CONTENTS

ARTICLES

403 Childhood Asthma: Update
Gail G. Shapiro

413 Pediatric Pharmacokinetics and Therapeutic Drug Monitoring
Howard L. McLeod and William E. Evans

422 Pediatric Ocular Injuries
Betty R. Klein and Marvin L. Sears

429 Knee and Ankle Injuries in Children
Dennis P. Grogan and John A. Ogden

435 Index of Suspicion
Summer Smith, John L. Green, Susan K. Lynch, and Mark J. Polak

ABSTRACTS

437 Carbohydrate Intolerance

438 Pertussis

COVER

“The Knitting Lesson” (ca 1860) by Jean Francois Millet (1814–1875). Renowned for his peasant paintings, Millet in this painting illustrates the cycles of life and the passing on of skills from one generation to another. One of the major tasks of pediatricians is to teach parents and children skills to promote health. May we do it as gently and lovingly as this mother teaches her daughter knitting. (From the Museum of Fine Arts, Boston, Massachusetts.)

ANSWER KEY


---

**PIR QUIZ**

6. Pharmacokinetics is defined as the effect of the body on a particular drug. In the neonate, each of the following correctly describes a contributing factor in this interaction, except:
A. Total body water approximates 50% of body weight.
B. Orally administered drugs move by “first-pass metabolism” into the circulation.
C. Water content of adipose tissue approximates 55%.
D. More active metabolites result from hepatic phase I transformation.
E. Less binding by serum albumin increases active concentrations of drugs in the circulation.

7. Therapeutic drug monitoring is important for many drugs used in pediatrics. Of the following, the most accurate statement is:
A. Irreversible suppression of iron uptake by the bone marrow is associated with peak chloramphenicol concentrations more than 25 μg/mL.
B. Prompt distribution of digoxin to tissues permits early and accurate measurement of levels.
C. Decreased trough concentrations of gentamicin follow reduced time intervals between doses.
D. Usually appropriate dosages of theophylline may result in toxic levels when given simultaneously with erythromycin.
E. The linear relationship between dosage and plasma level permits accurate changes in phenytoin administration to achieve therapeutic efficacy.

8. Each of the following is a true statement regarding theophylline, except:
A. The rate of methylation of theophylline to caffeine is higher in neonates than in older subjects.
B. Serum half-life is shorter in young children than in adolescents.
C. The binding to serum proteins is less in neonates than in adults.
D. The serum concentrations required for the treatment of apnea approximate those for the treatment of asthma.
E. The inhibitory effect of cimetidine potentiates serum levels to the point of toxicity.

9. Of the following, the most likely maternal medication to be compatible with safe breast-feeding is:
A. Acetylsalicylic acid.
B. Diazepam.
C. Phenobarbital.
D. Lithium.
E. Estrogen/progesterone oral contraceptive.

---

This work is supported by a grant from the National Institutes of Health (NIH R37 CA35401), Leukemia Program Project grant CA20180, CORE Cancer Center Support grant CA21765, a Center of Excellence grant from the State of Tennessee, and ALSAC.
Ocular Injuries


Jury potential. There have been rare but disturbing reports of unilateral and bilateral perforating ocular injuries with subsequent mixed flora endophthalmitis from orthodontic headgear. The children who suffered these injuries were wearing a rigid metallic bow with two projections that fit into the mouth and an elastic strap that fits over the head. The distance between the intraoral prongs approximated that of the interpupillary distance, accounting for the bilateral injury.

Ocular trauma is the most common cause of unilateral blindness in children. These injuries inflict a significant toll on children, their families, the health-care system, and society. Children who have poor vision in one eye have an increased risk of injuring the well-seeing eye. They have altered depth perception and tend to sight balls with their good eye during sports. The American Academy of Ophthalmology has recommended that children with uniocular poor vision be prescribed glasses with polycarbonate lenses for constant wear. Pediatricians and family practitioners are in an excellent position to educate families in their care and in their community about the importance of eye protection and other aspects of ocular injury prevention.

SUGGESTED READING


Friedberg MA, Rapuano CJ, eds. Wills Eye Hospital, Office and Emergency Room Diagnosis and Treatment of Eye Disease. Philadelphia, PA: JB Lippincott Company; 1990


PIR QUIZ

Match presenting symptoms/signs with the most likely underlying injury.

A. Corneal abrasion
B. Corneal laceration
C. Lens dislocation
D. Retinal detachment
E. Posterior rupture of globe
F. Basilar skull fracture

16. The cardinal signs of blow-out fracture include each of the following, except:
A. Foveal “cherry red” spot.
B. Enophthalmos.
C. Loss of sensation over the malar eminence.
D. Diplopia on upward gaze.
E. Positive traction test.

17. You are working in a rural hospital. While examining an adolescent with a minor lid laceration and other facial cuts suffered when he hit a windshield in an automobile accident, you note her left pupil is teardrop-shaped. You suspect a corneal laceration. To assure the best possible outcome, you should promptly carry out each of the following actions, except:
A. Conduct a meticulous examination of the globe.
B. Place a cup-shaped shield securely over the eye to prevent further injury.
C. Assure the patient receives neither food nor drink.
D. Begin intravenous antibiotic therapy.
E. Arrange for immediate transfer to the care of an ophthalmologist.

18. The ocular emergency for which outcome is most critically dependent upon immediate action by the pediatrician is:
A. Retinal detachment.
B. Lid avulsion.
C. Orbital apex fracture.
D. Chemical burn.
E. Hyphema.

19. Which of the following preventive efforts is least likely to reduce the frequency of serious ocular injury?:
A. Strict enforcement of facemask and high-sticking rules in ice hockey.
B. Customary use of protective goggles in racquet sports and basketball.
C. Restricted marketing of BB guns and other nonpowder firearms.
D. Installation of antilacerative windshields coupled with mandatory use of seat belt restraints.
E. Elimination of orthodontic headgear.
Orthopedics
Knee and Ankle Injury

Initial treatment includes rest, ice, compression, and elevation (easily remembered by the acronym RICE). Range-of-motion exercises should begin as soon as the symptoms allow. Specific muscle-strengthening exercises begin when the acute inflammation resolves. Rehabilitation of these injuries may prevent them from becoming a source of recurrent problems.

Fractures involving the distal tibial physis are common, constituting about 10% of all physeal injuries (Fig 8). They occur more frequently in boys, typically between the ages of 11 and 15 years. The pattern of fracture depends on the exact mechanism of injury (ie, the position of the foot at the time of the accident and the direction of the forces applied to the ankle). The most common pattern is the type 2 physeal injury, in which the fracture goes across the physis and out through the metaphysis (Fig 8). The fibula is most often fractured at the same time, usually through the metaphysis. Types 3 and 4 physeal injuries usually occur through the medial malleolus and enter the articular surface of the ankle, making them more severe.

Type 2 injuries require reduction of the growth plate displacement and cast immobilization. Type 3 and 4 injuries require the additional anatomic reduction of the disruption of the joint surface via operative reduction and internal fixation. Smooth pins are used to fix these and other fractures involving the growth plate. This form of operative treatment of type 3 and 4 injuries has been shown to yield significantly improved results compared with treatment by cast immobilization alone.

Complications relate to the extent and exact location of the damage done to the growth plate at the time of the injury. A growth plate injury can produce shortening (with resultant limb length discrepancy) or angular deformity (with resultant malignment of the ankle joint). The significance of the growth plate injury will depend on the number of years of the child’s remaining growth. The best way to avoid or to minimize these complications is to reduce all fractures accurately and to fix internally those fractures that require it, particularly those that enter the joint surface. Operative fixation of fractures involving the growth plates around the ankle is required more often than with other children’s fractures.

Suggested Reading