

Ultrasound-guided Needle Aspiration of Cranial Epidural Hematoma in a Neonate

Dong Hoon Lee, M.D.,¹ Sang Weon Lee, M.D.,¹ Tae Hong Lee, M.D.,² Ji Eun Ban, M.D.³

Departments of Neurosurgery,¹ Radiology,² Pediatrics,³ School of Medicine, Pusan National University, Busan, Korea

We report a unique case of a neonate with an epidural hematoma induced by vacuum extraction. The epidural hematoma, communicating with a cephalhematoma through a linear skull fracture, disappeared after ultrasound-guided needle aspiration. The patient quickly recovered and one month later computed tomography revealed a complete resolution of the epidural hematoma.

KEY WORDS : Epidural hematoma · Needle aspiration · Neonate.

Introduction

Epidural hematoma(EDH) is considered to be rare in neonates, being a rare form of neonatal birth injury accounting for 2% of newborn intracranial hemorrhage. We report a case of ultrasound-guided needle aspiration of EDH in a neonate who suffered a cephalhematoma and an EDH as a complication of vacuum extraction.

Case Report

History

A female infant was born at 39 weeks to a primigravida mother after a normal antenatal screen. The pregnancy was uncomplicated. The infant was delivered vaginally with a vertex presentation and the aid of a vacuum extractor. The newborn child weighed 3,180g and the Apgar score was 8 at 1 min. No problem occurred until 7 days after birth, when the cephalhematoma in the right parietal region was recognized. On the 8th day, the patient was brought to our hospital because the size of the cephalhematoma had increased. The patient exhibited irritability with tense anterior fontanel. The cephalhematoma, 6.5×7.5cm, was found in the right parietal region. Body temperature was 37°C, heart rate was 135/min, and respiratory rate was 45/min. The results of a platelet and clotting study were also within the normal limits. Cranial computed tomography(CT) revealed the cephalhematoma, a linear skull

fracture, and the 7×3.5×6cm-sized EDH (Fig. 1). The CT also showed that the EDH was of mixed high and low density.

Intervention

Using a sterile technique and topical anesthesia, the patient was placed in supine position. The first needle (16 gauge Medicut®) was inserted into the cephalhematoma, and the second needle was inserted into the EDH through the fracture gap under ultrasound guidance over cephalhematoma (Fig. 2A). Dark reddish liquefied blood amounting to 70ml was aspirated from the cephalhematoma, but the volume of the EDH was not decreased, so the EDH was aspirated under continual ultrasound guidance over anterior fontanelle(Fig. 2B). Dark reddish liquefied blood similar to that from the cephalhematoma, amounting to 60ml, was aspirated. The tense anterior fontanel immediately depressed, and the bulged scalp became flattened. The patient was tolerable during the procedure.

Postoperative course

In a postoperative CT, the cephalhematoma was totally removed, but a residual EDH, a high density lesion 5×1×4cm in size, was recognized (Fig. 3). In serial ultrasonography, the EDH was gradually resolved without reaccumulation (Fig. 4). The patient recovered quickly and did not have clinical seizures, but was loaded with phenobarbital. Scalp swelling and bluish discoloration gradually subsided over 2 weeks.

After 1 month, CT revealed complete resolution of the residual

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• Address for reprints : Sang Weon Lee, M.D., Department of Neurosurgery, School of Medicine, Pusan National University, 1-10 Ami-dong, Seo-gu, Busan 602-739, Korea Tel : +82-51-240-7257, 247-0244, Fax : +82-51-244-0282, E-mail : md@medimail.co.kr

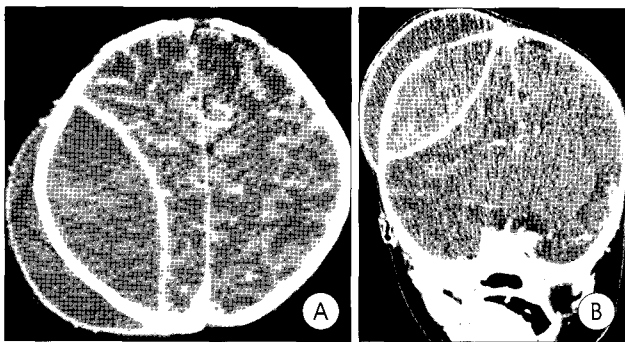


Fig. 1. Preoperative axial computed tomography shows a 7×3.5×6cm lentiform mixed-density lesion in the right parietal region(A). Coronal reformation computed tomography demonstrates cephalhematoma and epidural hematoma with combined skull fracture(B).

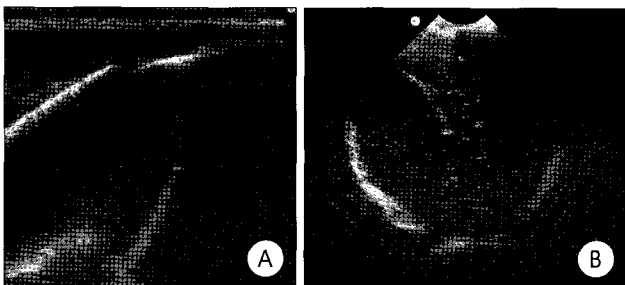


Fig. 2. Intraoperative ultrasonography shows fracture gap(A) and lentiform epidural hematoma(B).



Fig. 3. Postoperative computed tomography demonstrates residual high-density lesion.

enrichment^{9,12}), but EDH following vacuum extraction is rare in neonates. Takagi et al.¹¹) observed EDH in only 2 of 134 autopsied patients with neonatal intracranial hemorrhage and a review by Merry et al.⁶) revealed only 1 neonate among 417 patients with EDHs in all ages.

EDH is a collection of blood between the inner cortical bone and the periosteal layer of the dura. The rarity of EDHs in neonates as compared with children or adults might be explained by the absence of the middle meningeal artery groove, which makes the middle meningeal artery less susceptible to injury⁴) and by the tight attachment between the dural membrane and periosteum and the poor development of the dura mater vessels in neonates which makes the formation of EDH unlikely⁸).

EDH (Fig. 5), and the patient had no clinical seizures and neurological deficit.

Discussion

Vaccum extraction is associated with subgaleal hemorrhage, subdural, subarachnoid and/ or parenchymal hemorrhage^{9,12}), but EDH following vacuum extraction is rare in neonates.

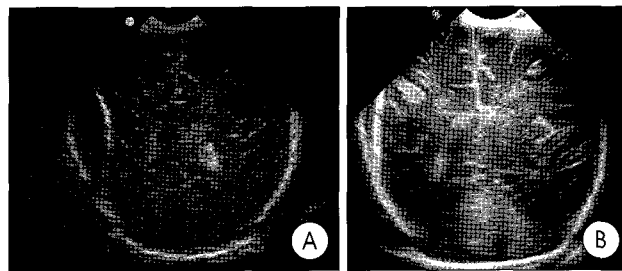


Fig. 4. Postoperative serial ultrasonography shows residual epidural hematoma (A : postoperative day 3) and decreased amount of previous hematoma (B : postoperative day 10).

When accompanied by linear skull fracture, overriding of fracture segments and tearing of branches of the middle meningeal artery or large venous sinuses are the probable causes of EDH⁴). EDH occurs without associated skull fracture in 30~40% of cases³). Owing to

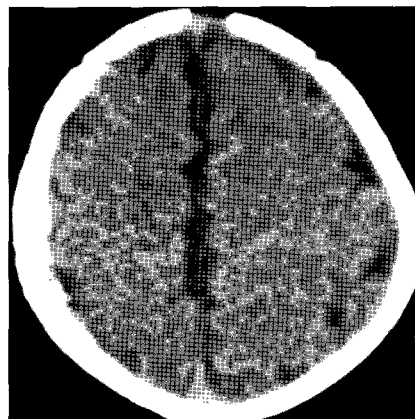


Fig. 5. Postoperative 1 month computed tomography reveals complete resolution of epidural hematoma.

its pliable nature, the neonatal skull might distort without fracturing, thereby tearing the dura away from the undersurface of the cranium. Small EDH less than 1cm thick can be treated conservatively with serial surveillance CT scans. Surgical treatment consists of an open craniotomy with evacuation of the hematoma. The dura is then tacked up to the cranium to prevent reaccumulation of blood²).

It is generally considered that cephalhematoma will resolve spontaneously and that a small amount of EDH communicating with the cephalhematoma might be resolved spontaneously as well.

Needle aspiration of acute subdural hematomas in infant has been described^{5,10}). Percutaneous aspiration through open suture has obviated the need for open drainage. Subdural hematoma is distinct from EDH in that it might become mixed with cerebrospinal fluid and hence be amenable to needle aspiration. By contrast, EDH has a tendency to be semisolid and hence not as treatable by needle aspiration¹³).

When the patient presented at our hospital, the cephalhematoma was the main complaint, and the linear skull fracture and EDH were detected by neuroradiological investigation. It is reasonable to assume that the cephalhematoma spread to an epidural space through a fracture gap because the major portion of the EDH was liquid with a density that was proved by CT

scans to be identical to that of the cephalhematoma.

According to a literature review^{1,7)}, in the case of EDH communicating with cephalhematoma in a neonate, only the aspiration of the cephalhematoma can resolve the EDH. But in our case, after the aspiration of cephalhematoma, a large portion of the EDH remained, so additional aspiration of the EDH was necessary.

Conclusion

For the management of EDH in a neonate, ultrasound-guided needle aspiration was safe and effective in our case.

In selected cases, ultrasound-guided needle aspiration is considered to be the first treatment modality of neonate EDH.

However, because EDH is typically caused by an arterial injury and hence carries a risk of recurrence due to uncontrolled arterial hemorrhage, ultrasound needle aspiration is not a standard form of treatment.

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