Pediatrics in Review


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COVER

Each of our 1996 issues of Pediatrics in Review will feature a work of art submitted to our cover art contest this past year. We received more than 200 entries and have chosen 12 to appear on our covers—four from each of three age groups: 5 to 7 years, 8 to 10 years, and 11 to 15 years. The entrants were asked to submit a drawing of what they like to do best. Most of the entries will be displayed by the American Academy of Pediatrics at various sites. This month's work, by 6-year-old Taylor Woolwine, is of him playing basketball with friends in physical education class. Taylor lives in Mechanicsville, MD; his pediatrician is Pablo A. Dublin, Jr, MD.

ANSWER KEY

Reactions to Iodinated Contrast Media

Reaction to Radiographic Contrast Media.
Walker AC, Carr DH. Br J Radiol. 1986;59:531-536


Pretreatment With Corticosteroids to Prevent Adverse Reactions to Non-Ionic Contrast Media. Lasser EC, Berry CC. AJR. 1994;162:523-516


The exact mechanism responsible for adverse reactions to iodinated contrast administered intravenously during radiologic evaluation is not known. However, through work that has been performed both in the laboratory and in clinical trials, we do know that the types of reactions are variable and the underlying etiologies multifactorial. Moreover, reactions can be prevented in many cases through careful choice of contrast agent and pretreatment with corticosteroids and antihistamines.

Adverse contrast reactions can be separated into two broad categories: chemotoxic and anaphylactoid. Chemotoxic reactions are dose-dependent and related to direct chemical effects of the contrast medium. Pain at the injection site and flushing belong in this category; a combination of hypertonicity and calcium binding results in vasodilatation. Nausea and vomiting likely are chemotoxic reactions, but that remains controversial. Reactions that are not dose-dependent and appear similar to allergic hypersensitivity are classified as anaphylactoid. Urticaria, bronchospasm, and angioneurotic edema are examples.

In general, investigators categorize reactions according to their level of severity. Nausea, vomiting, diaphoresis, limited urticaria, and pruritus have been considered minor reactions and usually require no treatment. Moderate reactions include facial edema, extensive urticaria, bronchospasm, or laryngeal spasm not requiring intubation. Although treatment may be necessary, these reactions usually are self-limited. Severe reactions include hypotension, cardiovascular collapse, bronchospasm, laryngeal edema requiring intubation, and any reaction severe enough to warrant hospitalization. Patients at increased risk for adverse reactions include those who have a history of reaction to contrast, major allergies, and asthma.

Although many reactions to iodinated contrast appear similar to those related to allergic hypersensitivity, they have not been proven to be antigen/antibody-mediated. In 1976, Brash demonstrated a higher rate of binding of radiolabeled contrast media in the globulin fraction of patients who had reactions. He also identified the specific antibodies to contrast media in rabbits. Yet, both Lasser and Carr were unable to detect any evidence of specific immunoglobulin (Ig)E or IgM related to contrast media in either animal or human reactors. Iodinated contrast has been shown to have a direct effect on mast cells and basophils, causing release of histamine. Robertson and coworkers demonstrated elevated plasma histamine levels in 80% of patients who received contrast. They were unable to correlate these levels with clinically apparent adverse reactions. Others have demonstrated histamine release along with bradykinin and fibrin split products through activation of the compliment system, which has been shown experimentally to produce symptoms similar to anaphylactic shock.

Since 1929, when Moses Swick introduced the first intravenous contrast agent into clinical practice, much work has been done to decrease the incidence of reactions. One major strategy has been to reduce the chemotoxicity of contrast media. In 1968, Almòn postulated that the hyperosmolality of contrast was the major cause of reactions. Since then,
retested for neuroblastoma at intervals if the first evaluation is negative. Periodic reassessment may be indicated in secondary dyskinesias for which no etiology has been found.

SUGGESTED READING

Cosgrove AP, Corry IS, Graham HK. Botulinum toxin in the management of the lower limb in cerebral palsy. Dev Med Child Neurol. 1994;36:386–396

PIR QUIZ

6. Which one of the following statements regarding tic disorders is true?
A. Behavior modification is an important component of therapy.
B. Girls are more affected than boys.
C. Magnetic resonance imaging frequently demonstrates the etiologic abnormality.
D. Movements are exaggerated with anxiety.
E. Voluntary activities requiring concentration worsen abnormal movements.

7. A 2-month-old child presents with nonrhythmical, spontaneous, multidirectional, chaotic eye movements and jerky movements of extremities that were first noticed 1 month ago. He appears active during these movements. Which one of the following conditions is most likely associated with these symptoms?
A. Epilepsy partialis continua.
B. Infantile spasms.
C. Neuroblastoma.
D. Sandifer syndrome.
E. Tay-Sachs disease.

8. Which of the following is associated with Gilles de la Tourette syndrome?
A. Brief periods of loss of consciousness.
B. Gastroesophageal reflux with torticollis.
C. Infantile spasms.
D. Laboratory evidence of prior streptococcal infection.
E. Obsessive/compulsive behavior.

9. Immunomodulation with intravenous immune globulin (IVIG) should be considered in:
A. Drug-induced dyskinesia.
B. Gilles de la Tourette syndrome.
C. Infantile spasms.
D. Rheumatic chorea.
E. Sandifer syndrome.

10. A 4-year-old child presents with facial distortion, torticollis, and opisthotonus following accidental ingestion of prochlorperazine. Which one of the following drugs is most appropriate for treatment?
A. Clonidine.
B. Diphenhydramine.
C. Haloperidol.
D. Lorazepam.
E. Phenobarbital.
FLUIDS & ELECTROLYTES
Clinical Aspects

PIR QUIZ

11. The most correct statement regarding oral rehydration therapy (ORT) is:
   A. All rehydration solutions contain equivalent amounts of glucose and electrolytes.
   B. Commercial "Gatorade" with a sodium concentration of 20 mEq/L is an acceptable oral rehydration solution.
   C. Continuing diarrhea is a contraindication to the use of ORT.
   D. Oral rehydration solutions should be given at a rate of 100 mL/kg over 6 hours for moderate dehydration.
   E. Use of ORT is limited to patients older than 12 months of age.

12. An 18-month-old boy is admitted to the hospital with a history of diarrhea and vomiting for 3 days. On physical examination he is unresponsive and has occasional twitching of the arms and legs. Dehydration is estimated to be 10%.
   A. Admission serum electrolytes are: Na⁺, 115 mEq/L; Cl⁻, 83 mEq/L; HCO₃⁻, 15 mEq/L; and BUN, 44 mg/dL. On a randomly obtained urine, the specific gravity is 1.022 and Na⁺ is 12 mEq/L. The most appropriate immediate management for this patient is:
      A. Intravenous administration of 0.45% saline in glucose at a rate of 20 mL/kg over 12 hours.
      B. Intravenous administration of 3% saline calculated to raise serum Na⁺ by 1 to 2 mEq/L over 8 hours.
      C. Intravenous furosemide 2 mg/kg to promote increased extracellular osmolality by water loss.
      D. Intravenous phenobarbital in a loading dose of 15 to 25 mg/kg followed by intravenous fluids containing 0.6% NaCl.
   B. Correction of elevated serum sodium should proceed at a rate of 10 mEq/L or less over each 24 hours.
   C. Daily maintenance requirements of sodium at 3 mEq/kg are needed.
   D. Intracellular osmolality and extracellular osmolality are balanced due to the generation of intracellular "idiogenic osmoles."
   E. The presence of excess body sodium mandates use of electrolyte-free solutions for initial rehydration.

13. All of the following statements about hypernatremic dehydration are true except:
   A. An initial fluid infusion of 20 mL/kg of body weight is needed to restore effective plasma volume.
   B. Correction of elevated serum sodium should proceed at a rate of 10 mEq/L or less over each 24 hours.
   C. Daily maintenance requirements of sodium at 3 mEq/kg are needed.
   D. Intracellular osmolality and extracellular osmolality are balanced due to the generation of intracellular "idiogenic osmoles."
   E. The presence of excess body sodium mandates use of electrolyte-free solutions for initial rehydration.

14. A 4-year-old girl is admitted to the hospital with a history of repeated nonbilious vomiting for 2 days. There is no history of fever or diarrhea. On physical examination, dehydration is estimated to be moderate. The girl is somnolent but recognizes her parents. Her breathing is slightly labored. Admission serum electrolytes are: Na⁺, 134 mEq/L; Cl⁻, 98 mEq/L; HCO₃⁻, 14 mEq/L; and BUN, 42 mg/dL. Arterial pH is 7.25. By use of the formula for calculation, the anion gap is estimated to approximate:
   A. 4 mEq/L.
   B. 12 mEq/L.
   C. 22 mEq/L.
   D. 34 mEq/L.

15. For the patient in question 14, the combination of the clinical picture and the estimated anion gap is most consistent with the diagnosis of:
   A. Acetaminophen intoxication.
   B. Acute renal tubular necrosis.
   C. Acute respiratory alkalosis.
   D. Diabetic ketoacidosis.
   E. Meningitis with inappropriate antidiuretic hormone.

POINT-COUNTERPOINT

Acute Asthma Therapy

A reader noted: "I am surprised to find no mention of inhaled steroids in the article by Drs. Murphy and Kelly 'Advances in Management of Acute Asthma in Children' (July 1996). Their article is the only one I have come across that avoids mentioning the use of inhaled corticosteroids in children during the last 4 to 5 years when there seems to be a concerted effort to get pediatricians to use them."

Drs. Kelly and Murphy respond: "We appreciate your concerns about our lack of discussion of inhaled corticosteroids. However, our charge for the article was to review the current treatment of acute exacerbations of asthma, including exercise-induced bronchospasm. As inhaled corticosteroids currently are not indicated for the treatment of acute exacerbations or for protection against exercise-induced asthma, we did not include them in our discussion. As you pointed out, their use is being promoted for childhood asthma and as early intervention to alter the course of the disease. This is receiving quite a lot of interest. However, there are still unanswered questions about inhaled corticosteroids in children that would take an entire monograph to outline and would be suitable for an article in Pediatrics in Review. Until that time, might we suggest a recent article that provides an excellent summary of the issues surrounding inhaled steroid use: Kamada, Szefler SJ, Martin RJ, et al. Issues in the use of inhaled glucocorticoids: The Asthma Clinical Research Network. Am J Respir Crit Care Med. 1996;153:1739–1748."