Multilevel Acute Spinal Epidural Hematoma in a Patient With Chronic Renal Failure

—Case Report—

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Abstract

A 47-year-old female with diabetic nephropathy presented with acute onset of severe back pain and progressive weakness in both lower extremities. Neuroimaging revealed a spinal epidural hematoma extending from the T-3 vertebra to the sacrum. Removal of all or every other lamina on levels with epidural hematoma and emergent evacuation of the hematoma were planned. T-9 and T-10 laminectomies were performed, but excessive bleeding during the operation prompted us to abandon the procedure. Plasma and desmopressin administration controlled the bleeding from the drain 8 hours after the operation. Follow-up neuroimaging one month later revealed total resolution of the hematoma with improved neurological status. Acute spinal epidural hematomas extending over more than 15 segments are extremely rare and the surgical treatment is still challenging. Coexisting hemorrhagic diathesis creates more problems. Conservative treatment may be the best option.

Key words: chronic renal failure, coagulation defect, spinal epidural hematoma

Introduction

Acute spinal epidural hematomas (ASEHs) may develop in the cervical, thoracic, lumbar, and/or sacral regions. Magnetic resonance (MR) imaging has increased the detection rate from 2.2 to 6.4 patients per thousand per year.

ASEH manifests as sudden onset of severe pain followed by total motor and sensory loss as early as 10 hours after onset.

Prolonged and excessive bleeding may continue in the presence of coagulation defect or absence of early hematoma formation. Anticoagulation or hemorrhagic diathesis is a common cause of spontaneous ASEHs.

ASEH with progressive neurological deficit should be treated by emergent evacuation of the hematoma and decompression of the spinal cord. Multilevel ASEH requires removal of all or every other lamina of the involved spinal levels and evacuation of the hematoma. However, conservative treatment with spontaneous resolution of the hematoma may be preferred to surgical decompression.

Surgical treatment of multilevel ASEH manifesting as progressive neurological deficit associated with coagulation defect is very challenging.

We describe a case of ASEH involving more than 15 spinal segments associated with thrombocyte activation defect caused by chronic renal disease.

Case Report

A 47-year-old female with type II diabetes mellitus and diabetic nephropathy had received medical treatment and blood dialysis for 3 years. She suffered acute onset of severe back pain and progressive weakness in both lower extremities, and was admitted to our emergency service 48 hours later. Neurological examination revealed distal and proximal paresis of both lower extremities with motor strength of 1/5, positive Babinski’s sign on both sides, and sensory impairment below T-4 level. Blood coagulation tests showed platelet count (PC) of 174,000/mm³, international normalized ratio...
Fig. 1 Thoracic (A) and lumbar (B) sagittal T2-weighted and thoracic axial T1-weighted (C) magnetic resonance images demonstrating an epidural mass lesion extending from the T-3 level to the sacrum. (B) shows the typical ‘curtain sign’ for a spinal epidural mass lesion (arrows), caused by loosening of the dura attachment to the posterior longitudinal ligament. Computed tomography scan (D) demonstrating extensions of the spinal epidural hematoma into the bilateral neural foramina at the L-3 level (arrowheads).

(INR) of 1.08, and activated partial thromboplastin time (APTT) of 35.2/sec. MR imaging and computed tomography demonstrated an epidural mass extending from the T-3 level to the sacrum, indicating a spinal epidural hematoma (Fig. 1). Exploration of this mass lesion through multilevel laminectomies between T-3 and the sacrum was planned to exclude lymphoma and to perform decompression of the spinal cord. Emergent spinal angiography excluded spinal vascular malformation.

Initial T-9 and T-10 laminectomies were performed and the epidural space at these levels was explored. Examination of frozen sections confirmed the presence of coagulated blood in the epidural space. Meticulous bleeding control with bipolar coagulation and hemostatic material was performed, but excessive bleeding continued from all layers of the surgical field. We decided to finish the procedure. The closure was performed with placement of an epidural drain.

Early after the operation, blood coagulation tests showed PC of 142.000/mm³, INR of 1.28, and a very high and unmeasurable APTT level. Bleeding from the drain continued. Several units of plasma and desmopressin (3 ml i.v. over 8 hrs) were administered to improve the activation of platelet functions, and finally the bleeding from the drain was controlled 8 hours postoperatively.

No improvement in her neurological status was observed one week after the operation. She required continuous dialysis due to her diabetic nephropathy and was transferred to the rehabilitation program. Serial radiological follow-up studies showed gradual resolution of the hematoma. One month after the operation, MR imaging demonstrated total resolution of the hematoma (Fig. 2) and the motor strength of the lower extremities improved to 3/5.

Discussion

The main factor in our case of ASEH was the coagulation defect due to chronic renal failure. The patient was not hypertensive, which would have worsened the neurological status. MR imaging may be helpful to differentiate ASEH from spinal lymphoma or premembranous hematoma.15,25)

The outcome depends on the localization of the hematoma, the preoperative neurological condition, and the timing of surgery.7,9,16) Patients with incomplete neurological deficit have more favorable outcomes.2,8,7,15,16,22) Patients with complete motor and sensory loss should undergo surgical decompression within 12 hours after onset,22) although there are contradictory opinions.4,9) Patients who recover after treatment probably have a demyelinating lesion, whereas patients with no improvement have an axotomizing lesion.16,19) We prefer to operate on such cases with progressive neurological deficit as early as possible. Two main surgical indications for this case were prevention of rapid progressive neurological deficit and differential diagnosis of the lesion with lymphoma. Conservative treatment may be preferred for small hematomas with mild neuro-
ASEH and Chronic Renal Failure

The best treatment in our case would be rapid evacuation of the hematoma with multilevel laminectomies if no excessive perioperative bleeding occurred. However, sometimes the aggressive treatment must be converted to conservative treatment as in our case. The bleeding was coming from the visual surgical field, not under the laminae superior and inferior to the laminectomy area. Even extensive bipolar coagulation and use of hemostatic materials could not stop this extensive bleeding. The extension of the laminectomies would have been hazardous, if not fatal. So, we stopped the operation after inserting an epidural drain. Peri- and early postoperative administration of plasma and especially desmopressin, to improve the activation of platelet functions, finally stopped this extensive bleeding.

A good outcome was reported in a similar case. The patient had a hematoma extending between the T-8 and L-2 levels, and complete sensory and motor loss developed by 10 hours after onset. Emergent T11-L1 laminectomies were performed and the motor score normalized at 2 days after the operation. The necessity for long segment laminectomies in the presence of a provocative coagulation defect may be hazardous. We experienced great difficulty with only two laminectomies, although the coagulation tests were normal preoperatively. The cause of excessive bleeding during the operation might be rapid perioperative changes of coagulation parameters due to chronic renal failure. Whether the hematoma should be evacuated and the risk of excessive bleeding accepted, or the patient should be followed and the presence of neurological deterioration accepted is hard to decide. There is a lack of information about the treatment protocol of such cases. Surgical evacuation of the hematoma is essential after stabilization of coagulation parameters, and the operation should be continued if the perioperative epidural bleeding can be controlled. Conservative treatment after unsatisfactory surgical decompression due to coagulation defect may result in some improvement of neurological status. However, extensive rehabilitation is essential for such cases.

Continuous dialysis is superior to intermittent dialysis in neurosurgical patients with renal failure because it is less often associated with hemorrhage due to insufficient dialysis. Systemic heparinization in hemodialysis and continuous arteriovenous hemofiltration may cause hemorrhage. Continuous arteriovenous hemofiltration with short half-life anticoagulants may be useful in patients who are not suitable candidates for peritoneal dialysis.

Fig. 2 Thoracic sagittal T₁-weighted (A) and T₂-weighted (B), and lumbar sagittal T₁-weighted (C) and T₂-weighted (D) magnetic resonance images one month after the operation showing complete resorption of the spinal epidural hematoma.

logical deficit unless the clinical evaluation indicates progression. The results of conservative treatment are poor, especially if the hematoma compresses the cervical cord. The best treatment in our case would be rapid evacuation of the hematoma with multilevel laminectomies if no excessive perioperative bleeding occurred. However, sometimes the aggressive treatment must be converted to conservative treatment as in our case. The bleeding was coming from the visual surgical field, not under the laminae superior and inferior to the laminectomy area. Even extensive bipolar coagulation and use of hemostatic materials could not stop this extensive bleeding. The extension of the laminectomies would have been hazardous, if not fatal. So, we stopped the operation after inserting an epidural drain. Peri- and early postoperative administration of plasma and especially desmopressin, to improve the activation of platelet functions, finally stopped this extensive bleeding.

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