal Epidural Hematoma Following Continuous Epidural Anesthesia

TED F. GINGRICH, M.D.*

Recently, Bromage has written a comprehensive review of epidural anesthesia in which he indicates that further studies of the mechanism of action as well as applicability and complications of the technique are necessary. This is a report of a serious, though rare, complication of lumbar epidural anesthesia.

CASE REPORT

A 73-year-old man was admitted to the hospital with a painful leg that had developed suddenly five days previously. He had a history of arteriosclerotic disease, and had had a Dacron prosthesis inserted at the aorto-bifurcation three years prior to admission. Examination revealed a cold, blue, swollen left leg with no pulses palpable in the popliteal, dorsalis pedis or posterior tibial arteries. Faint pulsation was present in the femoral area. A line of demarcation was present at mid-thigh level.

Because of reasonable certainty that this clinical episode was due to thrombosis of the graft, it was decided to attempt a sympathectomy of the extremity to salvage as much of the leg as possible prior to amputation. An epidural catheter was placed between L3-L4 and 15 ml. of 1 per cent lidocaine (Xylocaine) were injected through the catheter. Within 20 minutes the leg began to warm and the line of demarcation receded to about the level of the knee. The patient was obviously much more comfortable, so it was decided to leave the catheter in place and continue the block for two or three days. Sixteen hours after placement of the catheter, anticoagulation therapy was started, with intravenous heparin every four hours. After 24 hours, it was noted that Xylocaine had to be injected more frequently and in larger quantity to produce relief of pain. At the 48th hour, the patient developed severe pain in the lumbar area and was given both morphine and barbiturate. To check the position of the epidural catheter, 1 cc. of contrast dye was injected through the catheter and an X-ray was made. The tip of the catheter was located in the interspinous area, so it was removed. The patient had no more pain, but during the next

* Division of Anesthesiology, University of Colorado Medical Center, Denver, Colorado.
six hours he developed motor paralysis of the legs and a sensory deficit to the T10 level. He was taken to surgery, where a hematoma of approximately 100 cc, was evacuated from the T11 to L4 level of the epidural space. During the next several months the patient recovered most of the sensory and motor power in the lower extremities, having a left above-knee amputation in the meantime.

**Discussion**

In 1964, 43 cases of spinal epidural hematoma were reviewed, eight of these associated with anticoagulant therapy. Markham, in 1967, reported 46 instances from the literature and three cases of his own, for a total of 49. All of these cases occurred spontaneously. Although nearly every textbook and review article about the subject mentions blood dyscrasias and anticoagulation therapy as contraindications for epidural or subarachnoid anesthesia, there have been few reports of hematoma in patients given anticoagulants after the catheter was placed. Frumin and Schwartz reported a complication similar to this in a review of 128 cases. Their patient received a continuous lumbar block for removal of a femoral embolus and for treatment of postoperative arterial spasm. A hematoma formed in the peridural space during concurrent anticoagulation therapy. Prolonged loss of function of the lower part of the body resulted from compression of the cord. Bonica reported an incident of cauda equina syndrome resulting from subarachnoid clots as a complication of subarachnoid anesthesia in a patient who had a blood dyscrasia unknown to the surgical team. Lund, in considering complications of 150,000 epidural anesthetics, reported no instance of an epidural hematoma. Bonica, in reviewing 3,637 cases of epidural anesthesia and Moore, reporting 11,574 cases of subarachnoid anesthesia, gave no indication that the complication of hematoma and paralysis had occurred.

Some clinicians consider peripheral vascular disorders among the most important clinical indications for use of peridural block. Undoubtedly thousands of patients who have received continuous epidural anesthetics have had unrecognized blood dyscrasias, or have received anticoagulant therapy before or during surgical operation. It is an established surgical principle to administer heparin intra-

venously prior to opening a major vessel for embolectomy, thrombectomy or bypass procedure. Some surgeons also give anticoagulant drugs to the patient in the immediate postoperative period. Patients who undergo continuous epidural sympathetic blockade for frostbite, occlusive disease, etc., sometimes receive heparin.

The question arises whether anticoagulation therapy or blood dyscrasias represent absolute contraindications for either spinal or epidural anesthesia. If so, is the institution of anticoagulation during the period that the catheter is in place also a contraindication? If spinal epidural hematoma is as rare as this review of the literature indicates, an awareness that the complication can occur seems all that is necessary. If, on the other hand, the complication is one that, for one reason or another, is not always reported when it occurs, many patients may have had epidural hematoma and the incidence may actually be quite high.

More information is needed concerning the incidence of spinal epidural hematoma in patients who receive anticoagulation therapy during continuous epidural anesthesia. This data must be evaluated before it can be said that the advantages of this technique outweigh the disadvantages.

**References**