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Development of Delayed Epidural Hematoma

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Delayed epidural hematomas are not often seen in head injury victims. Two cases of such epidural hematomas that developed after evacuation of contralateral subdural hematomas are reported. We discuss the value of postoperative computed tomography (CT) on patients undergoing prior decompressive surgery for traumatic lesions and the need for plain skull radiography.

Case Reports

Case 1

A 24-year-old man was brought to the emergency room after a beating to the head with a baseball bat. At the time of admission he was noted to have a dilated right pupil and abnormal extensor responses bilaterally. The initial CT scan revealed a large, right, acute, subdural hematoma with appropriate right-to-left shift of the midline structures (fig. 1A). He underwent a decompressive craniotomy with evacuation of the subdural hematoma. Failure to improve neurologically at 24 hr after surgery led to a repeat CT examination. It revealed a large, left, acute, epidural hematoma (fig. 1B). A left frontotemporoparietal craniotomy and evacuation of the clot was performed. At operation a left temporal bone fracture also was noted. The patient made a slow neurologic recovery.

Case 2

A 37-year-old man was assaulted and brought to the emergency room in a comatose state. An emergency CT scan revealed a subdural hematoma along the right frontoparietal convexity (fig. 2). It was evacuated by a right frontotemporal craniotomy. After operation the patient did not improve. His left pupil was dilated and unreactive 14 hr later. He died soon afterwards. At autopsy a left temporal epidural hematoma measuring about 100 ml was found. In addition, a left temporal skull fracture through the middle meningeal arterial groove was found.

Discussion

The development of delayed traumatic intracerebral and subdural hematomas is well recognized with the widespread use of CT [1-7]. Delayed hemorrhage into the epidural space, however, is not well documented except for one report. Koulouris and Rizzoli [8] reported the case of a delayed epidural hematoma that developed after evacuation of a contralateral frontal venous epidural hematoma. A linear skull fracture was discovered at surgery on the side of the delayed lesion. Soni [9] reported the development of bilateral epidural hematomas presenting at different intervals after head injury. Overlying both were skull fractures not initially recognized. CT was not available at the time.

Our epidural hematomas were not present on initial CT and developed within 24 hr of evacuation of a contralateral subdural hematoma. The epidural lesions were apparently responsible for the failure of improvement in neurologic status of the patients after surgery.

The phenomenon of delayed traumatic intracerebral hematomas has been noted especially after decompressive surgery for the initial lesions. It has been suggested that the original mass effect tamponades injured vessels until surgical decompression [3, 4]. This may also be the case in the formation of delayed epidural hematomas. Ford and McLaurin [10] showed that a critical area of dura must be separated from the overlying bone during injury and that the hematoma forms when this area is acted upon by an arterial bleeder. It may be that the mass effect caused by the subdural hematoma prevents dural separation until surgical decompression occurs.

In all three cases of delayed epidural hemorrhage (including the previously reported one) an overlying linear skull fracture was present. Because of its sensitivity for the detection of acute traumatic intracranial lesions, CT became the primary radiologic method of investigation. If CT reveals a mass lesion requiring immediate decompressive surgery, skull radiography may be neglected. Although depressed fractures of calvarium may easily be seen on CT, partial volume effect and the finite size of the pixel may prevent the detection of linear fractures of the skull vault and base. Considerable controversy exists in the literature about the effectiveness of skull radiography in head trauma [11-13]. Further, the significance of detecting linear skull fractures in the management and outcome of head injury patients was questioned by other investigators [14].

Although it is true that a skull fracture and brain injury

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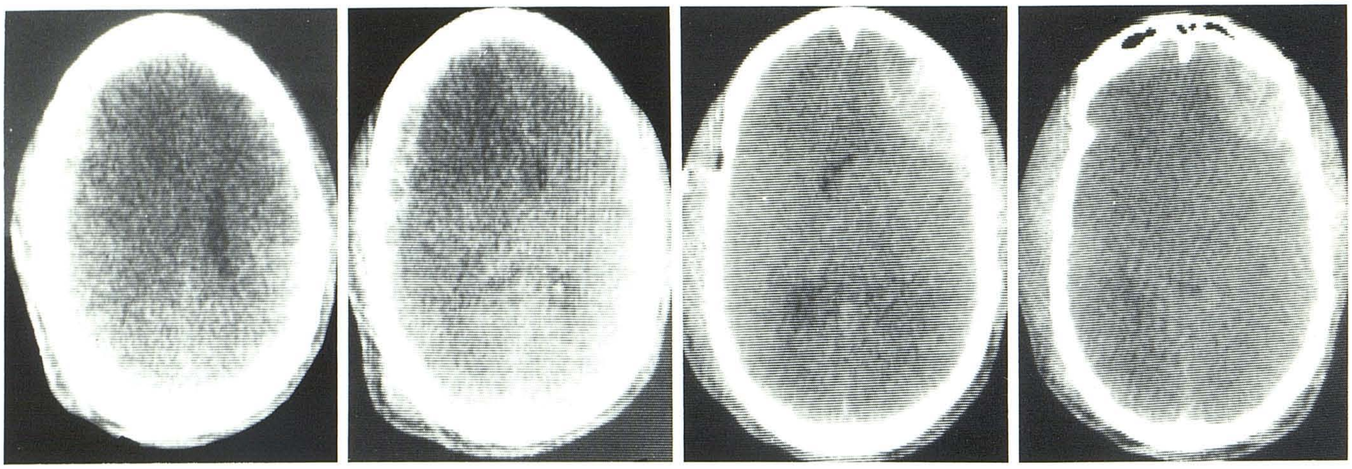

A B

Fig. 1.—Case 1. **A**, Initial scan. Right frontoparietal subdural hematoma. Appropriate midline shift. **B**, Postoperative scan. Large left frontal epidural hematoma. Original subdural hematoma no longer present.

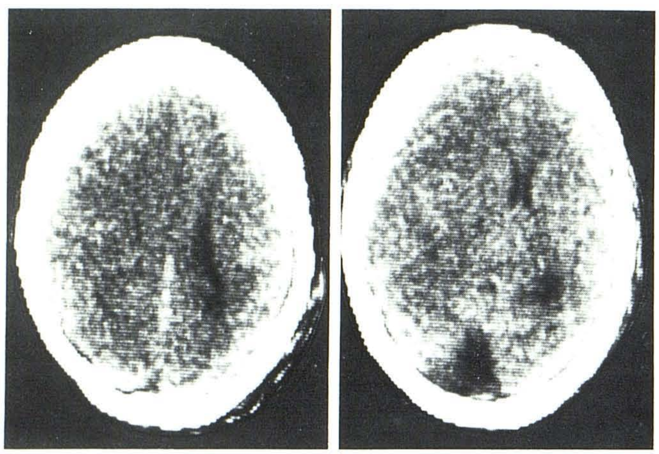

Fig. 2.—Case 2. Initial scan. Right subdural hematoma with shift of midline structures.

may or may not be associated with each other in a given patient, recognition of the presence of fracture is important. In one series of head trauma patients studied by CT, two-thirds of skull fractures were associated with significant intracranial lesions [15]. Skull fractures were also present in 80 of 100 consecutive autopsy cases of head injuries [16]. In addition to the prognostic implications, skull fracture may be the only indication as to the severity of blow sustained by the calvarium even if there is no structural damage of brain on CT or by clinical evaluation. It is probably more important to obtain plain skull radiographs under such circumstances, so that one can observe the patient for fracture-related complications such as infection and hemorrhage [17].

Although uncommon, delayed epidural hemorrhage may develop as a complication of fracture after decompressive surgery, as shown by our two cases. This phenomenon underscores another reason for skull radiography even if CT is performed and shows a lesion requiring immediate surgery. Skull films can be obtained subsequently to detect fractures since epidural hematomas are eminently treatable with prompt diagnosis and evacuation [18].

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