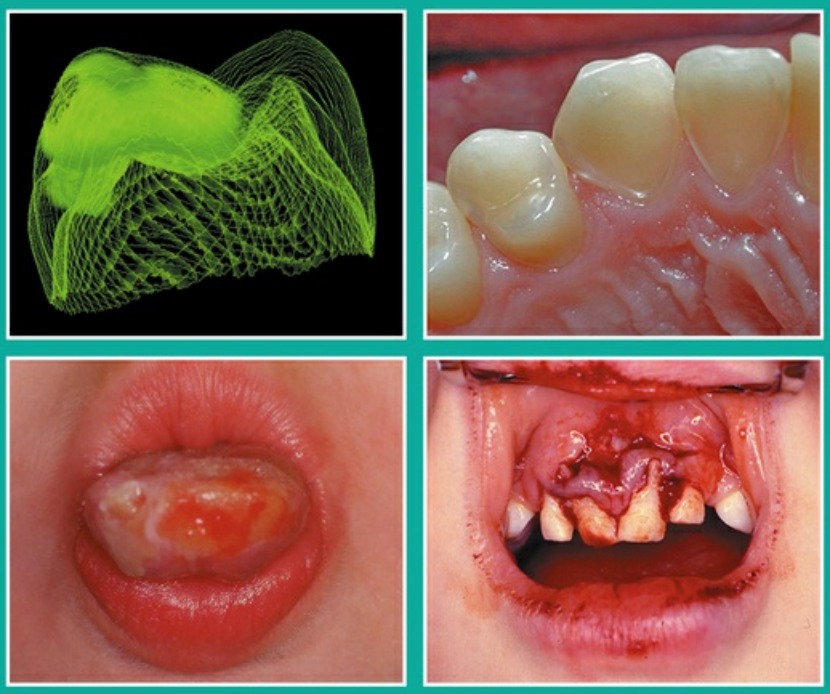
THIRD EDITION

Pediatric Dentistry

A Clinical Approach

EDITED BY
GÖRAN KOCH • SVEN POULSEN • IVAR ESPELID • DORTE HAUBEK



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To Anna,Lena Hallonsten

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Preface to the Second Edition

Pediatric Dentistry: A Clinical Approach was first published in 2001 with the aim of providing a comprehensive review of pediatric dentistry with special emphasis on evidence‐based oral health care for the child and adolescent. In this second edition of this textbook, we have built upon the earlier volume by thoroughly updating the text, as well as replacing chapters and adding new ones as necessary.

The sciences behind pediatric dentistry, as well as strategies of clinical approaches, have developed rapidly over the past few decades. These advances have been reflected in the considerable work undertaken by the many clinicians and scientists who have contributed to this textbook.

Pediatric dentistry aims to improve the oral health of children and adolescents through health promotion, prevention and systematic and comprehensive oral care. It is concerned with the expression of, and interventions against, the major dental diseases as well as with a number of dental and oral conditions specific to childhood and adolescence. These comprise all aspects of dental and occlusal developmental disturbances, traumatic injuries to the teeth, periodontal conditions, oral pathological conditions, pain control, dental need and treatment of handicapped and medically compromised children. Pediatric dentistry applies principles from other clinical disciplines, medical and behavioral sciences and adapts them to the special needs of the growing and developing individual from birth through infancy and childhood to adolescent late teens.

Our objective is that this book will serve not only as a basis for undergraduate training in pediatric dentistry but will also be of relevance to postgraduate students and dental practitioners who want to increase their knowledge and skills in order to deliver up‐to‐date pediatric dental care.

Göran Koch and Sven Poulsen
Editors

Preface to the Third Edition

This third edition of *Pediatric Dentistry: A Clinical Approach* follows up on the two previous editions published in 2001 and 2009. It represents a considerable effort from a large group of highly experienced colleagues within the field of pediatric dentistry and related disciplines.

The present edition is expanded to include new chapters on recently developed essential subjects within the field of pediatric dentistry, i.e., genetics in pediatric dentistry, child abuse and neglected children, and ethics in pediatric dentistry. The previous chapter on pedodontic endodontics has been split into two chapters – one on primary teeth and one on young permanent teeth. Most of the chapters have been thoroughly revised and several new illustrations are included. The concept of evidence‚based care has been given more attention.

It is our hope that this edition will also serve the objective stated for the previous editions.

Göran Koch, Sven Poulsen, Ivar Espelid, Dorte Haubek
Editors

About the Companion Website

This book is accompanied by a companion website:

www.wiley.com/go/koch/pediatric_dentistry

The website includes:

- Interactive multiple choice questions

CHAPTER 1

Pediatric Oral Health and Pediatric Dentistry: The Perspectives

Sven Poulsen, Göran Koch, Ivar Espelid, and Dorte Haubek

Children are special

Pediatric dentistry is defined as "the practice, and teaching of and research in comprehensive preventative and therapeutic oral health care of children from birth through adolescence" [1]. The central element in this definition—and that which distinguish it from other clinical fields in dentistry—is *children*, further qualified as individuals *from birth through adolescence*.

In this book, we adopt the United Nations (UN) Convention definition of a child as "every human being below the age of 18 years unless, under the law applicable to the child, majority is attained earlier" [2]. That children are different from adults has not always been recognized. Previously, children were depicted as "small adults" (Figure 1.1), but recent research reflect that health services for children need to consider that children are growing and developing individuals who are dependent on an adult caregiver. This requires oral health professionals with special competencies, so‐called *child competency* (Box 1.1).

Figure 1.1 Until the eighteenth century, children were considered to be small adults (sort of "miniature grown‐ups") as shown in this painting from a medieval church. Note the similarity of the facial features of the adults and the children.

Source: Epitaph in Norra Sandsjö parish church, Sweden, of Johan Printzensköld and Anna Hård af Segerstad and their five children.

Box 1.1 Professionals should recognize that children are not "small adults" and that special competency (child competency) is needed, when meeting children

Children are different from adults in a number of ways:

- children are individuals in growth and development
  - physical
  - psychological
  - social
  - cognitive
  - emotional
- oral health, including attitudes and behavior relating to oral health, is formed during childhood and adolescence
- children's situation is different from the situation of adults:
  - they are in the care of and dependent on adults
  - they are not able to foresee consequences of their own decisions and behavior.

Child competency is:

- a specific insight into the dental and oral health for the child and adolescent
- an ability to communicate effectively with children, adolescents, and their parents
- a positive professional attitude towards children, adolescents, and their parents.

Today, a satisfactory definition of health needs to include somatic as well as non‐somatic dimensions. Consequently, oral health should include not only sound teeth and surrounding oral structures, but also absence of dental fear and anxiety as a prerequisite for good oral health during later periods of life. This is consistent with recent concepts of oral health as a determinant factor for quality of life [3].

Community responsibility: the population perspective

By the end of the nineteenth century, a number of large epidemiologic studies on caries in children carried out in the Nordic countries showed that more than 80% of the children had carious teeth and that only a few per thousand had received any dental treatment. These studies were the major reason why children's dental health was conceived as a problem, requiring public intervention in terms of organized public dental health services for children.

It is interesting to note that the arguments for better oral services for children in the Nordic countries were based on epidemiologic data. Using epidemiologic information to document a health problem is to adopt a population approach rather than an individual clinical approach. This illustrates that in the Nordic countries, organized child dental care has for more than a century been considered a collective responsibility rather than the responsibility of the individual on their own. Formal legislation and regulations concerning child dental care were passed by the parliaments of all Nordic countries several decades ago and dental services, including outreach preventive services, have been developed to serve the whole child population. The epidemiologic starting point of child dental care in the Nordic countries also explains why the child dental services in these countries have collected valuable epidemiologic information to continually monitor the level of disease in the target groups.

The clinical perspective

Pediatric dentistry encompasses all aspects of oral health care for children and adolescents. It is based on basic knowledge from various odontological, medical, and behavioral sciences that are applied to the unique situation of the developing child and young person. Prevention is still the cornerstone of pediatric dentistry. Starting prevention in early childhood makes it possible to maintain sound erupting teeth and keep oral structures healthy. Pediatric dentistry also implies early diagnosis and treatment of the multitude of oral diseases and conditions found in the child's and the adolescent's oral cavity, including caries, periodontal diseases, mineralization disturbances, dental erosion, disturbances in tooth development and tooth eruption, and traumatic injuries in otherwise healthy individuals as well as oral health care of sick and disabled children. The realm of pediatric dentistry is constantly expanding, and now includes such areas as early identification of children suspected to suffer from syndromes, and of children suspected to suffer from child maltreatment. Ethical considerations superimpose all these areas.

The quest for evidence‐based interventions—preventive, diagnostic or rehabilitative—is urgent in pediatric dentistry as well as in all other fields of dentistry, and recent research has identified the need for more high‐quality research in a number of the domains comprising pediatric dentistry [4]. It is important that diagnosis, risk assessment, prevention, treatment, and follow‐up of children are based on scientific evidence, when available. Translation of evidence into clinical guidelines will thus help to secure quality of dental care for all children. The burden of dental disease is not equally distributed and it is a goal to diminish the inequality. Health technology assessment (HTA) bodies in many countries have provided useful guidelines about important topics in pediatric dentistry. In Scandinavia, the Swedish

Council on Health Technology Assessment (SBU) has produced relevant guidelines for pediatric dentistry.

Education in pediatric dentistry: the perspectives

The undergraduate education and training in pediatric dentistry in the Nordic countries today is well balanced and aims to give the student sufficient knowledge and competence to deliver basic dental care to preschool children, school children, and adolescents. During the last decades the undergraduate curriculum has increased the emphasis on prevention and behavioral and social sciences.

The need for postgraduate courses and training was recognized early. To provide dental care to complicated cases, often with special needs and in a multidisciplinary team, requires specialized knowledge and child competence as obtained in a specialist education in pediatric dentistry. The European Academy of Paediatric Dentistry presented guidelines for a specialist education in pediatric dentistry in 1995 [5]. The education is a 3‚year full‚time course given at universities and institutes preceded by at least 2 years' practice as a general practitioner. This program has been adopted by most educational centers in Europe during the last decades.

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CHAPTER 2
Growth and Pubertal Development

Anders Juul, Sven Kreiborg, and Katharina M. Main

The evaluation of growth charts and pubertal development in children and adolescents is an important tool for any clinician in the assessment of health status. Optimal thriving and height attainment in accordance with family potential can only be achieved in an environment providing optimal socioeconomic conditions, health care, and psychosocial support. Thus, failure to thrive or to grow may be the first indication of an underlying problem that may need attention. In turn, treatment of children may need to consider the specific growth and developmental windows in order not to disturb this delicate balance.

Measurement of growth in different phases of life

The current concept of prenatal and postnatal growth suggests that there are distinct growth phases, which should be considered separately.

Prenatal growth

Prenatal growth is divided into three trimesters (by convention). The first trimester is characterized by organogenesis and tissue differentiation, whereas the second and third trimesters are characterized by rapid growth and maturation of the fetus. Fetal growth can be assessed by serial ultrasonography in the second and third trimesters. Abdominal circumference, head circumference, and femoral length of the fetus can be determined, and from these parameters fetal weight can be estimated using different algorithms [1]. The fetal weight estimate should be related to normative data. Some reference curves for fetal growth are based on children born prematurely [2], and hence such curves tend to underestimate normal fetal weights from healthy pregnancies. Alternatively, reference curves based on ultrasound studies of normal healthy infants exist [1] and should preferably be used. Based on the changes in fetal weight estimates over time, the fetus can be considered as having a normal fetal growth rate, or alternatively as experiencing intrauterine growth restriction (IUGR) [3]. Children born at term (gestational age 37–42 weeks) are considered mature. Children born before 37 weeks of gestation are premature, and children born after 42 weeks of gestation are postmature. At birth, weight and length can be measured and compared to normative data correcting for gestational age at birth. Based on these comparisons, a newborn child can be classified as either appropriate for gestational age (AGA), small for gestational age (SGA), or large for gestational age (LGA).

IUGR fetuses will often end up being SGA at birth, but not necessarily so. Thus, IUGR infants may end up lighter than their genetic potential but remain within normal ranges (i.e., AGA). Therefore, IUGR and SGA are not synonymous entities, although they are often referred to as such in the literature (Figure 2.1). Height velocity *in utero* is higher than at any time later in life, leading to an average birth length of 50–52 cm and birth weight of 3.5–3.6 kg after 37–42 weeks of gestation. It is therefore not surprising that growth disturbances during this phase may have long-lasting effects on growth and health later in life. Whereas the first trimester is dominated by tissue differentiation and organ formation, the second and especially third trimesters show a rapid gain first in length and then in weight. Fetal and placental endocrinology is highly complex and hormones such as insulin, leptin, placental growth hormone, insulin-like growth factor (IGF)-2, and thyroid hormone are only some of the many growth factors involved in the regulation of fetal growth.

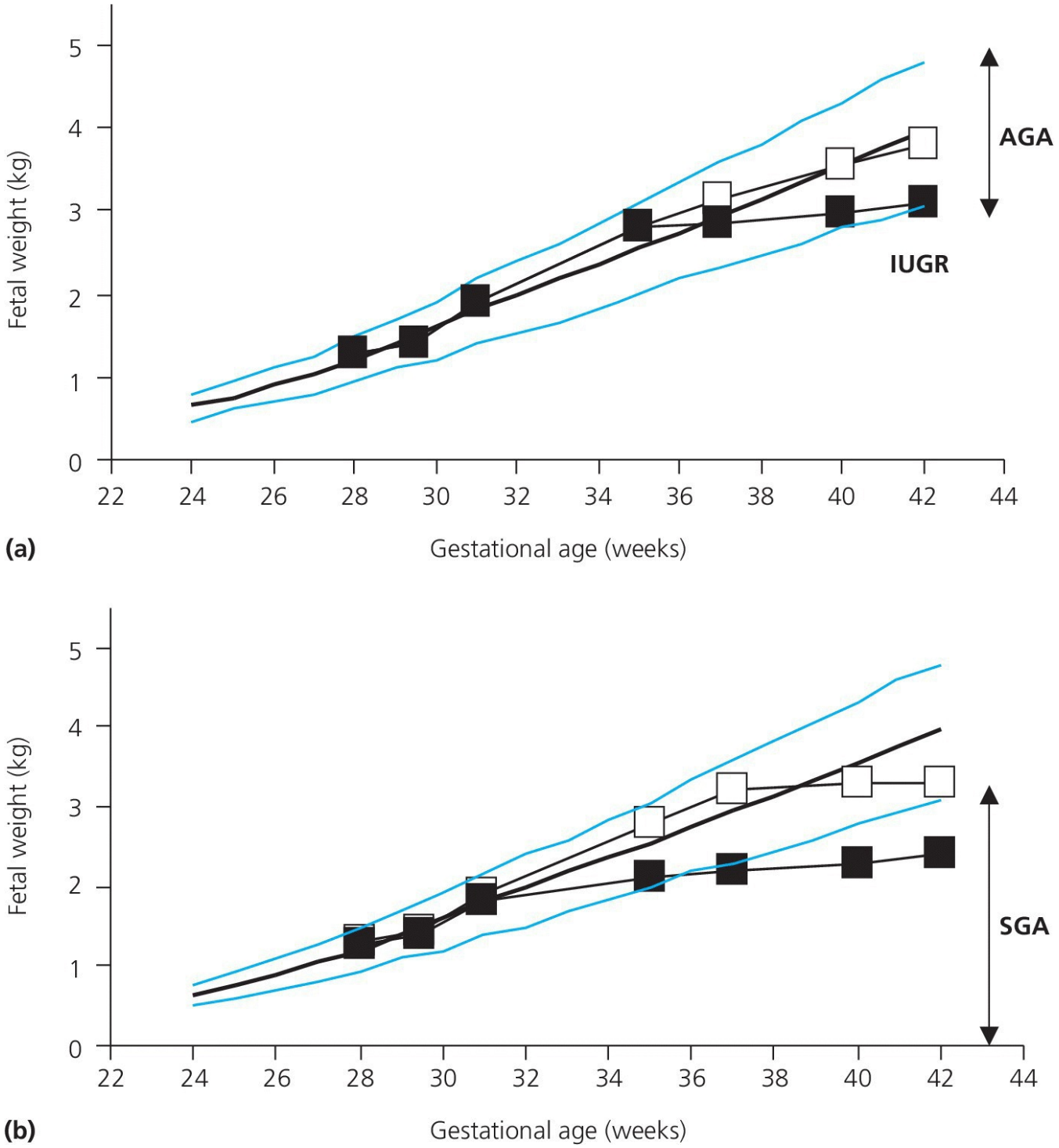

Figure 2.1 Reference ranges for fetal weight according to gestational age during pregnancy denoted by the blue lines (10th, 50th, and 90th percentiles) (8). Panel (a) shows examples of children with normal birth weights at term; a normally growing fetus ending with a birth weight which is appropriate for gestational age (AGA) and (▪) a fetus with third trimester intrauterine growth restriction (IUGR) ending with a birth weight below the genetic potential but within normal limits (AGA). Panel (b) shows examples of fetuses with intrauterine growth retardation (IUGR) ending up AGA (□) or SGA (▪).

Postnatal growth

Postnatally, height can be determined by measuring length in the supine position in the first 2–3 years of life. After 2–3 years of age standing height can be measured, preferably using a wall‚mounted stadiometer. Height is determined without shoes, shoulders towards the wall, arms hanging down, and the face straight forward (Figure 2.2). The eyes should be horizontally aligned with the external ear opening. The means of three measurements are recorded. The stadiometer should be calibrated on a daily basis.