Epidural Hematoma

Definition
An epidural or extradural hematoma/hemorrhage is an accumulation of blood in between the skull bone and the dura mater.

Epidemiology
Traumatic brain injury is the leading cause of EDH. 11.3% of patients that have a traumatic brain injury develop an epidural hematoma (EDH). The peak age for EDH is between 20 and 30 year-old. Males have higher incidences of developing EDH than females.

Pathophysiology
The dura mater is a double-layer fibrous membrane, made up of the periosteal dura and the meningeal dura. Anatomically, the periosteal dura is adhered to the inner surface of the skull bone and has no physical space (epidural space). In an EDH, the hematoma “pushes” the dura mater away from the inner table of the skull bone and forms the biconvex shaped hematoma.

Epidural hematomas are the result of bleeding from the arterial or venous blood vessels, or bone fractures. Most EDHs are associated with skull fracture and occur in the parietal temporal region.

Nontraumatic EDH is rare. Infection or diseases such as lupus erythematosus that weaken the meningeal blood vessels, blood diseases (sickle cell disease), or coagulopathy are believed to be causes of nontraumatic EDH.

An EDH can occur immediately after a head injury, or it can occur hours or days after the initial injury. When EDH is developed after the initial negative CT scan, it is called a delayed epidural hematoma (DEDH).

Manifestations
The classic presentation for patients with EDH is a brief period of decreased level of consciousness or loss of consciousness at the time of injury, followed by a temporary lucid period of few minutes to several hours without any neurological symptoms. If the EDH expands and compresses the brain stem, the patient will deteriorate and have an altered level of consciousness after the lucid period. This classic presentation only occurs in less than half of patients with EDH. Approximately 58% of patients with EDH become unconscious after head injuries, and some patients remained unconscious after injury.

Other manifestations of EDH are headache, lethargy and the mass effect from the hematoma. The side effects include headache, ipsilateral papillary dilation, contralateral hemiparesis, and changes in level of consciousness.

Diagnostic Tests
The diagnosis of EDH can be made based on the patient’s history, clinical presentation and neuroradiological investigations such as skull X-ray or a CT scan. A skull X-ray may not be able to rule out EDH, however, it is useful in revealing skull fractures that could be associated with EDH. If any fracture is identified in the skull X-ray, a CT scan of the head should be performed.

Computed tomography (CT) scan or MRI can detect an early EDH. CT scan is fast, non-invasive and able to show the size and location of the hematoma as well as any other fracture or injury. Early CT scans may not be able to identify EDH. Delayed EDH may occur many hours after injury, therefore repeat CT scans are required when there are any changes to the patient’s neurological status.

CT scan showing a left epidural hematoma (arrow)

Treatment Options
Depending on the size and location of the EDH and neurological condition of the patient, treatment options range from conservative to surgical interventions. Conservative treatment is appropriate for patients with a small and isolated hematoma with no clinical signs of neurological deterioration. However, delayed EDH may occur hours after the initial injury. Without prompt interventions, delayed EDH can be fatal or cause severe neurological deficits. Close observation and repeated CT scan are essential within 24 hours or when clinical deterioration is detected.

Patients with herniation due to mass effect of the EDH require immediate surgical intervention. Other indications for surgery include the patient’s Glasgow
Coma Score, altered mental status, pupillary asymmetry, abnormal flexion, and neurological deterioration. Surgical interventions include craniectomy, craniotomy, or burr hole to remove the EDH. Performing a craniectomy provides better exposure to evacuate the EDH, discover the bleeding source, and control bleeding.

**Nursing Implications**

Epidural hematomas can be difficult to recognize because the patient may not have a loss of consciousness. Even patients who lose consciousness, for brief periods, the patient usually has a normal neurological examination after regaining consciousness. Patients with delayed EDH may not have any warning signs and can deteriorate very rapidly.

When patients develop herniation, delayed treatment can increase the risk of permanent neurological damage or death. Early intervention has demonstrated a favorable outcome even for patients with larger EDH, therefore close monitoring of patient's neurological status and vital signs is essential.

Vomiting can be a sign of mass effect in the medulla and may indicate deterioration for patients with EDH. Vomiting may also induce more hemorrhaging because of increased venous pressure during vomiting. Reassess the patient's neurological signs and administer an anti-emetic agent when the patient complains of nausea and vomiting. An urgent CT scan may be required to assess possible DEDH or expansion of the EDH.

If the patient presents with herniation or any signs of increased ICP such as altered level of consciousness, non-reactive pupils, pupillary asymmetry, hemiparesis or vomiting, nurses should notify the patient's physician immediately. Closely monitor the patient's condition, maintain a patent airway, administer supplementary oxygen if required, and to prepare for a CT scan, administration of a hypertonic solution, and be prepared for a possible emergency surgery.

**Reference**


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