Rapid Resolution of Acute Subdural Hematoma

—Report of Four Cases—

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Abstract

We report four cases of acute subdural hematoma (ASDH) in which the hematoma rapidly resolved. Three of the four hematomas were traumatic. The outcome was good in three cases and fair in one. Spontaneous resolution of ASDH is rare.

Key words: acute subdural hematoma, brain swelling, intracranial decompression

Introduction

Acute subdural hematoma (ASDH) is a life-threatening condition, and it has been repeatedly emphasized that surgery should be performed as soon as possible.^{2-4,6,10,11)} Recently, however, several cases have been reported^{5,7,8,14)} in which an ASDH decreased or disappeared spontaneously. We present four such cases and discuss the mechanisms of rapid resolution or diminution of ASDH.

Case Reports

Case 1: A 63-year-old male was referred to our clinic with severe headache, vomiting, and disturbed consciousness. On admission, he was lethargic and had a Glasgow Coma Scale (GCS) score of 13. His pupils were of equal size and reacted normally to light, and no motor weakness was noted. He had a history of liver cirrhosis. A computed tomographic (CT) scan disclosed a right ASDH and a moderate midline shift (Fig. 1 *left*). Cerebral angiography revealed no vascular anomaly. Under the diagnosis of idiopathic ASDH, conservative therapy was initiated, since he had no ominous clinical signs or symptoms. A CT scan obtained on the following day revealed spontaneous resolution of the hematoma (Fig. 1 *right*). He had recovered completely by the following day

and was discharged 1 week later with no neurological deficit.

Case 2: A 16-year-old male suffered a traumatic head injury in a traffic accident and was transferred to our clinic. He reportedly was conscious and lucid for about 1 hour after the accident. On admission, he was comatose, with a GCS score of 3, and his pupils were mydriatic and unresponsive to light. Because his breathing was rough and irregular, emergency orotracheal intubation was performed. A CT scan demonstrated a left ASDH and an extreme midline shift (Fig. 2 *left*). Despite institution of a mannitol drip, his pupils remained completely mydriatic. Barbiturate therapy alone was given because surgery was not indicated, owing to complete tentorial herniation. Several hours later, the right pupil began to constrict and both pupils subsequently became miotic. Two days after admission, a CT scan revealed that the subdural hematoma and midline shift had diminished (Fig. 2 *right*). Unfortunately, however, despite clinical improvement, the cerebral herniation produced arterial obstruction in the territory of the left anterior and posterior cerebral arteries, resulting in tetraparesis. Over the following 2 months, he gradually recovered, becoming alert and responding to rehabilitation.

Case 3: A 27-year-old female incurred a traumatic head injury in a traffic accident and was admitted to a local hospital. A CT scan revealed a left ASDH and temporal lobe contusion (Fig. 3 *left*), and she was transferred to our hospital for surgery. On ad-

Fig. 1 Case 1. *left*: CT scan obtained on admission, showing a right subdural hematoma containing a low-density area, which implies involvement of cerebrospinal fluid. *right*: CT scan taken on the next day, revealing resolution of the hematoma.

Fig. 2 Case 2. *left*: CT scan on admission, showing a left subdural hematoma with partial low density. *right*: Two days later, CT scan demonstrated diminution of the hematoma.

Fig. 3 Case 3. *left*: CT scan obtained on admission, showing a left subdural hematoma with a region of low density. *right*: Six hours later, CT scan revealed diminution of the hematoma.

mission, she was lethargic and had a GCS score of 10. Her pupils were equal in size and reactive to light, and no motor weakness was noted. Six hours after the injury a second CT scan disclosed diminution of the subdural hematoma and the midline shift (Fig. 3 *right*). Therefore, she was managed conservatively. Two weeks later, she recovered fully and displayed no neurological deficit.

Case 4: A 48-year-old male received a traumatic head injury in a traffic accident and was referred to Daiyukai General Hospital. On admission, he was stuporous, with a GCS score of 9. His pupils were anisocoric and reactive to light. He vomited frequently. A skull x-ray showed a linear occipital fracture, and a CT scan revealed a bifrontal brain contusion, a right ASDH, and traumatic subarachnoid hemorrhage (Fig. 4 *upper*). Since the ASDH was thin, he was treated conservatively. Approximately 6 hours later, a CT scan revealed that the subdural hematoma had disappeared (Fig. 4 *lower*). Approximate-

Fig. 4 Case 4. *upper*: CT scan taken on admission, demonstrating a right subdural hematoma, bifrontal brain contusion, and traumatic subarachnoid hemorrhage. *lower*: Six hours later, the hematoma had disappeared.

ly 1 week later, increased bifrontal swelling caused by the brain contusion necessitated a decompressive craniectomy. Over the next 2 months, he gradually recovered consciousness and was discharged with mild memory disturbance.

Discussion

Controversy surrounds treatment of ASDH,³⁾ which even in its rare nontraumatic and idiopathic forms¹³⁾ carries a very high mortality rate relative to other types of brain pathology.^{2-4,6,10,11)} Generally, the diagnosis of ASDH mandates prompt surgical intervention.^{2-4,6,10,11)} However, ASDH accompanied by acute brain swelling, especially diffuse swelling of one cerebral hemisphere, which may occur even if the ASDH is thin,⁵⁾ differs from that without swelling. In the event of acute brain swelling, the indication for surgery is not clear-cut, particularly since surgical intervention often produces a serious secondary lesion.^{1,11,12)}

Shishido *et al.*¹²⁾ asserted that there is no effective treatment for ASDH with acute brain swelling. Seelig *et al.*¹⁰⁾ reported that patients with ASDH who underwent surgery within the first 4 hours had a significantly better survival rate than those operated on after 4 hours, although they did not mention ASDH with brain swelling. It would seem that surgery is the treatment of choice for ASDH other than those that are thin and/or accompanied by acute brain swelling. However, if this is accepted as the standard procedure, there will be few data regarding the effect of conservative therapy.

In addition to our four cases, there have been several other reports of ASDH that diminished or disappeared spontaneously.^{5,7,8,14)} Polman *et al.*⁸⁾ described a case in which magnetic resonance imaging demonstrated not actual disappearance of the hematoma, but rather redistribution of the blood, although CT indicated its disappearance. Makiyama *et al.*⁵⁾ speculated that in their cases, the ASDH may have been obliterated by the pressure produced by acute cerebral swelling. They further hypothesize that spontaneous disappearance of ASDH may not be a rare occurrence. Nagao *et al.*⁷⁾ proposed that, in a pediatric case, participation of the cerebrospinal fluid leakage secondary to tearing of the arachnoid membrane may have played an important role in washing out the hematoma. In three of our four cases (Cases 1-3), cerebrospinal fluid participated in the ASDH; the dilution by cerebrospinal fluid may have been responsible for the rapid apparent resolution of the ASDH, *via* washing out or redistribution. These three cases appeared to have had no signifi-

cant brain swelling. In Case 4, symmetrical narrowing of the ventricles and cisterns, shown by CT, suggested acute brain swelling, which may have resulted in pressure-induced redistribution of the ASDH, as postulated by Makiyama *et al.*⁵⁾ In fact, in Case 4, thin subdural spreading of the hematoma over the hemisphere *via* redistribution was confirmed during the decompressive craniectomy. Victoratos *et al.*¹⁴⁾ described a case of subdural hematoma in which, 1 week after the onset, its complete disappearance was discovered at surgery. This was considered a chronic subdural hematoma, and the mechanism of its early disappearance undoubtedly differs from that of rapid resolution of ASDH.

Several authors^{2,4,6)} have advocated immediate decompressive craniectomy in cases of severe head injury involving a midline shift of greater than 5 mm due to an intracranial mass lesion. By this criterion, our Cases 1-3 appear to have required immediate surgical intervention. In Case 2, however, barbiturate therapy, which can be effective in lowering intracranial pressure,⁹⁾ was apparently helpful in preventing brain death, and the ASDH fortunately resolved rapidly and spontaneously. In any event, in some cases of ASDH, clinical improvement follows spontaneous resolution of the hematoma and alleviation of its mass effect. Therefore, with close observation of the clinical course, conservative management may be sufficient in certain cases of ASDH.

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References

- 1) Adams JH: Diffuse brain damage in human and experimental head injury. *Neurosurg* 6: 46-53, 1987
- 2) Clifton GL, Grossman RG, Makela ME, Miner ME, Handel S, Sadhu V: Neurological course and correlated computerized tomography finding after severe closed head injury. *J Neurosurg* 52: 611-624, 1980
- 3) Cooper PR, Rovit RL, Ransohoff J: Hemicraniectomy in the treatment of acute subdural hematoma: A re-appraisal. *Surg Neurol* 5: 25-28, 1976
- 4) Levati A, Farina ML, Vecchi G, Rossanda M, Marubini MB: Prognosis of severe head injuries. *J Neurosurg* 57: 779-783, 1982
- 5) Makiyama Y, Katayama Y, Ueno Y, Koike Y, Tsubokawa T: Acute subdural hematomas spontaneously disappearing within 3 days following closed

- head injury: Report of two cases. *Nihon Univ J Med* 27: 123-127, 1985
- 6) Miller JD, Butterworth JF, Gudeman SK, Faulkner JE, Choi SC, Selhorst JB, Harbison JW, Lutz HA, Young HF, Becker DP: Further experience in the management of severe head injury. *J Neurosurg* 54: 289-299, 1981
 - 7) Nagao T, Aoki N, Mizutani H, Kitamura K: Acute subdural hematoma with rapid resolution in infancy: Case report. *Neurosurgery* 19: 465-467, 1986
 - 8) Polman CH, Gijsberg CJ, Heimans JJ, Ponssen H, Valk J: Rapid spontaneous resolution of an acute subdural hematoma. *Neurosurgery* 19: 446-448, 1986
 - 9) Rea GL, Rockswold GL: Barbiturate therapy in uncontrolled intracranial hypertension. *Neurosurgery* 12: 401-404, 1983
 - 10) Seelig JM, Becker DP, Miller JD, Greenberg RP, Ward JD, Choi SC: Traumatic acute subdural hematoma. Major mortality reduction in comatose patients treated within four hours. *N Engl J Med* 304: 1511-1518, 1981
 - 11) Shigemori M, Syojima K, Nakayama K, Kojima T, Watanabe M, Kuramoto S: Outcome of acute subdural haematoma following decompressive hemicraniectomy. *Acta Neurochir [Suppl] (Wien)* 28: 195-198, 1979
 - 12) Shishido T, Nakayama K, Shojima K, Watanabe M, Kuramoto S: A study on the indication of external decompressive hemicraniectomy for acute subdural hematomas. *Neurol Med Chir (Tokyo)* 20: 53-60, 1980
 - 13) Tokoro K, Nakajima F, Yamataki A: Acute spontaneous subdural hematoma of arterial origin. *Surg Neurol* 29: 159-163, 1988
 - 14) Victoratos GC, Bligh AS: A more systemic management of subdural hematoma with the aid of CT scan. *Surg Neurol* 15: 158-160, 1981

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