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The Identification of Battered-Infant Skeletons

The physical anthropologist dealing with forensic cases often examines the skeletons of children who have died either from accidental or natural causes or under circumstances suspicious of homicide. Also, the skeletal remains of infants and children of prehistoric populations are commonly examined. However, even experienced forensic anthropologists are not always familiar with the skeletal signs of an increasingly common phenomenon: the battered child [1-4]. It is improbable that a case of child abuse that did not result in fractures would be detected in skeletal remains, but severe cases involving multiple antemortem fractures in various stages of healing in anatomically regional patterns should be sufficient indication of prolonged, severe child abuse. If numerous fractures occurring about the time of death are present, the possibility of homicide must be considered. The following case is unusual in that three infants from the same family showed evidence of severe abuse and possible homicide.

During part of a routine discussion of family size with their new teacher, two children who had recently moved into the school district casually mentioned that they had had three other siblings but that their mother and father had killed them. When questioned, the mother stated that the father had indeed killed three of their children and that she had helped him bury them in the basement and backyard where they had been living at the time. Police in the original jurisdiction recovered the three small bundles, wrapped in baby blankets and containing bones, in the areas where the mother indicated that the bodies had been buried. One of these was recovered under some trees in the backyard, and the other two were dug out of the dirt of the basement floor.

When the remains were received at the University of Maryland Forensic Anthropology Laboratory, the box contained three separate body bags, each of which contained human infant remains still wrapped in baby blankets (Fig. 1). Each bag contained diaper pins and remnants of diaper covers or parts of the diapering material in situ in the pelvic area (Fig. 2). The skeletal remains were virtually intact, and most of the bones were in proper anatomic alignment. It appeared that the infants had simply been wrapped in their crib blankets and placed in the ground at the time of death. Remnants of head hair adhering to the frontal and parietal bones indicated that the hair color was dark brown and the hair was in the form of moderately loose curls. Although all the bones were present, some postmortem erosion or decomposition had affected the ends of some of the long bones. All three bags were quite moist when they arrived at the laboratory.

Ages at the time of death were estimated from the general size and maturity of the bones present and the measured lengths of such long bones as were appropriate. The long bone measurements were compared with both published and unpublished charts indicating the approximate length of the intermetaphyseal lengths of those bones.

The remains marked "Body C" were processed first and appeared to have been buried longer than the other two skeletons. There were numerous roots growing through the

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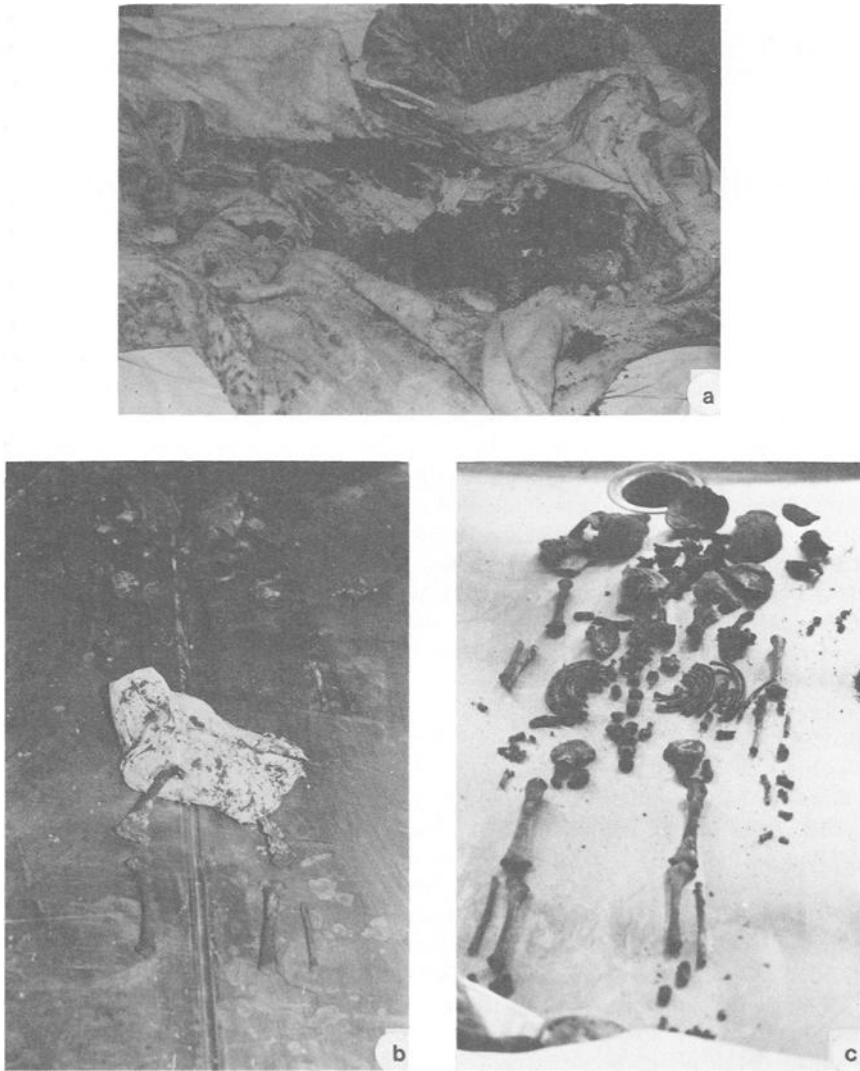


FIG. 1—Remains of *Body A* (a), *Body B* (b), and *Body C* (c).

blanket that enclosed the body and penetrating into some of the foramina in the infant bones (Fig. 3). The blanket itself was a uniform dark-gray color, and the fibers had begun to loosen in the weave. These remains had been recovered from the grave in the backyard and appeared to have been in the ground for approximately four or five years. On the basis of the length of the long bones, *Body C* was estimated to have been approximately three months of age. The sciatic notch was wider in these remains than in the other two, but the suggestion made that these might be remains of a female infant was accompanied by a warning that it is very difficult to determine sex in infants and children under the age of puberty and that any such estimation would be unreliable.

There were multiple fractures throughout the skeleton, most of which were clearly postmortem. From the groundwater stain of the fractured edges it was determined that a few of the fractures might have occurred at the time of death. In addition, there was a

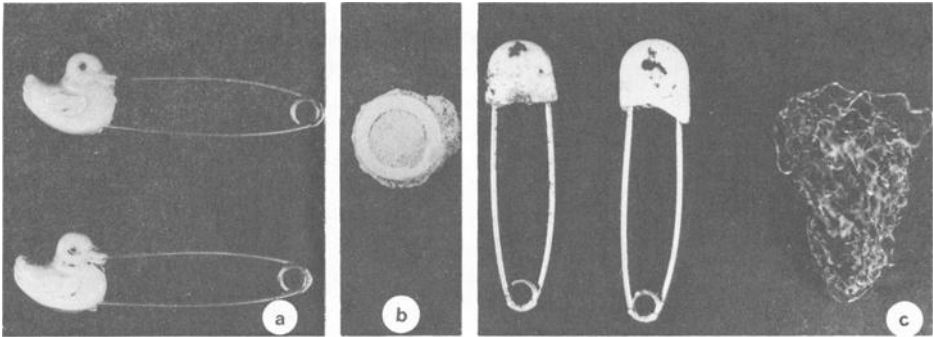


FIG. 2.—Diaper pins and snap from diaper cover as removed from Body A (a) and Body C (b and c).

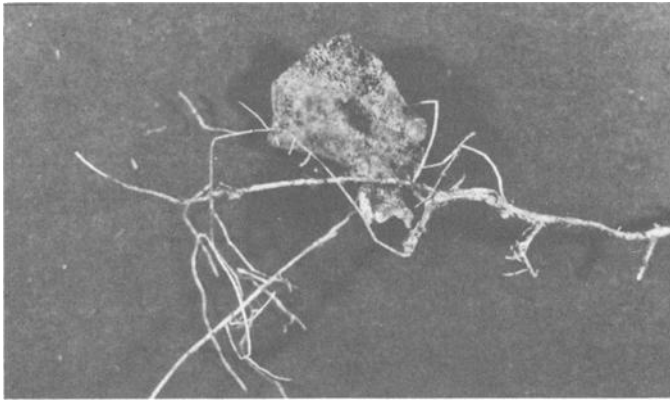


FIG. 3.—Petrous portion of temporal bone from Body C with roots growing around it.

healing fracture of the lingual aspect of the right mandible in the general vicinity of the gonial angle and just back of the second premolar (Fig. 4). It appeared that this fracture had been in the process of healing for about two weeks prior to the time of death. Since only the lingual aspect showed clear signs of fracture, it appeared that this was a greenstick fracture resulting from force applied to the outside of the face in that area.

Body B was recovered from the basement of the house underneath the remains designated Body A. There were rather few roots penetrating the bundles of blanket and bones in these two cases, and such roots as were present were rather small and colorless. In the

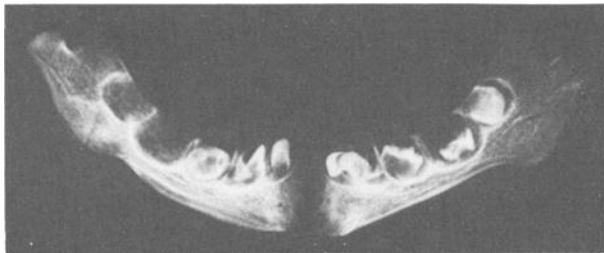


FIG. 4.—Radiograph of mandible of Body C showing antemortem healing unilateral fracture.

case of Body B, the hair was dark brown and loosely curled. It appeared that the body had been in the ground between two and five years because it was buried for less time than Body C and was clearly in the ground longer than Body A. The age at the time of death of Body B was approximately three months after birth. This estimate was based on the measured length of long bones. There were multiple fractures, most of which appeared to have been recent and postmortem. There was one fracture of the right mandible at the same location as the healing fracture in Body C. This fracture appeared to have occurred at about the time of death, or at least burial. There were also fractures of the right radius and ulna. There were healing fractures of the left side of the rib cage that had occurred soon before the time of death (Fig. 5) and were clearly antemortem. There was also a

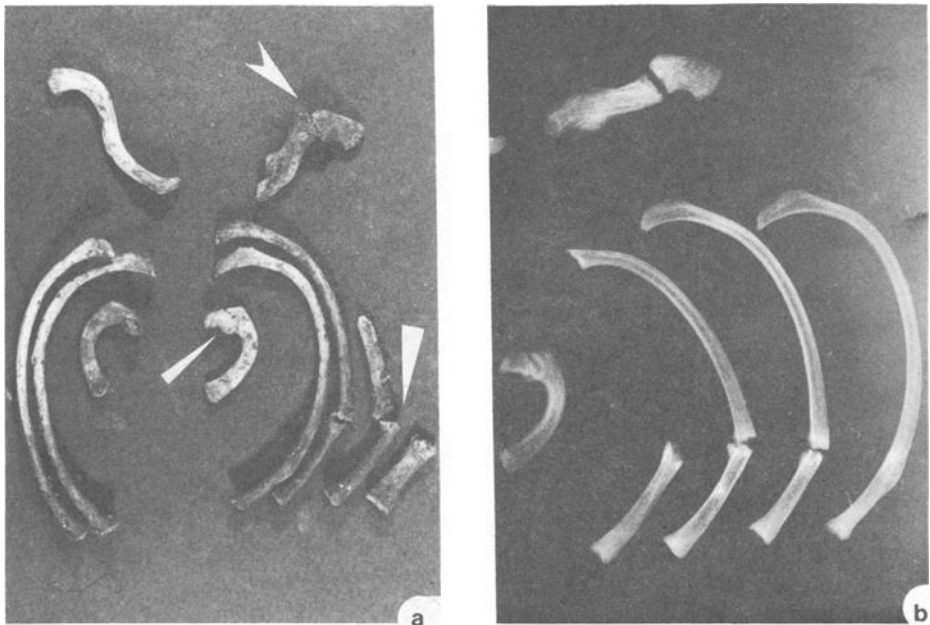


FIG. 5—(a) Ribs and clavicle of Body B. (b) Radiograph showing healing fractures.

healing fracture of the left clavicle that appeared to have occurred about the same time as those of the rib cage. However, the left clavicle appeared to have been fractured and to have healed prior to the more recent fracture. This would indicate trauma to the clavicle on two separate occasions.

Body A was clearly the most recent burial of the three. The blankets wrapping the body were in a good state of preservation and the colorful patterns were very clear. There was some caseous material inside the "diaper," and there were virtually no roots attempting to penetrate the blanket wrap. A scrap of infant blanket had been used as a diaper, and the diaper cover was intact. As a matter of possible interest, both of the diaper pins were blue in color, as is common practice in swaddling male infants. The sciatic notch in these remains was also narrow when compared to that of Body C. The age at the time of death was estimated as being five to six months after birth, based on dentition and measured long bone lengths.

There were healing antemortem fractures of the right clavicle and several ribs in the left rib cage (Fig. 6). These were in one major area, however. Although these fractures

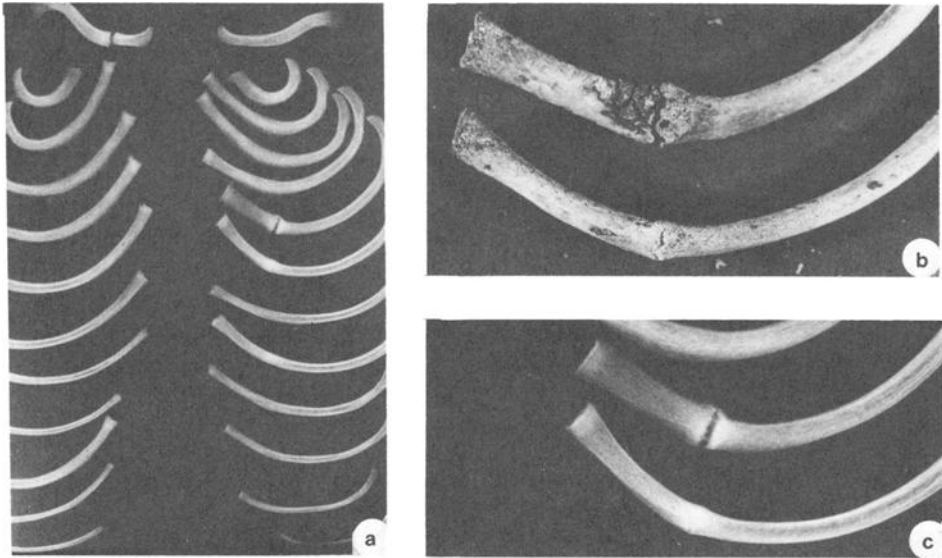


FIG. 6—Ribs and clavicles of Body A: (a) general distribution of fractures; (b) reparative callus on two ribs of left rib cage; and (c) radiograph of the ribs shown in (b).

seemed to be in various stages of healing, they were thought to have occurred at approximately the same time.

Discussion

All three of these bodies showed several fractures that had occurred at the time of death or shortly thereafter. One problem in this case was to distinguish the recent postmortem fractures that were caused during exhumation from older ones that had occurred around the time of death or shortly thereafter. Groundwater stains of the fracture ends were most helpful in distinguishing these fractures. Only those fractures in which the fractured end of the bone was the same color and approximate texture as other surfaces of the bone were considered to have occurred around the time of death. Fractures caused during exhumation had much lighter color bone in the fracture edge than could be seen on the surface (Fig. 7a). With bones of the skull vault such as the frontal, occipital, and parietal bones, it was necessary to be very conservative in identifying "fractures" around the growing periphery. Normally, during fetal and infant growth, large notches occur around the expanding edges of these bones, and these are occasionally mistaken for traumatic fractures (Fig. 7b). Only breaks that cut across the radiating lines of spicular growth in such bones were labeled as fractures, and only when the fracture edges were the same color as the bone surfaces were they considered to be possibly significant.

All three of these bodies showed clear gross and radiographic evidence of antemortem fractures, in some cases in various stages of healing. Unhealed fractures in the same locations as healed ones on the other bodies tended to confirm repeated trauma in the same general pattern. Radiographic examination of suspected fractures in such cases is essential for adequate interpretation, as the increased radiopacity of healing bone ends provides an excellent indication that the fractures are indeed antemortem. Without clear indications of known trauma such as healing antemortem fractures, it might be rather hazardous for the forensic anthropologist to call a child's skeleton "battered" on the basis

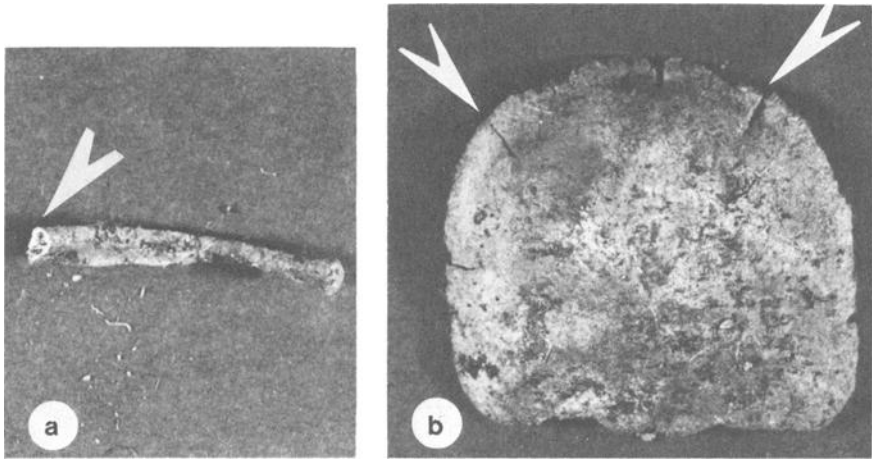


FIG.7—Photographs illustrating hazards in interpretation; (a) lighter colored end (arrow) of a recent fracture incurred in a rib during exhumation and (b) normal clefts in an occipital bone resulting from uneven radial spicular growth.

of a few broken bones that might have been fractured after death had occurred from other causes.

References

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