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Forensic Anthropology and Crimes Involving Children

Most of the skeletons examined by forensic anthropologists are those of adults, partly because there are more adults than children and partly because adults are more frequently the victims of crimes and transportation accidents. Despite this, many children are the victims of crime and their skeletons are often examined by forensic anthropologists. Not infrequently, crimes are perpetrated by children, but it is the victim rather than the criminal who may come to the attention of the forensic anthropologist. The anthropologist generally deals with the identification of unknown remains, including those of children, and with indications of the circumstances at the time of death.

In subadult skeletons, it is usually fairly easy to determine age with a gratifyingly narrow range of accuracy from dental eruption, ossification of secondary centers, and fusion of the epiphyses of the long bones to their metaphyses. The reliability of such age determination in children is quite high if the bulk of the skeleton is intact and the teeth are in the process of eruption. It is less easy, of course, if only fragments of bones are recovered. Unfortunately, the bones of children tend to be much less durable than those of adults under most postmortem conditions. Since the epiphyses are not attached to the metaphyses and are embedded in a larger amount of cartilage than that present in adult bones, there is a tendency for the epiphyses to be lost and the metaphyses to be badly eroded postmortem if the remains are exposed. The bones of children contain a higher percentage of cancellous bone than do those of adults, and the cortex is usually thinner and more porous, so children's bones are more susceptible to the gnawing of small animals.

Other problems peculiar to the identification of children's skeletons may be encountered to a lesser degree in adult remains. The ability to determine sex in the skeletons of children may be quite limited, and such determinations are often quite unreliable. If the pelvis of the skeleton has been lost or destroyed, it may be difficult to produce a highly reliable estimate of the sex. This problem diminishes in skeletons of children past the age of puberty but is significant in those of prepubertal children. The accelerated growth spurt in a medial direction at the pubic symphysis, which begins at puberty in the female and continues through adolescence, produces the more dramatic sex differences that are evident in adults. In other parts of the skeleton, the extra development of muscle attachments found in the adult male has not yet occurred in the child, nor has development of the large mastoid processes or brow ridges that help distinguish the male skull.

Race determination is usually possible in subadult skeletons but may be much more difficult than in adult skeletons. Stature formulae, such as those produced by Rollet [1] and Trotter and Gleser [2,3] are unsuitable for determining the stature of children.

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The relationship of bone length to age, established by such investigators as Maresh [4] and Anderson et al [5], must be applied to dry skeletal material with some caution, as their findings were derived from radiographic studies of living children and generally cannot be used with any degree of accuracy to predict stature at time of death in subadult skeletons.

The older the child, the more easily the anthropologist may be able to determine sex, race, and stature. Age, then, may be the major factor in the identification of the skeletal remains of children who have had little or no restorative work performed and no dental X-rays taken. Yet the frequency with which the skeletons of children turn up as unknown remains requires considerable attention to this significant area of identification. The question other than identity that most frequently applies to remains of children is cause of death. It may be possible for the forensic anthropologist to identify from the skeleton the probability that the child was a victim of homicide, the battered child syndrome, or fairly long-term malnutrition.

In skeletons from puberty to adulthood, other factors must be considered. With the high rate of adolescent suicide in the United States, the question of suicide versus homicide is pertinent, as is the question of whether there has been foul play or misadventure. The sequence of epiphyseal closure, continued dental eruption, and the closure of the basilar suture make it possible to determine accurately age at death throughout adolescence. Sex determination is fairly reliable, particularly at the age ranges of late adolescence. Stature is fairly difficult to reconstruct in the early phases of adolescence, when there is a good bit of variability but for which there are few adequate stature reconstruction tables that the anthropologist can apply.

A typical case in which the forensic anthropologist deals with a child victim of possible homicide involves the disappearance of a child and subsequent recovery of a skeleton several months or even years later. A child's skeleton was recovered not far from an area where a child had been reported missing about a year earlier. The skeleton was sent to the forensic anthropology laboratory, where the age was determined to be between 8 and 10 years, based on dental eruption and long-bone length. The ends of the long bones, the sternum, and portions of the ribs and the pelvis had all been gnawed post-mortem by animals. The few remnants of epiphyses had been gnawed and were scarcely recognizable. Large areas of the innominate bones were missing and the portion remaining in the vicinity of the sciatic notch was not conclusive as an indicator of sex. Some of the teeth were missing, and no dental restorations had been made on those that remained. On the basis of age determination and the mother's recognition of the few remnants of clothing, the individual was identified as the boy who had been missing for about a year. Cause of death could not be determined from the skeletal remains, but homicide was later proved.

Another type of case involving a subadult as a victim of crime is found in increasing frequency in the adolescent group. The skeletal remains of an adolescent, determined to be female, were sent to the forensic anthropology laboratory. The distal end of the right humerus showed evidence of an old, healed intercondylar fracture extending to slightly above the medial epicondyle. The fracture was confirmed by radiographs. The local law enforcement agency replied to the description given by the anthropologists that the agency could identify a girl who had been missing for some months and was thought to have been a few months pregnant. Reexamination of the area of the pubic symphysis did not disclose any significant alterations of the posterior aspect of the symphysis, where gestation pits are often found. There was, however, an unusual amount of resorptive activity involving the anterior aspect of the symphysis (Fig. 1). This is an area where a nonsuppurative osteitis pubis usually occurs; however, it is not an area in which gestational changes have been documented. The remains were identified on the basis of age, sex, and stature estimates combined with the old healed fracture of the distal

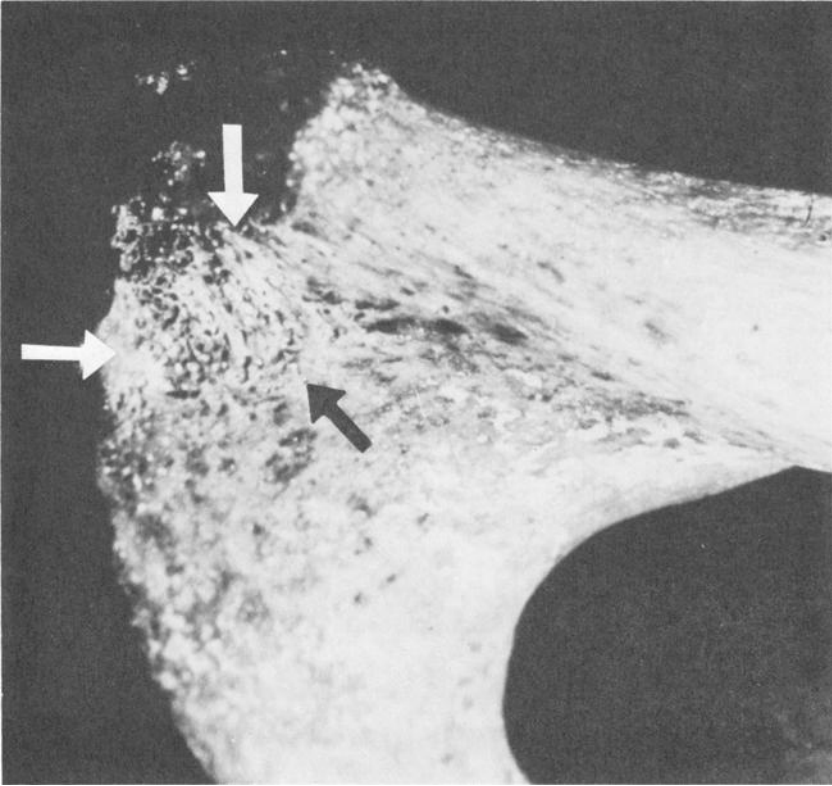


FIG. 1—Anterior surface of the pubic symphysis showing roughened area of bone resorption (arrows).

humerus. The anterior resorption in the area of the pubic symphysis was mentioned, but no specific indication of pregnancy could be established. Homicide was strongly suspected.

An example of the type of confusion that can arise when two anthropologists disagree in their biological description of older adolescents can be seen in the next case. Toward the end of summer, in the course of searching a lake for the body of a 16-year-old boy who was known to have drowned on 4 July, the police discovered the remains of an adolescent boy at the bottom of a concrete overflow that drained the lake (Fig. 2). Although the remains were still mostly flesh covered, they were totally unrecognizable due to advanced decomposition. The clothing did not match that worn by the boy who had drowned. The police brought the remains to the anthropology laboratory for further information, and another physical anthropologist processed the remains and estimated the age to have been in the late twenties.

No one was known to have been missing in the area in that age range, although there was an older adolescent who had disappeared three months before the remains were discovered and was thought to have left home. He was last seen by two of his friends with whom he had camped out overnight near the lake that past April. He was reported by them to have stayed behind at the lake after arguing with them before they returned home the next day. The anthropologist had pulled the remains apart and cooked them on a stove for several hours, then had taken them to the local carwash and sprayed them with a soapy high-pressure stream. When the author examined the remains, they appeared to be somewhat younger than the original estimate, and a micro-

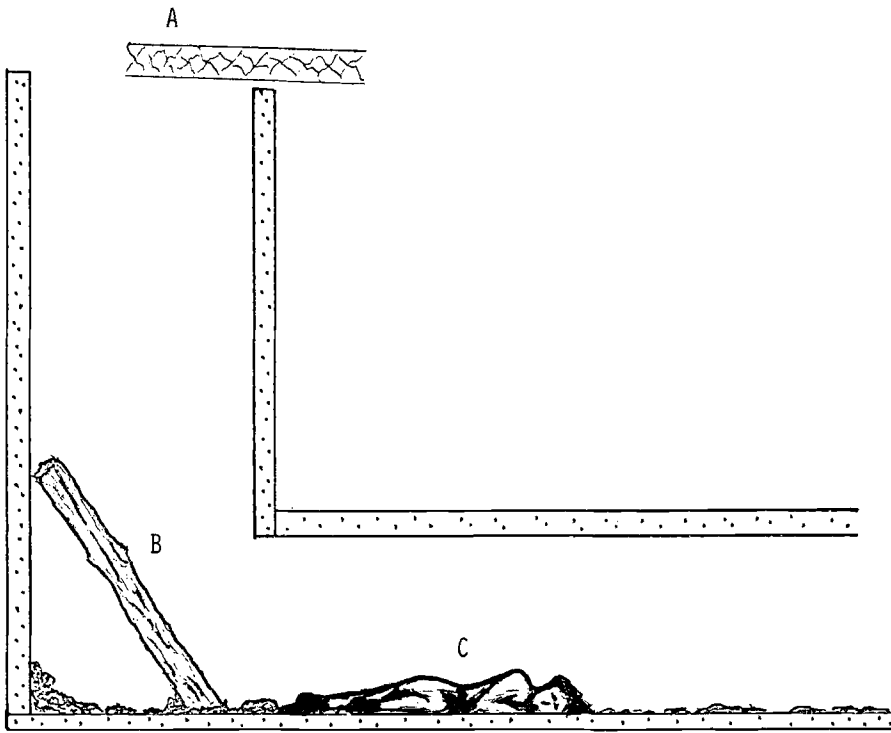


FIG. 2.—Sketch of overflow drain indicating the approximate positions of the entrance with an old bedspring partly covering it (a), a log wedged diagonally at the bottom (b), and the body of the deceased as it was discovered (c).

scopic estimation of age was undertaken. The microscopic age estimate was between 15 and 23, with 18 the most probable age.

During the course of the examination, several fractures were discovered (Fig. 3). These appeared to be fresh with no evidence of healing, but the remains had been sufficiently washed to eliminate the possibility of finding traces of extravasated blood or stains. There was a depressed fracture of the left rear part of the skull involving the left and right parietals and the occipital. There were also fractures of several of the ribs of the lower right side and compression fractures of at least two of the thoracic vertebrae, near T-11 and T-12. There were additional fractures of the posterior articular processes and lateral processes of other thoracic and lumbar vertebrae. The police had noted the depressed fracture of the skull and suspected that this individual had been the victim of homicide. The compression fractures of the vertebrae, the fractures of the posterior and articular facets and transverse processes, and the fractures of three ribs suggested the possibility of a falling accident. It was suggested that these fractures could have resulted from a fall if the individual had struck an uneven surface head-on and the body had flexed suddenly at the moment of impact, fracturing the posterior articular processes and compressing the anterior portion of the vertebral bodies.

Based on agreement of the estimates of age, sex, race, and stature, plus identification of some remnants of clothing by the mother, identification was made. The police examined the site and reported that a log was wedged at the bottom of the drain in a diagonal fashion in such a manner that the deceased could have fallen and struck the log head first, thereby flexing the body and ricocheting it further into the overflow drain where it was found. There were several moderately large rocks lying on the floor of the drain, and the deceased could also have struck his head on any of these

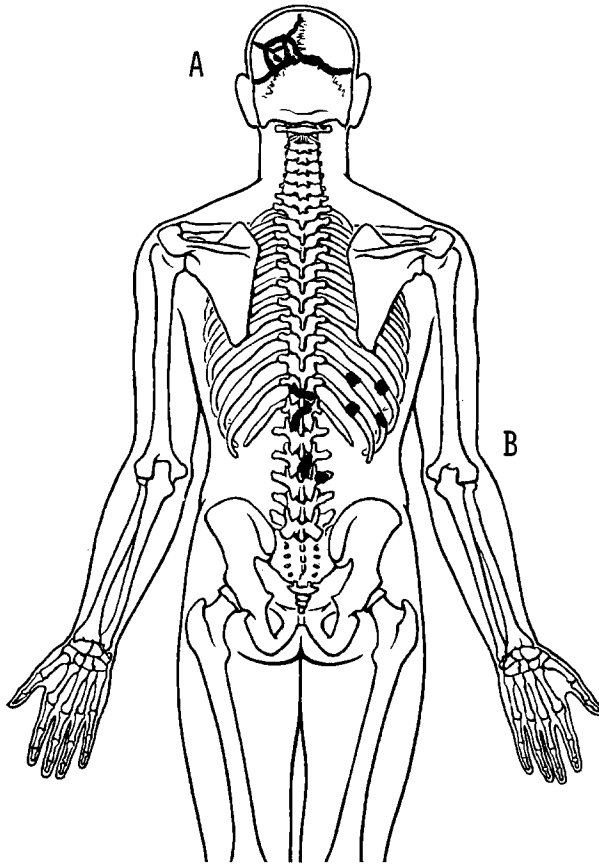


FIG. 3—Location of the depressed fracture of the skull (a) and fractures of the ribs and vertebrae (b).

during the fall. Overflow from rains subsequent to his disappearance, though minimal, had washed away any real hope of establishing such events.

The disturbing aspect of this particular case is that his friends were in jeopardy of being tried for his murder, as they were the last people to have seen him alive and they admitted to arguing with him. Discovery of the compression fractures and other vertebral fractures strongly supported the idea that death resulted from a fall that was inadvertent rather than caused by his companions. Although the possibility that they had fractured his skull and thrown his body down the overflow drain could not be ruled out, an alternative to homicide was shown to be just as possible. The presence of a large depressed fracture of the skull does not necessarily indicate that the individual was struck a blow. It was also possible to determine that this was not the body of the boy who had drowned and to make a positive and proper identification.

Another type of case in which the forensic anthropologist might be helpful is in the identification of the battered child, although few of these cases, if any, have turned up as skeletal remains. With the increased numbers of battered children, it is probable that such cases will be more frequent in the practice of forensic anthropologists. In such cases, it is important not only to establish identification but also to detect the presence of multiple fractures in various stages of healing as the skeletal hallmark of the battered child. The entire syndrome consists of multiple contusions, subdural hemorrhage, and multiple fractures of various durations. It is important, then, for the forensic

anthropologist to note carefully the stages of healing of different fractures in remains of children who have multiple fractures that occurred prior to time of death as well as any fractures that are unhealed and may have occurred at the time of death. Such information is important in establishing the battered child syndrome from skeletal material. One should note too much symmetry of rib fractures, as these occur in hypervitaminosis A.

Not all cases of forensic anthropology deal with adults or children; some deal with unborn fetal remains. In such cases, determination of the age and time since death may be the identifying factors. Age is one of the few estimates that can be made with any degree of reliability in fetal skeletal remains. In older fetuses, measurement of the length of the ossified portions of long bones and the diameters of their shafts may be quite helpful in estimating their age. In younger fetal material, however, the amount of bone recovered may be minimal. A woman reported to her gynecologist that she had found "gritty material" during her recent menstrual periods. She brought samples of this to the gynecologist, who recognized what he thought was fetal bone. The patient had been pregnant 5 years previously and had miscarried at about 14 weeks. The doctor who treated her at that time did a curettage, but he encountered so much bleeding that he stopped before evacuating the entire uterine contents. Since that time, her history had been normal until recently when the gritty fragments appeared.

The fragments were sent to the forensic laboratory for any information as to possible age or time since death that might be determined. An interesting aspect of this case is that the woman had a bicornuate uterus (Fig. 4), and the possibility had been raised that

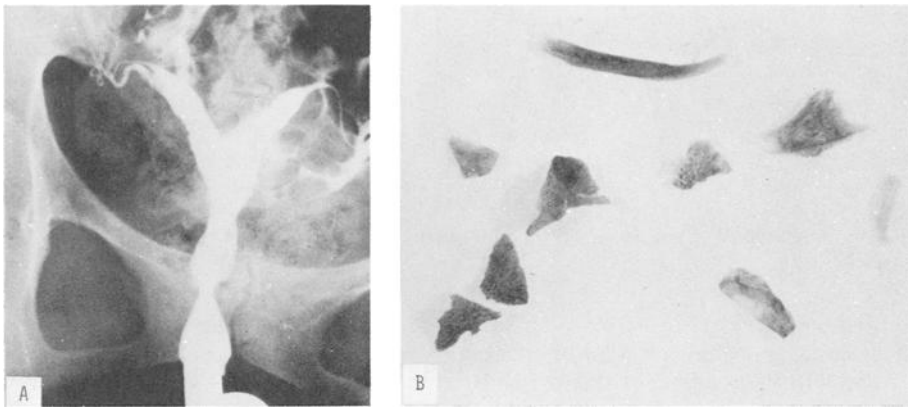


FIG. 4—*Bicornuate uterus (a) and fragments of fetal bone (b).*

the pregnancy of 5 years ago and the partial curettage following it had left behind bits of fetus, which remained as an essentially nonirritating foreign body for 5 years before becoming dislodged. During this time, the nonpregnant part of the uterus was undergoing normal cyclic changes. The other explanation is that there was an unrecognized pregnancy that had resulted in a spontaneous miscarriage.

The bones seemed to be compatible in shape and degree of ossification with those of approximately 13 to 14 weeks of menstrual age and appeared to be fetal bone from the skull and portions of the upper trunk. One bone seemed to be the ossified portion of a scapula, and part of one rib was present. Direct metric comparisons were undertaken with a series of known crown-rump lengths of fetuses to establish the normal amount of ossification for a given fetal age. It was suggested by the anthropologist that the fetal bones may well have been left by the partial curettage and remained intact for 5 years in one cornu of the uterus. One reason for this possibility is that the only material recovered was from the head and one portion of the shoulder and upper trunk sug-

gesting that the rest may well have been curretted away. Also, there was some irregularity of growth covering the ossified portions of parts of the bones, an indication that perhaps there had been an abnormality of growth prior to the death of the fetus or some postmortem changes had occurred in the material remaining in utero. It was pointed out that it was equally possible that the woman had been pregnant for 14 weeks a second time and that this was not detected because of normal menstruation from the nonpregnant part of the uterus. In either event, there seemed no reason to suspect that criminal abortion had been attempted or performed, as had been suggested.

In dealing with possible homicide cases in childhood and adolescence, it is important to utilize all available information and the best judgment possible. Sometimes cases that clearly seem to be homicide turn out to be the result of accident. Unless there are very strong indications of homicide, it is wise not to do more than suggest that possibility based on injuries clearly observed in the skeleton. It is also necessary to be very alert to the possibility of homicide or death by accident. Clothing and any remnants of personal belongings may be most helpful in the identification of children whose most precise biological description is usually that of age.

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