CASE REPORT
J Korean Neurosurg Soc 39 : 464-466, 2006

Neonatal Cephalohematoma and Epidural Hematoma by Birth Trauma

Seok-Won Chung, M.D., Seong-Hyun Park, M.D., Sung-Kyoo Hwang, M.D.
Department of Neurosurgery, Kyungpook National University Hospital, Daegu, Korea

Cephalohematoma with epidural hematoma(EDH) is a known complication of birth trauma and is usually best managed by observation only. However, this complication may jeopardize a neonatal life because of cranial compromise and hemodynamic instability. It should also be recognized that surgical intervention confers undoubted benefits on patients in some cases. We report a case of massive EDH with cephalohematoma and linear skull fracture, successfully treated with a craniotomy and evacuation of the hematoma.

KEY WORDS : Cephalohematoma · Epidural hematoma · Neonate.

Introduction

Head injury in the neonate produces higher rates of mortality and morbidity than does similar trauma in children and adults. Cephalohematoma is a subperiosteal hemorrhage and occurs as a result of birth trauma in about 1% of live births[5,8]. And epidural hematoma(EDH) is a rare form of neonatal birth injury accounting for 2% of newborn intracranial hemorrhage[1,6,12]. Early diagnosis and precise treatment decision are important, because in most cases appropriate treatment has produced good outcomes. We present here a case of a subacute EDH in a newborn with cephalohematoma and linear skull fracture, that was successfully treated.

Case Report

A male infant was born at 39 weeks to a 31-year-old multipara via vacuum extraction after an uncomplicated pregnancy. He weighed 3000g and had a head circumference of 33cm at birth. Initial Apgar scores were each 9 at 1 and 5 minutes. Initial coagulation parameters were within normal limits. After delivery, a small floating scalp pouch was seen in the right parietal area. One week after delivery, the newborn developed an expanding fluid collection within the right temporoparietal region on the scalp (Fig. 1A). His head circumference grew steadily to 36cm, and the anterior fontanel became full. The newborn became progressively lethargic and anemic.

Plain skull X-rays showed a linear skull fracture in the right parietal area (Fig. 1B). Magnetic resonance(MR) imaging re-

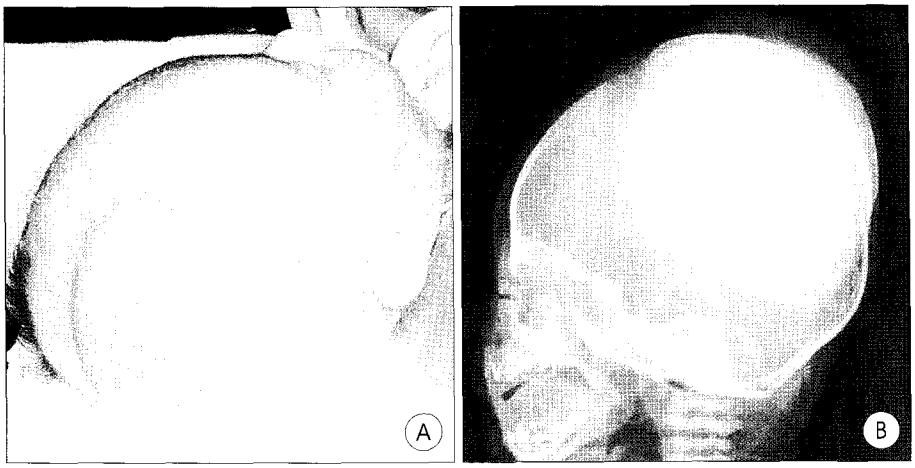

Fig. 1. A cephalohematoma in a 1-week-old newborn with a right parietal bump by vacuum extractor (A). A plain skull X-ray lateral view revealing the linear skull fracture on the right parietal area (B).

• Received : November 14, 2005 • Accepted : December 7, 2005
• Address for reprints : Seong-Hyun Park, M.D., Department of Neurosurgery, Kyungpook National University Hospital, 50 Samdeok 2-ga, Jung-gu, Daegu 700-721, Korea Tel : +82-53-420-5647, Fax : +82-53-423-0504, E-mail : nsdoctor@naver.com

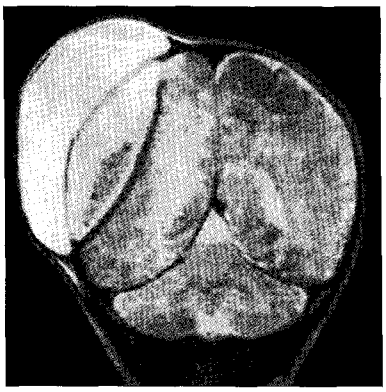

Fig. 2. Magnetic resonance images showing the massive crescent-shaped cephalohematoma and epidural hematoma over the right temporoparietal region with the skull fracture. A tense scalp pouch over the fracture was filled with a subacute hematoma and communicated to the epidural space through the skull fracture. The epidural hematoma contained some mixed signals.

vealed the huge crescent-shaped cephalohematoma communicated to the massive EDH through a fracture of the skull (Fig. 2). The hematoma was hyperintense on T1 and T2 weighted images, showing the characteristics of a subacute hematoma. The EDH had some mixed signals on the basis of a high signal on the T1 and T2 weighted images.

Because of the radiographic feature of the increased intracranial pressure, the neurological deficit, and the massive EDH with some coagulated blood, a decision was made to remove the hematoma immediately. Initially, percutaneous needle aspiration was performed, and about 100cc of liquefied cephalohematoma was removed. At the same time, packed red blood cells were transfused. After a craniotomy was performed (Fig. 3), the EDH was carefully removed. Only a small amount of clot remained in the epidural space. Following removal of the EDH, the dura was then tacked up to the cranium to prevent blood reaccumulation. A Jackson-Pratt drain was inserted during the next 2 days, this drain diverted an additional 15cc of blood. With a combination of hemodynamic resuscitation and vigorous transfusion and evacuation of the hematoma, the neonate made a good recovery. A follow-up computed tomographic(CT) scan revealed no hematoma in the subperiosteal and epidural space. The postoperative course was uneventful, and he was discharged about 2 weeks after the operation.

Fig. 3. Intraoperative photograph showing the periosteum (arrows) and skull fracture (arrow head) before the craniotomy. The cephalohematoma located in the subperiosteal space was aspirated by needle before the linear skin incision.

Discussion

Traumatic head injuries in newborns are known to be associated with higher morbidity and mortality than similar traumatic lesions in children or adults. The incidence of major birth trauma such as fractures is between 1 and 11.7 in every 1000 to 2000 live births[7]. The mode of delivery has been implicated in birth trauma. There is much debate in the obstetric literature regarding the efficacy and safety of vaginal delivery assistive devices, such as forceps and vacuum extractors[11]. In our case, the cephalohematoma and EDH with skull fracture were attributed to the application of excessive suction with a vacuum extractor. Massive EDH with cephalohematoma is a well-recognized life-threatening birth complication and needs to be managed cooperatively because of the hemodynamic collapse and brain compression. If neonates with these complications are diagnosed and operated on in a timely fashion, they can make a good recovery. Needless to say, the team managing these patients needs to be skilled in the resuscitation and anesthesia of critically ill neonates.

Cephalohematoma is a subperiosteal hemorrhage and occurs as a result of birth trauma in about 1% of live births[5,8]. Cephalohematoma is an accumulation of blood between the periosteum and bone; therefore, cranial sutures limit its expansion. However, if a space-restricted cephalohematoma is combined with an EDH communicated through a skull fracture, this is potentially fatal. This hematoma presents as a palpably firm, tense mass that resolves over weeks to months and can calcify and become incorporated in periosteal new bone. Rarely, the breakdown of hemoglobin retained in the tissues may result in hyperbilirubinemia and jaundice, or pallor may ensue from the anemia. The course of a cephalohematoma is variable. It may not be apparent for 24 to 72 hours, it may enlarge over a few days, and it usually resorbs within 4 weeks, although it can take longer. Treatment of the cephalohematoma can begin with head wrapping, which may promote resorption. However, the important thing to do in treatment is careful follow-up of neonates with cephalohematomas. If the neonatal head circumference enlarges, CT or MRI scan should be performed to find another head injury or to make a decision regarding immediate surgical evacuation.

Skull fractures in neonates, although not always easy to detect, are a frequent radiological finding after birth trauma. Skull fractures of the parietal bones have also been reported after the introduction of vacuum extraction[4]. The causes of skull

fractures are a narrow pelvic passage or pressure against the promontory of the sacrum by forceps and vacuum extractors. Anywhere from 5.4% to 25% of linear skull fractures have an associated cephalohematoma[2]. In such patients, a CT or MRI scan should be obtained to rule out an EDH. Blood can easily seep back and forth through the bone fracture and create a collection external (cephalohematoma) or internal (EDH) to the bone, as in our case. The significance of skull fractures among newborns is often underestimated since the majority of these lesions demand no special treatment and heal spontaneously within weeks or months. Additional lesions causing neurological symptoms, such as EDHs, which otherwise occur at a high incidence in association with skull fractures, are less common in newborns because of the adherence of the dura to the inner table of the skull.

Intracranial hemorrhage is the most serious complication related to birth trauma. EDH in the neonate in the case presented here is a rare disorder. Because of the expansibility of the skull and the compliances of the brains of newborns, EDH may initially go undetected. Takagi et al. reported EDHs in only 2 out of 134 autopsies who had neonatal intracranial hemorrhages[9]. And EDH may occur without an associated skull fracture in 30% to 40% of cases[3]. Only a few cases of EDH following vacuum extraction have been reported[1,6]. Only after the EDH has reached significant size do neonates develop signs of increased intracranial pressure. Initially, they may have irritability with a full fontanelle and increasing head circumference. Later, they may develop signs of brain compression. Since the bleeding is often venous, these hematomas evolve slowly, and the clinical presentation of EDH in newborns can be less dramatic than in adults. Aggressive early imaging is recommended when this injury is suspected.

Management in neonatal head injury consists chiefly of restoring the circulating blood volume and cranial decompression. Correction of anemia with transfusion of appropriate blood products is necessary. Head circumference, systemic blood pressure, urine output, and other hemodynamic parameters must be followed closely. Surgical removal of the hematoma is indicated in rare cases of cranial compression accompanied by neurological deterioration, such as in the patient presented in this report. As far as surgical treatment is concerned, there are two approaches : craniotomy and evacuation or puncture and aspiration. Needle aspiration after puncture of the cephalohematoma has been described in some reports[10,12]. The success of this method has been attributed to the connection between the EDH and the overlying cephalohematoma. Aspiration also may be followed by blood reaccumulation, thus potentially increasing the requirement for transfusion, and may also increase the risk of infection. The authors expected the hematoma's density and stage due to the MR images. The cephalohematoma with a homogeneous high signal on the T1 and T2 weighed images was in the well liquefied state as a subacute stage however, the EDH was expected to have a coagulated portion due to mixed signals in the hematoma. Although puncture and aspiration might have been attempted in our case with the hematoma communicated to the skull fracture, we performed a craniotomy and evacuation of the hematoma because of the nature of the EDH based on the MR imaging, the amount of hematoma, and the neurological deficit.

Conclusion

The authors' early recognition of EDH in neonates led to the rapid hemodynamic resuscitation and surgical evacuation before irreversible events ensued. As with all surgical intervention in newborns, an experienced surgical and anesthesia team is mandatory for careful hemostasis and blood replacement.

References

1. Akiyama Y, Moritake K, Maruyama N, Takamura M, Yamasaki T : Acute epidural hematoma related to cesarean section in a neonate with Chiari II malformation. **Childs Nerv Syst 17** : 290-293, 2001
2. Curran JS : Birth-associated injury. **Clin Perinatol 8** : 111-129, 1981
3. Faix RG, Donn SM : Immediate management of the traumatized infant. **Clin Perinatol 10** : 487-505, 1983
4. Govaert P, Vanhaesebrouck P, De Praeter C, Moens K, Leroy J : Vacuum extraction, bone injury and neonatal subgaleal bleeding. **Eur J Pediatr 151** : 532-535, 1992
5. LeBlanc CM, Allen UD, Ventureyra E : Cephalohematomas revisited. **Clin Pediatr 34** : 86-89, 1995
6. Okuno T, Miyamoto M, Itakura T, Ueno M, Shimizu M, Minamide A, et al : A case of epidural hematoma caused by vacuum extraction without any skull fractures and accompanied cephalohematoma. **No Shinkei Geka 21** : 1137-1141, 1993
7. Puza S, Roth N, Macones GA, Mennuti MT, Morgan MA : Does cesarean section decrease the incidence of major birth trauma? **J Perinatol 18** : 9-12, 1998
8. Sohn HC, Kim Y, Choi KS, Chu JW, Sim BS : Cephalohematoma associated with the temporal meningocele and hemicranial dysplasia. **J Korean Neurosurg Soc 1** : 208-212, 1972
9. Takagi T, Nagai R, Wakabayashi S, Mizawa I, Hayashi K : Extradural hemorrhage in the newborn as a results of birth trauma. **Childs Brain 4** : 306-318, 1978
10. Vachharajani A, Mathur A : Ultrasound-guided needle aspiration of cranial epidural hematoma in a neonate : treating a rare complication of vacuum extraction. **Am J Perinatol 19** : 401-404, 2002
11. Williams MC : Vacuum-assisted delivery. **Clin Perinatol 22** : 933-952, 1995
12. Yamamoto T, Enomoto T, Nose T : Epidural hematoma associated with cephalohematoma in a neonate-case report. **Neurol Med Chir 35** : 749-752, 1995