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## **Fractures of the Infant Skull Caused by Animal Bites**

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# Fractures of the Infant Skull Caused by Animal Bites

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Animal bites are extremely common in the United States and their incidence is increasing [1-5]. Dog bites are most common, usually producing variable flesh wounds without bony injury. Reports of fractures from bites are difficult to find. However, canine bites present a special hazard to the infant skull which is relatively thin and incompletely mineralized. One compound depressed skull fracture from a dog's tooth has been reported [6]. We have recently seen two infants with multiple depressed skull fractures from the teeth of a dog and a pet wolf puppy. The radiographic appearance of the fractures is highly unusual and possibly distinctive.

## Case Reports

### Case 1

An 8-month-old girl under direct observation of her mother was attacked without apparent provocation by the family dog, a 5-year-old golden retriever. In the emergency room, the child was found to have multiple lacerations of the scalp and left side of the neck. Because of an apparent right parietal depressed skull fracture, skull radiographs were obtained. Additional depressed fragments at multiple sites were then discovered in the right parietal and left occipital bones as well as a linear right parietal fracture (figs. 1A and 1B). Computed tomography confirmed the fractures without additional abnormalities. At operation, the multiple fragments were removed without difficulty, but one depressed fragment was found lodged in the superior sagittal sinus. Considerable blood loss occurred during its removal. Postoperatively, gross hematuria developed. Blood studies indicated disseminated intravascular coagulation, and treatment with fresh frozen plasma was begun. She had a seizure 10 hr later and was found to have a dilated right pupil. Another CT study demonstrated new bilateral intracerebral hemorrhages with subdural extension of hemorrhage on the right (figs. 1C and 1D). The subdural hematoma was evacuated but bleeding difficulties recurred postoperatively. Cardiopulmonary arrest followed and she could not be resuscitated. A postmortem examination demonstrated extensive bilateral subdural hematomas in continuity with bilateral intracerebral hematomas.

### Case 2

A 4-month-old boy was left briefly by his mother on the floor of an empty room. She returned to discover a 4-month-old pet wolf attacking the infant, grasping the head in its jaws and shaking vigorously. In the emergency room, the child was found to be unconscious and bleeding from wounds to the head and neck. He

was transferred to our institution and had regained consciousness by admission. Scattered lacerations were visible over the calvarium, left neck, left eyelid, and right ear. Skull films demonstrated multiple depressed skull fractures of the right frontal and parietal bones (fig. 2). The depressed fragments were removed under general anesthesia. Exploration of the left neck wound showed complete transection of the left vertebral artery although bleeding had stopped. Subsequently, he was found to have complete paralysis of the left side of the diaphragm and of the left deltoid and biceps muscles secondary to phrenic nerve and brachial plexus injury. Recurrent episodes of atelectasis and infection in the ensuing 2 months required surgical plication of the left side of the diaphragm. He is now doing well except for persistent nerve palsies. Follow-up skull films 6 months later showed satisfactory healing of the fractures.

## Discussion

At least 1 million people are bitten by animals in the United States each year [5]. Most are dog bites involving the extremities [1]. However, children have a high incidence of bites to the head and face, and the smaller the child, the greater the risk. Below age 5, about one-third of all dog bites involve the head and face [1]. Bite wounds in these areas, particularly from large animals, may be serious or even fatal. However, fractures are rarely caused by bites. Most studies of bite injuries do not even mention the possibility of fracture. There is a single case report of a mandibular fracture from a dog bite and another single case of a solitary depressed fracture of the skull due to a dog bite [6, 7].

In both of our cases, the infant's head was grasped in the vise of a canine's jaws with great pressure applied to small areas at the points of the teeth. The resultant depressed fracture fragments were therefore small but multiple and scattered over more than one skull region. The puncture wounds of the skin were small relative to the depth of the injury, and in each case a careful search of the skull films revealed more depressed fractures than were suspected by initial clinical assessment. Some of the puncture holes were nearly circular while others were more elongated. Several elongated holes in parallel probably resulted from teeth slipping together as the animal shook its victim.

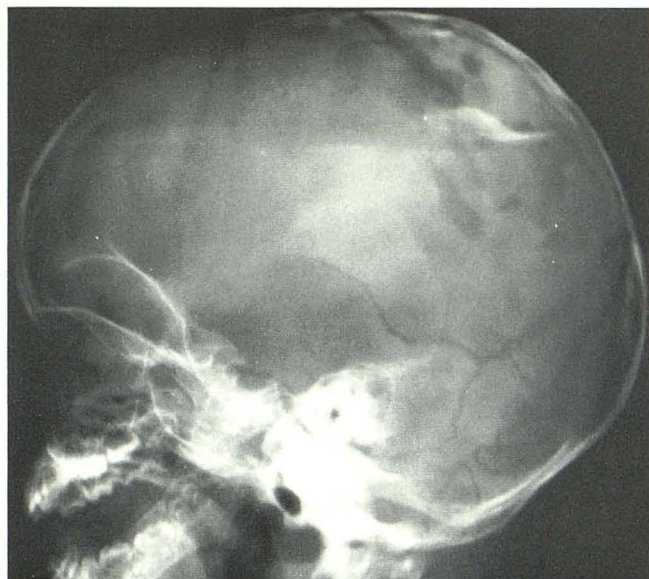
The multiplicity, size, shape, and distribution of these compound depressed fractures in the infant skull provide a

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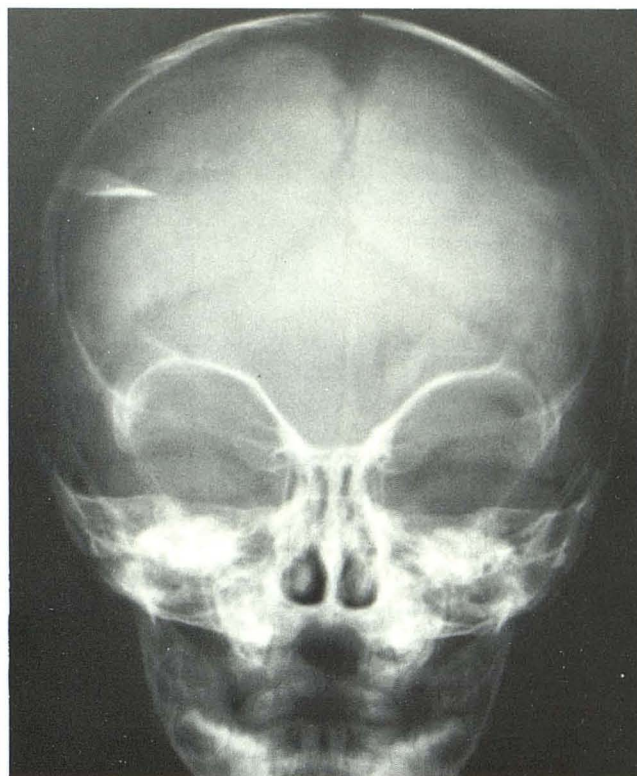
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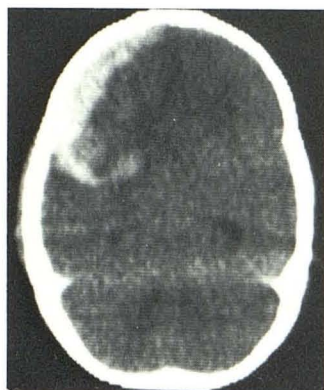




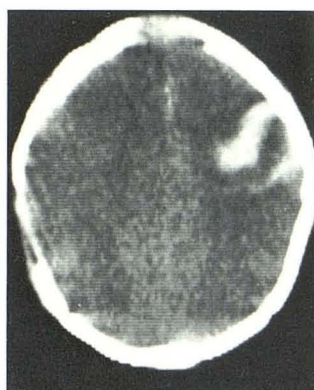
A



B



C



D

Fig. 1.—Case 1. A and B, Linear right parietal fracture. Multiple depressed fractures in right parietal bone and single depressed fracture in left occipital bone. Many bony defects are circular; some are elongated and parallel. C and D, CT scans after onset of disseminated intravascular coagulation. C, Small right intracerebral hematoma extends into much larger frontoparietal subdural hematoma. D, Left intracerebral hematoma extends to cortical surface.

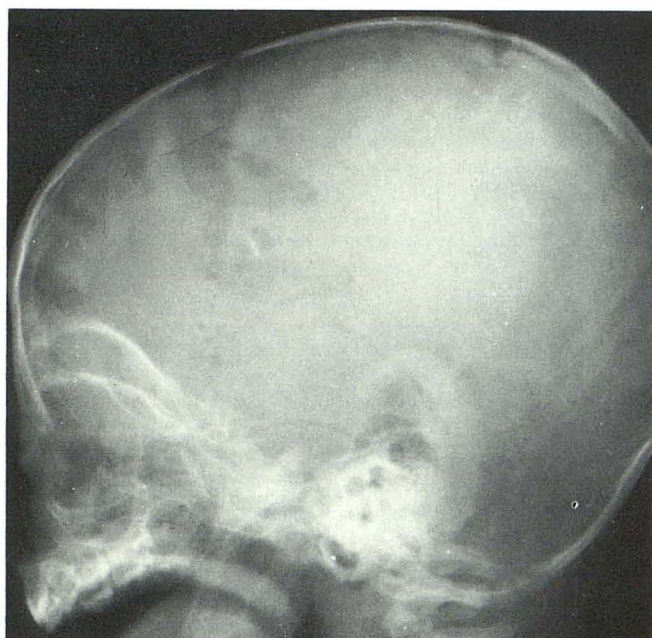


Fig. 2.—Case 2. Multiple depressed fractures in right frontal and parietal bones. Most bony defects are elongated and parallel; some are more circular.

sufficiently distinctive pattern to suggest the cause even without clinical history. The concomitant increasing pet population and incidence of animal bites suggest that more injuries of this type may be seen in the future.

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