

# The Juvenile Skeleton in Forensic Abuse Investigations

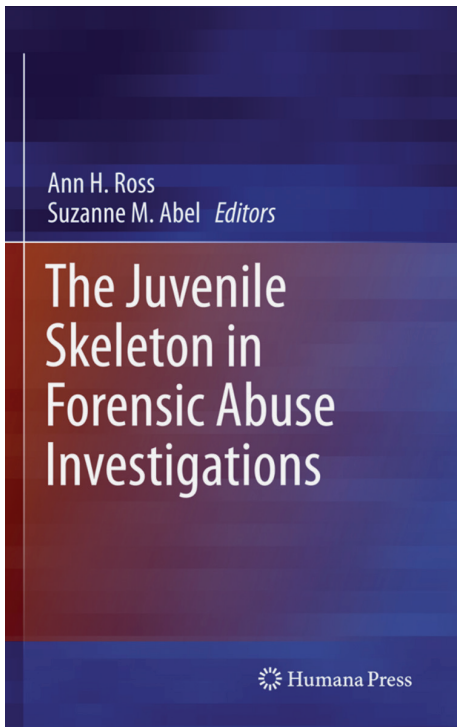
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Investigations into the study of juvenile skeletal remains in forensic anthropological and bioarchaeological studies has increased considerable in the last decade. Child abuse is not a recent phenomenon as it is sometimes lead to believe. But can be traced back to Soranus who claimed that neglect and abuse of children by their wet nurses was common. The Persian physician Rhazes (AD 860–923) also commented that children were the victims of physical abuse and neglect. Other authors such as Stone (1977) and Kuefler (1991) showed that children in Anglo-Saxon and medieval Britain, especially those who suffered from a disability were particularly prone to physical abuse. In 1860, the French physician Ambrose Tardieu acknowledged the existence and causes of child abuse in a paper (Tardieu, 1860) which was ignored by his peers at the time. West (1888) reported a number of cases of periosteal swellings in

children from the one family but failed to make the connection to child abuse but instead put it down as rickets. In 1930s America there was increased recognition of battered children in child hospitals. However, an influential paper by Caffey (1946) discussed cases of subdural haematomas and long bone and rib fractures which he could not assign a pathological reason for; instead he suggested that these lesions may be as a result of child abuse in the home. His findings became highly controversial.

In today's society child abuse and neglect is widely recognised. However, the abuse and deaths of children continue to be a major issue. This book is divided into twelve chapters covering topics related to child maltreatment and abuse to discussions on growth and development of the young skeleton. In chapter 1 (Ross and Abel), we are reminded that in 2005, there were an estimated 1,460 fatalities due to child maltreatment, of which 42% were as a result of neglect, 24% caused by physical abuse and 27% caused by a combination. Children less than 4 years accounted for nearly 77% of all maltreatment, with 42% of these deaths occurring in infants. In 1999, it was estimated that 1,800 children were victims of homicide in the United States, higher than any other developed country. Homicide was the only cause of child death that has increased in incidence by 50% in the 0–4 year age group.

Chapter two (Ragan) gives an overview of child abuse and murder. The chapter opens with a history of child maltreatment; the chapter discusses the cultural differences in what is perceived as acceptable, for example, infanticide was often deemed necessary. In the Middle Ages, children were often seen as liabilities due to widespread poverty and in

the 16<sup>th</sup> and 17<sup>th</sup> centuries children were often exploited for the purpose of work. It was not until 1874 in New York that child protection in the United States was born. Nowadays, children's rights exist in all western countries, but still the World Health Organisation (WHO) report that annually about 31,000 children under 15 years of age are homicide victims.

Chapter three (Humphries) outlines the basic anatomy, growth and development of the juvenile skeleton. An understanding of the juvenile skeleton in both forensic and archaeological contexts is crucial for the interpretation of health and disease, trauma and what is considered normal and abnormal. Therefore, anatomical terminology, anatomy of bone and development are precisely described. In chapter four (Ubelaker and Montaperto) the authors explain the biomechanical and remodelling factors in the interpretation of fractures in children, bone fractures are the most frequent and hard evidence of child abuse in both the living and the deceased. Since 80% of fractures that are caused by abuse occur in children less than 18 months. Although not all abuse involves skeletal injury. The stage of repair and timing of fracture episodes are described here in detail. Following on from injuries sustained by abuse, in chapter five (Heldrich) examines the injuries caused by birth and the importance to differentiate injuries that can occur in the newborn and infant population from intentional injury. These may include injuries resulting from large babies, prematurity, forceps delivery, vacuum extraction, abnormal fetal presentation and prolonged labour. The types of injuries may include linear and depressed skull fractures; clavicular fractures, rib fracture and humeral fractures are common. The chapter deals with

Osteogenesis Imperfecta and metabolic bone disease and thirteen other rather uncommon/rare diseases in infants and children which can be mistaken for child abuse. These include Menke's Syndrome, Cole-Carpenter syndrome, Bruck syndrome, idiopathic juvenile osteoporosis, osteoporosis pseudoglioma, McCone-Albright syndrome, osteopetrosis, Caffey's disease, infantile severe hypophosphatasia, familial hypophosphatasia, scurvy, vitamin A intoxication and congenital insensitivity to pain.

In cases of non-accidental skeletal trauma, the forensic anthropologist and forensic pathologist are called upon to assess skeletal trauma and distinguish injuries from accidental and non-accidental origin and this is the topic of chapter six (Abel). Chapter seven (O'Neal and Schindell) focuses on cases where abuse and or neglect have led to the death of a child and reviews the basic scene investigation procedures and their application in child death investigations. Chapter eight (Kimmerle and Chrostowski) the authors discuss some of the medicolegal issues of battered baby syndrome. Battered baby syndrome is well recognised worldwide but it often causes controversy both in and out of the courtroom. Chapter nine (Cardosa and Magalhães) deals with the evidence of neglect from juvenile skeletal remains. They offer two general approaches for the detection of growth and failure from observations in bones and teeth. One approach focuses on the comparison of height estimations and long bone lengths to sex and age specific references of height and long bone length. The other approach assesses the discrepancy between dental and skeletal age.

Chapter ten (Ross) continues with the most severe form of maltreatment which is fatal starvation. Deaths caused by starvation are rare and difficult to investigate, but yet nearly 32% of cases reported in the United States in 2008 were due to neglect. Chapter eleven (Sutphin and Ross) outlines juvenile stature estimation from a Chilean perspective. They discuss that malnutrition even for a short time, has a big influence on long bone growth. Therefore, age estimation can be a problem in the affected individual. Estimating juvenile stature is complex and must take into account a number of factors. However, the results presented here with regard to the Chilean case must be treated with caution and cannot be universally applied. In the final chapter (Cunningham, Kirkland and Ross) bone weathering is discussed, this is a much researched topic in forensic science with the use of domestic pigs as a substitute for human bone. Decomposition and time of death estimation are important factors in any criminal/homicide investigation.

Overall, this book contains interesting, well-written chapters which cover a large and important topic such as child abuse both in clinical and anthropological settings. This book will no doubt be of considerable value to those working with children who are subjected to abuse both in the present and past populations.

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