

Acute Epidural Hematoma Caused by Contrecoup Head Injury

—Case Report—

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Abstract

A 50-year-old woman presented with a rare case of contrecoup epidural hematoma (EDH) associated with coup EDH. She was hit by a car while riding a bicycle, and struck the left parietal region of her head on the ground. She was dazed for a few minutes. On admission, she complained of nausea but exhibited no neurological deficits. Skull radiography revealed a linear fracture of the left temporal bone. Computed tomography (CT) demonstrated acute EDH in the right frontal region due to contrecoup injury, and thin EDH in the left temporal region due to coup injury. She vomited repeatedly after admission. She became lethargic and exhibited right hemiparesis. CT, taken 2 hours later, revealed enlargement of the left coup EDH, but no enlargement of the right contrecoup EDH. An emergent evacuation of the enlarged coup EDH was performed. Immediately after the operation, she became alert and the right hemiparesis subsided. The contrecoup EDH was conservatively treated, in the absence of enlargement. She was discharged 12 days after the injury without neurological deficits.

Key words: epidural hematoma, contrecoup injury, head injury

Introduction

Acute epidural hematoma (EDH) is commonly a result of coup head injury with skull fracture. The EDH is almost always unilateral and arises in the vicinity of the impact site. Acute EDH caused by a contrecoup injury is extremely rare.^{1,3-6)} We report a case of contrecoup EDH associated with coup EDH.

Case Report

A 50-year-old woman was hit by a car while riding a bicycle. She struck the left parietal region of her head on the ground. She was dazed for a few minutes. On admission, she complained of nausea but exhibited no neurological deficits. She had subcutaneous hematoma (about 8 cm in diameter) at the injury site. Skull radiography revealed a linear fracture of the left temporal bone. Computed tomography (CT) demonstrated acute EDH in the right frontal region and thin EDH in the left temporal region (Fig. 1). There was no evidence of a concurrent blow in the right frontal region. Skull radiography and CT showed no evidence of skull

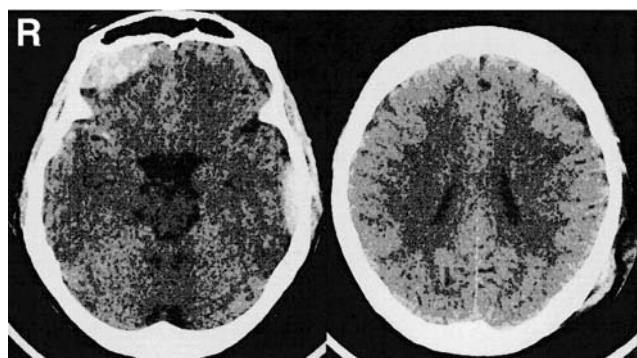


Fig. 1 Computed tomography scans on admission, 30 minutes after head injury, demonstrating subcutaneous hematoma at the left parietal region, thin epidural hematoma (EDH) due to coup injury in the left temporal region, and EDH due to contrecoup injury in the right frontal region.

fracture in the right frontal region (Fig. 2). She vomited repeatedly after admission. She became lethargic and exhibited right hemiparesis. CT, taken 2 hours later, revealed enlargement of the left coup EDH, but no enlargement of the right contrecoup

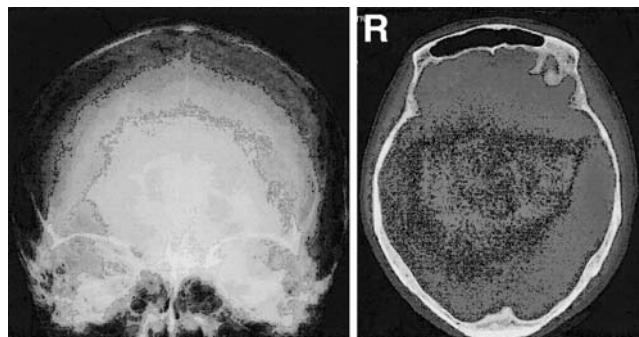


Fig. 2 Skull radiograph (left) and bone-window computed tomography scan (right) showing no evidence of fracture in the right frontal region.

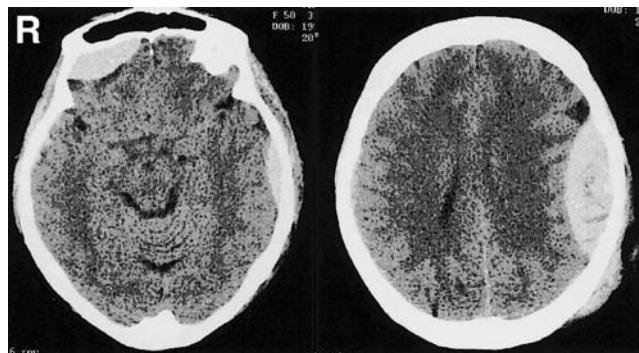


Fig. 3 Computed tomography scans, taken 120 minutes later, showing enlargement of the left temporal epidural hematoma (EDH) but no enlargement of the right frontal EDH.

EDH (Fig. 3). An emergent evacuation of the enlarged coup EDH was performed. Immediately after the operation, she became alert and the right hemiparesis subsided.

Magnetic resonance (MR) imaging, taken 11 days after injury, demonstrated the periphery of the right frontal EDH as hyperintense on both T₁- and T₂-weighted images, and the center as hypointense on T₁-weighted and isointense on T₂-weighted images (Fig. 4). These MR imaging findings were compatible with the subacute phase of hematoma. Sagittal MR imaging showed this hematoma was located at the corner of the frontal convexity and frontal base. Cerebral contusion was revealed in the right frontal lobe subjacent to the contrecoup EDH. Another parenchymal lesion was identified in the left globus pallidus internus. The contrecoup EDH was conservatively treated, in the absence of enlargement. She was discharged 12 days after the injury without neurological deficits.

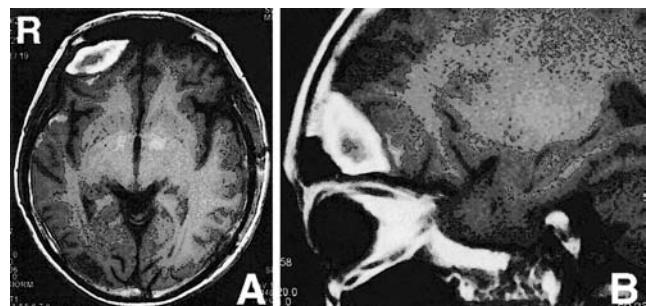


Fig. 4 Axial T₁-weighted (A) and sagittal T₂-weighted magnetic resonance images (B), taken 11 days after injury, demonstrating contrecoup epidural hematoma (EDH) at the corner of the frontal convexity and frontal base, and cerebral contusion subjacent to the contrecoup EDH. Another parenchymal lesion is identifiable in the left globus pallidus internus.

Discussion

Only five cases with acute EDHs caused by contrecoup injury have been reported.^{1,3-6)} The clinical features of these five cases and the present case are summarized in Table 1. The four women and two men were aged from 21 to 59 years. Interestingly, this rare condition occurred in the sixth decade of life in all but Case 2. In Case 2, the contrecoup EDH appeared after evacuation of the coup EDH.¹⁾

Parietooccipital blunt head injuries induced the frontal contrecoup EDHs in all but Case 5. In Case 5, parietal contrecoup EDH was caused by being struck with an axe in the frontal region.³⁾ Radiography showed skull fractures at the impact sites in all cases except Case 1.⁶⁾ CT or MR imaging demonstrated coup lesions including cerebral contusion, subdural hematoma, or EDH in most cases, including our patient.^{1,3,4)} Preoperative neurological states of the patients were generally good. Patients with contrecoup EDH had Glasgow Coma Scale scores of better than 12 points except for Case 5.³⁾

Four of the five previous patients underwent craniotomy for the contrecoup EDHs.^{1,3,4,6)} All patients experienced good recovery, regardless of whether management was surgical or conservative. In our case, removal of the contrecoup EDH was unnecessary, because serial CT showed no enlargement and the EDH was not considered to be responsible for neurological deterioration. In contrast, the coup EDH had to be removed because of rapid enlargement with concomitant neurological deterioration.

Table 1 Clinical features of acute epidural hematoma (EDH) caused by contrecoup injury

Case No.	Author (Year)	Age, Sex	Cause	Injury site	Fracture	Coup injury	Operation for coup injury	Site of contrecoup EDH	Operation for contrecoup EDH	Outcome
1	Okamoto et al. (1983) ⁶⁾	51, F	fall	occipital	–	–	–	lt frontal	+	GR
2	Balasubramaniam and Ramesh (1991) ¹⁾	21, M	fall	rt parietal	+	EDH	+	lt frontal	+	GR
3	Miyazaki et al. (1995) ⁴⁾	52, F	TA	lt occipital	+	SDH	–	rt frontal	+	GR
4	Motohashi et al. (2000) ⁵⁾	59, F	fall	occipital	+	–	–	lt frontal	–	GR
5	Mishra and Mohanty (2001) ³⁾	50, M	axe	lt frontal	+	contusion	–	rt parietal	+	GR
6	Present case	50, F	TA	lt parietal	+	EDH	+	rt frontal	–	GR

GR: good recovery, SDH: subdural hematoma, TA: traffic accident.

Surgery for contrecoup EDHs has discovered no damage to larger arteries.^{1,3,4,6)} Oozing from small dural vessels was recognized in two cases.^{1,4)} The external layer of the dura is a proper periosteum with a vascular connection with the skull. Small interposed vessels are located between these structures. Damage to these small vessels may cause EDHs even in the absence of damage to major dural arteries or venous sinuses.

The mechanism of frontal contrecoup EDH development remains unclear. The dura mater of the lateral frontal region is easily detached from the inner table, as experienced during craniotomy procedures. Impact to the occipital region induces momentary negative pressure in the right frontal fossa due to the inertia of the brain.²⁾ These two factors may contribute to the development of contrecoup EDHs in the frontal region. Moreover, in our case, the contrecoup EDH developed at the corner of the lateral frontal convexity and the base of the skull, which forms a small curvature. This small curvature of the inner surface of the cranium might have prompted detachment of the dura from inner table of the skull secondary to the blunt parietal injury, causing the contrecoup EDH.

References

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