Infantile acute subdural hematoma case series

Of the 452 patients, 158 were diagnosed with subdural hematoma. Subdural hematoma was the most common finding intracranial finding in head trauma in infants and toddlers. A total of 51 patients were classified into the nonaccidental group, and 107 patients were classified into the accidental group. The age of patients with subdural hematoma showed a bimodal pattern. The mean age of the accidental group with subdural hematoma was significantly older than that in the nonaccidental group (10.2 months vs 5.9 months, respectively. $p < 0.001$). Multivariate analysis showed that patients under 5 months old, retinal hemorrhage, and seizure were significant risk factors for nonaccidental injury (odds ratio (OR) 3.86, $p = 0.0011$; OR 7.63, $p < 0.001$; OR 2.49, $p = 0.03$; respectively). On the other hand, the odds ratio for subdural hematoma was 1.96, and no significant difference was observed ($p = 0.34$).

At least in Japanese children, an infantile subdural hematoma was frequently observed not only in nonaccidental but also in accidental injuries. In infants with head trauma, age, the presence of retinal hemorrhage, and the presence of seizures should be considered when determining whether they were abused. Subdural hematoma is also a powerful finding to detect abuse, but care should be taken because, in some ethnic groups, such as the Japanese, there are many accidental cases [1)].

Medical records of term neonates with intracranial hemorrhage who underwent surgical intervention were retrospectively reviewed. There were two cases with spontaneous intraparenchymal hemorrhage. Both cases were delivered vaginally without any use of forceps or vacuum devices. Neither of them showed asphyxia, hypoxic-ischemic encephalopathy, hematological abnormalities, congenital vascular anomalies, infection, or birth trauma. Common symptoms included apnea, cyanosis, bradycardia, and decreased consciousness. The original location of bleeding was the parenchyma of the right temporal lobe. The hemorrhage extended to subdural spaces in both cases. Subdural hematoma (SDH) removal was performed without manipulating the parenchymal hematoma. Only a small amount of SDH (approximately 5 ml) was drained spontaneously with irrigation, which was sufficient to decrease the elevated intracranial pressure. The patients' respiratory conditions improved dramatically after the surgery.

Tamura and Inagaki proposed that removing only a small amount of SDH would be effective and sufficient to relieve severe symptoms of increased intracranial pressure in term neonates with massive spontaneous parenchymal hemorrhage [2)].

Blauwblomme et al. conducted a single-center open-label study between August 2011 and May 2012. Data were prospectively collected in a database and retrospectively analyzed.

Eighteen patients (male/female ratio 1.25) with a median age of 5 months were surgically treated. All had preoperative symptoms of intracranial hypertension or seizures. The SDH was bilateral in 16 cases, with a median width of 12 mm. Success of the procedure was noted in 14 of the 18 patients. There was no intraoperative complication or postoperative infection. Drainage failure was attributable to suboptimal positioning of the subdural drain in 2 cases and to migration in 1 case.

Subduro subgaleal drainage is an efficient treatment that could be proposed as an alternative to external subdural drainage or subduroperitoneal drainage [3].

Medical records and films of 21 cases of infantile acute subdural hematoma were reviewed retrospectively. Diagnosis was made by computed tomography or magnetic resonance imaging. Medical records were reviewed for comparison of age, gender, cause of injury, clinical presentation, surgical management, and outcome.

Twenty-one infants (9 girls and 12 boys) were identified with acute subdural hematoma, with ages ranging from 6 days to 12 months. The most common cause of injury was shaken baby syndrome. The most common clinical presentations were seizure, retinal hemorrhage, and consciousness disturbance. Eight patients with large subdural hematomas underwent craniotomy and evacuation of the blood clot. None of these patients developed chronic subdural hematoma. Thirteen patients with smaller subdural hematomas were treated conservatively. Among these patients, 11 developed chronic subdural hematomas 15 to 80 days (mean = 28 days) after the acute subdural hematomas. All patients with chronic subdural hematomas underwent burr hole and external drainage of the subdural hematoma. At follow-up, 13 (62%) had good recovery, 4 (19%) had moderate disability, 3 (14%) had severe disability, and 1 (5%) died. Based on GCS on admission, one (5%) had mild (GCS 13-15), 12 (57%) had moderate (GCS 9-12), and 8 (38%) had severe (GCS 8 or under) head injury. Good recovery was found in 100% (1/1), 75% (8/12), and 50% (4/8) of the patients with mild, moderate, and severe head injury, respectively. Sixty-three percent (5/8) of those patients undergoing operation for acute subdural hematomas and 62% (8/13) of those patients treated conservatively had good outcomes.

Infantile acute subdural hematoma if treated conservatively or neglected, is an important cause of infantile chronic subdural hematoma. Early recognition and suitable treatment may improve the outcome of this injury. If treatment is delayed or the condition is undiagnosed, acute subdural hematoma may cause severe morbidity or even fatality [4].

A prospective case series of a level I regional trauma center, regional children's hospital, and county medical examiner's office assessed consecutive children who were </=36 months old and had SDH. Children who had previously known hemorrhagic disease, previous neurosurgical procedure, previously recognized perinatal brain injury, meningitis, renal dialysis, and severe dehydration were excluded. Concurrent medical, retinal, skeletal, and social work abuse evaluation were measured. Etiologic assessment using predetermined criteria was conducted.

RESULTS: From March 1995 through December 1998, 66 children were admitted with SDH. Abuse was confirmed in 39 (59%), unintentional injury in 15 (23%), and indeterminate cause in 12 (18%). The mean age of abused children was 8.7 +/- 8.1 months and of children with unintentional injuries was 19.1 +/- 10.0 months. The predominant presenting histories for abusive injury were a minor fall or no mechanism for 33 (84%) of 39 patients. All unintentional injuries resulted from a motor vehicle accident or other documented major trauma. Chronic or mixed acute and chronic SDH were found only in abused children (17 [44%] of 39) and in children whose injuries were indeterminate (8 [67%] of 12), not in children who were unintentionally injured (0 [0%] of 15). Long bone and/or rib fractures were found in 20 (51%) of 39 abused children but in only 1 unintentionally injured child. Retinal bleeding was present in 28 (72%) of 39 of the abused children. Only 1 of the 3 unintentionally injured

children who had a retinal examination had bleeding, which was of the type associated with acute increased intracranial pressure.

CONCLUSIONS: Nearly one fifth of infant and toddler SDH resulted from unintentional trauma. Of those without obvious unintentional trauma, 76% were corroborated to have been abused. Abused children were younger, more likely to have chronic SDH, and more likely to have multiple associated injuries. Their injury history usually was minor or absent [5].

2002

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2000

Hwang et al., reviewed a total of 16 infant head injury patients under 12 months of age who were treated in from 1989 to 1997. Birth head injury was excluded. The most common age group was 3-5 months. Early seizures were noted in 7 cases, and motor weakness in 6. Three patients with acute intracranial hematoma and another 3 with depressed skull fracture were operated on soon after admission. Chronic subdural hematomas (SDHs) developed in 3 infants. Initial CT scans showed a small amount of SDH that needed no emergency operation. Resolution of the acute SDH and development of subdural hygroma appeared on follow-up CT scans within 2 weeks of injury. Two of these infants developed early seizures. Chronic SDH was diagnosed on the 68th and 111th days after the injuries were sustained, respectively. The third patient was the subject of close follow-up with special attention to the evolution of chronic SDH in view of our experience in the previous 2 cases, and was found to have developed chronic SDH on the 90th day after injury. All chronic SDH patients

were successively treated by subduro-peritoneal shunting. In conclusion, the evolution of chronic SDH from acute SDH is relatively common following infantile head injury. Infants with head injuries, especially if they are associated with acute SDH and early development of subdural hygroma, should be carefully followed up with special attention to the possible development of chronic SDH [7)].

1987

A retrospective analysis of the infantile acute subdural hematoma was made by Ikeda et al., with special reference to its pathogenesis.

In 11 of 15 cases, the hematomas were bilateral or a contralateral subdural fluid collection was present. In 7 of 11 patients who underwent operation the collection was bloody fluid and/or clotted blood. In 3 patients, a subdural membrane, as seen in adult chronic subdural hematoma, was found. In only 1 patient with unilateral hematoma was clotted blood present without subdural membrane. The thickest collection of clotted blood was in the parasagittal region. It is postulated that in most cases hemorrhage occurs after minor head injury, from the bridging veins near the superior sagittal sinus, into a pre-existing subdural fluid collection such as chronic subdural hematoma or subdural effusion with cranio-cerebral disproportion, and that infants without intracranial disproportion are unlikely to have acute subdural hematoma caused by minor head injury [8)].

1986

Aoki et al. report six Japanese cases of child abuse with subdural hematoma and discuss differences from those in the United States. The majority of abused children with subdural hematomas in Japan have suffered direct violence to the face and head, resulting in external signs of trauma. Failure to detect these external traces of trauma, however, might result in an incorrect diagnosis of infantile acute subdural hematoma attributed to accidental trivial head injury. Child abuse with subdural hematoma in the United States is frequently caused by whiplash shaking injury in which external signs of trauma may not be evident. In the United States, retinal hemorrhage and subdural hematoma together suggest child abuse; some cases of infantile acute subdural hematoma might be mistakenly diagnosed as child abuse. Thus, the constellation of retinal bleeding and subdural hematoma combined with the absence of visible signs of trauma is differently interpreted in the United States and Japan [9)].

1984

Twenty-six cases of infantile acute subdural hematoma treated between 1972 and 1983 were reviewed. The series was limited to infants with acute subdural hematoma apparently due to minor head trauma without loss of consciousness, and not associated with cerebral contusion. Twenty-three of the patients were boys, and three were girls, showing a clear male predominance. The patients ranged in age between 3 and 13 months, with an average age of 8.1 months, the majority of patients being between 7 and 10 months old. Most of the patients were brought to the hospital because of generalized tonic convulsion which developed soon after minor head trauma, and all patients had retinal and preretinal hemorrhage. The cases were graded into mild, intermediate, and fulminant types, mainly on the basis of the level of consciousness and motor weakness. Treatment for fulminant

cases was emergency craniotomy, and that for mild cases was subdural tapping alone. For intermediate cases, craniotomy or subdural tapping was selected according to the contents of the hematoma. The follow-up results included death in two cases, mild physical retardation in one case, and epilepsy in one case. The remaining 23 patients showed normal development. The relationship between computerized tomography (CT) findings and clinical grading was analyzed. Because some mild and intermediate cases could be missed on CT, the importance of noting the characteristic clinical course and of funduscopic examination is stressed [10].

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