

## **CLASSIFICATION OF IMPORTANT DISEASES OCCURRING IN THE MUSCULOSKELETAL SYSTEM**

**Yamini Ch.G.**

**Richard P.PL.**

*Independence researchers*

Atelectasis, derived from the Greek words atelēs and ektasis, literally meaning “incomplete expansion” in reference to the lungs. The term atelectasis can also be used to describe the collapse of a previously inflated lung, either partially or fully, because of specific respiratory disorders. There are three major types of atelectasis: adhesive, compressive, and obstructive.

Adhesive atelectasis is seen in premature infants who are unable to spontaneously breathe and in some infants after only a few days of developing breathing difficulties; their lungs show areas in which the alveoli, or air sacs, are not expanded with air. These infants usually suffer from a disorder called respiratory distress syndrome, in which the surface tension inside the alveolus is altered so that the alveoli are perpetually collapsed. This is typically caused by a failure to develop surface-active material (surfactant) in the lungs. Treatment for infants with this syndrome includes replacement therapy with surfactant.

Compressive atelectasis is caused by an external pressure on the lungs that drives the air out. Collapse is complete if the force is uniform or is partial when the force is localized. Local pressure can result from tumour growths, an enlarged heart, or elevation of the diaphragm. The ducts and bronchi leading to the alveoli are squeezed together by the pressure upon them.

Obstructive atelectasis may be caused by foreign objects lodged in one of the major bronchial passageways, causing air trapped in the alveoli to be slowly absorbed by the blood. It may also occur as a complication of abdominal surgery. The air passageways in the lungs normally secrete a mucous substance to trap dust, soot, and bacterial cells, which frequently enter with inhaled air. When a person undergoes surgery, the anesthetic stimulates an increase in bronchial secretions. Generally, if these secretions become too abundant, they can be pushed out of the bronchi by coughing or strong exhalation of air. After abdominal surgery, the breathing generally becomes more shallow because of the sharp pain induced by the breathing movements, and the muscles beneath the lungs may be weakened. Mucous plugs can result that cause atelectasis. Other causes of obstruction include tumours or infection.

The symptoms in extreme atelectasis include low blood oxygen content, which manifests as a bluish tint to the skin, absence of respiratory movement on the side involved, displacement of the heart toward the affected side, and consolidation of the lungs into a smaller mass. If a lung remains collapsed for a long period, the respiratory tissue is replaced by fibrous scar tissue, and respiratory function cannot be restored.

Treatment for obstructive and compressive atelectasis is directed toward removal of any obstruction or compressive forces.

**Childhood disease and disorder**, any illness, impairment, or abnormal condition that affects primarily infants and children—i.e., those in the age span that begins with the fetus and extends through adolescence.

Childhood is a period typified by change, both in the child and in the immediate environment. Changes in the child related to growth and development are so striking that it is almost as if the child were a series of distinct yet related individuals passing through infancy, childhood, and adolescence. Changes in the environment occur as the surroundings and contacts of a totally dependent infant become those of a progressively more independent child and adolescent. Health and disease during the period from conception to adolescence must be understood against this backdrop of changes.

Although, for the most part, the diseases of childhood are similar to those of the adult, there are several important differences. For example, certain specific disorders, such as precocious puberty, are unique to children; others, such as acute nephritis—inflammation of the kidney—are common in children and infrequent in adults. At the same time, some diseases that are common in adults are infrequent in children. These include essential hypertension (high blood pressure of unknown cause) and gout. Finally, a major segment of pediatric care concerns the treatment and prevention of congenital anomalies, both functional and structural.

Apart from variations in disease due to differences between children and adults, certain other features of diseases in children need to be emphasized. Infectious disorders are prevalent and remain a leading cause of death, although individual illnesses are often mild and of minor consequence. Most instances of the common communicable diseases, such as measles, chicken pox, and mumps, are encountered in childhood. Disorders of nutrition, still of great concern, especially but not exclusively in developing countries, are of extreme importance to the growing and developing child. The unique nutritional requirements of children make them unusually susceptible to deficiency states: vitamin-D deficiency causes rickets, a common disorder of children in developing countries, and only rarely causes any disease in adults. The major environmental hazards that endanger the health of young children are either unavoidable, as in air pollution, or accidental, as in poisoning and in traffic injuries. Older children, especially adolescents, are exposed, as are adults, to environmental hazards that they deliberately seek, such as cigarette smoking and the use of alcohol and other drugs.

Diagnosis of the diseases of childhood involves special considerations and techniques; for example, in evaluating genetic disorders, not only the patient but his entire family may need to be examined. Inapparent environmental causes of diseases, such as poisonings, must be considered and investigated thoroughly, by methods that at times resemble those of a detective. Diseases of the fetus may derive directly from disorders of the mother or may be caused by drugs administered to her. Diagnostic techniques have been developed that permit sophisticated examination of the fetus despite its apparent inaccessibility. The withdrawal of a small amount of the amniotic fluid that surrounds the fetus permits examination of fetal cells as well as the fluid itself. Chromosomal and biochemical studies at various stages of development may help to anticipate problems in the postnatal period; they may indicate the need for immediate treatment

of the fetus by such techniques as blood transfusion; or they may lead to the decision to terminate pregnancy because serious, untreatable disease has been recognized. Other specialized techniques permit examination of the fetus by X-ray and ultrasound, and by electrocardiography and electroencephalography (methods for observing and recording the electrical activity of the heart and the brain, respectively). Fetal blood can be obtained for analysis, and certain techniques permit direct viewing of the fetus. In examination of the infant, inaccessibility is no special problem, but his small size and limited ability to communicate require special techniques and skills. Of even more importance, however, is the fact that adult norms cannot be applied to younger age groups. Pediatric diagnosis requires knowledge of each stage of development, with regard not only to body size but also to body proportions, sexual development, the development and function of organs, biochemical composition of the body fluids, and the activity of enzymes. The development of psychological and intellectual function is equally complex and requires special understanding. Since the various periods of growth and development differ so markedly from one another, they are divided for convenience into the following stages: intrauterine (the period before birth), neonatal (first four weeks), infant (first year), preschool (one to five years), early school (six to 10 years for girls, six to 12 for boys), prepubescent (10 to 12 for girls, 12 to 14 for boys), and adolescent (12 to 18 for girls, 14 to 20 for boys). Only if appropriate norms are established for each stage of development can the child's condition be adequately evaluated and the results of diagnostic tests properly interpreted. Thus, it is of no concern if a 12-month-old infant is unable to walk alone, although some infants are able to do so at nine months of age. The crucial question is at what age one becomes concerned if a developmental milestone has not been reached. Five-year-old boys average 44 pounds (20 kilograms) in weight but may vary from 33 to 53 pounds (15 to 24 kilograms). The hemoglobin level that is of no concern in the three-month-old infant may reflect a serious state of anemia in the older child. The blood levels of certain enzymes and minerals differ markedly in the rapidly growing child from those in the late adolescent, whose growth is almost complete. Failure of a 15-year-old girl to have achieved menarche (the beginning of menstruation) may be indicative of no abnormality in sexual development but requires careful evaluation. Treatment of childhood disease requires similar considerations with regard to various stages of growth and development. Variation in drug dosage, for example, is based not only on body size but also on the distribution of the drug within the body, its rate of metabolism, and its rate of excretion, all of which change during various stages of development. The inability of infants and small children to swallow pills and capsules necessitates the use of other forms and alternate routes of administration. Drug toxicity of importance at one stage of development may be of no concern at another; for example, the commonly used antibiotic tetracycline is best avoided in treatment of the child younger than age 10 because it is deposited in teeth, in which enamel is also being deposited, and stains them. When permanent teeth are fully formed, the deposition of tetracycline no longer occurs. The delayed consequences of certain forms of treatment, especially with radioactive isotopes—substances that give off radiation in the process of breaking down into other substances—might be of no consequence in the case of an elderly person with a life expectancy of 10 or 20 years but might deter a physician from the use of such treatments for the infant with his whole life in front of him. Finally, the nutritional requirements of the growing child must be considered when treatment of disease requires modification of the diet or administration of drugs that may

affect the absorption or metabolism of essential nutrients.

The outlook for recovery from diseases in children is often better than it is for adults, since the child's additional capacity of growth may counteract the adverse influences of disease. The bone fracture that results in permanent deformity in the adult, for example, may heal with complete structural normality in the child, as continued growth results in remodeling and reshaping of the bone. Ultimately, the infant who has one kidney removed because of infection or tumour most likely will have entirely normal renal (kidney) function because the remaining kidney will increase its size and functional capacity with growth. In contrast, removal of one kidney in the adult usually results in a residual functional capacity equal to 70 to 75 percent of that of two normal kidneys.

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