Cow's Milk Protein Allergy in Infants and Children

Description/Etiology

Cow’s milk protein allergy (CMPA; also called cow’s milk allergy [CMA] and cow’s milk protein intolerance [CMPI]) refers to an immunologic reaction to one or more of the proteins found in cow’s milk (commonly referred to as cow’s milk proteins [CMPs]) that results in adverse systemic manifestations (e.g., asthma, eczema, rhinitis) and gastrointestinal signs and symptoms (e.g., diarrhea, vomiting, colic). Most signs and symptoms of CMPA manifest in early infancy if the infant is fed formula and manifest after weaning in infants who are breastfed. Less frequently, breastfed infants react to CMPs that are consumed by the mother when they are delivered through breast milk.

There are 2 types of CMPA: the immunoglobulin E (IgE)-mediated type, in which histamine is released during exposure to an antigen, and the non-IgE-mediated type. IgE-mediated CMPA typically triggers vomiting, angioedema, and/or urticaria within an hour of ingestion of CMPs. Signs and symptoms of non-IgE-mediated CMPA develop within 1 hour to several days following exposure to CMPs and include diarrhea, atopic dermatitis, and/or general intestinal discomfort.

The most accurate method for diagnosing CMPA is to eliminate CMPs from the infant’s diet to assess if signs and symptoms improve and perform a challenge test with CMP to evaluate for the return of signs and symptoms. Treatment of CMPA requires eliminating all sources of dietary CMPs. In some cases, this can be accomplished by exclusive breastfeeding for the first 4–6 months of the infant’s life unless the infant develops signs and symptoms of reaction to the CMPs in breast milk. If the infant reacts to breast milk, the mother can attempt to eliminate all sources of CMPs from her diet, the infant can be fed an extensively hydrolyzed infant formula (e.g., Nutramigen or Alimentum, in which a process of enzymatic hydrolysis has been used to break down CMPs to amino acids), or the infant can receive a free amino acid-based formula (e.g., Neocate, EleCare). All of these formulas are expensive, leading many clinicians to recommend initially giving the infant a more economical soy-based formula (e.g., Isomil, Alsoy). However, about 50% of infants with CMPA also demonstrate sensitivity to soy protein. Goat’s milk should not be considered as an alternative to cow’s milk because it cross-reacts with CMPs and is deficient in folic acid. Rice milk is not recommended for children under 5 years of age due to its relatively high arsenic content.

Facts and Figures

CMPA is responsible for one-fifth of food allergies in children in the United States, affecting approximately 2.5% of babies under 12 months of age. Many affected infants develop a tolerance for CMP as they mature. In fact, study results suggest that 80–90% of children outgrow their allergy to CMPs by 3 years of age.

Risk Factors

Children are more likely to have CMPA if they have a family history of allergy-related conditions (e.g., asthma, eczema, hay fever, food allergies). Asian and Black children are less likely to have CMPA than White children.
Signs and Symptoms/Clinical Presentation

Infants and children with CMPA exhibit a wide range of signs and symptoms, including colic, diarrhea, vomiting, gastrointestinal bleeding, gastroesophageal reflux, chronic constipation, sleeplessness, wheezing, rhinitis, bronchitis, asthma, sneezing, coughing, eczema, excessive crying or fussiness, anaphylaxis, and failure to thrive.

Nutritional Assessment

› **Patient Medical History**
  - Ask about signs and symptoms (e.g., vomiting, diarrhea, constipation) that can indicate inadequate intake of nutrients or fluid and can negatively affect appetite

› **Physical Findings of Particular Interest**
  - Many children with CMPA also have eczema
  - Pallor may indicate anemia as a result of gastrointestinal bleeding

› **Patient Dietary History**
  - Ask the parents about the infant’s/child’s feeding history, including whether he/she was exclusively breastfed or received formula, the type of formula if appropriate, and the timing and description of signs and symptoms in relation to the time of feedings

› **Anthropometric Data**
  - Anthropometric tools are available for the measurement of adequate nutrition in children
    - The Centers for Disease Control and Prevention (CDC) have established references for weight and growth patterns, which can be tracked on weight-for-age/height-for-age/weight-for-height age-based growth charts; as well as Body Mass Index (BMI) for age charts which assist in the calculation of BMI for ages 2 to 20 years

› **Laboratory Tests and Diagnostic Tests of Particular Interest to the Nutritionist**
  - CBC, including hemoglobin and hematocrit, may identify anemia and/or malnutrition
  - Blood testing may show nutrient deficiencies (e.g., iron, folate, calcium, essential fatty acid, vitamin D)

Treatment Goals

› **Promote Resolution of Nutrient Deficiencies and Symptomatic Relief, and Increase Parental Knowledge Regarding CMPA**
  - Monitor weight and results of laboratory tests and review feeding history; report abnormalities to the treating physician
  - Evaluate for signs and symptoms (nausea/vomiting/diarrhea/constipation) of CMPA and adjust dietary care plan if indicated
  - Review diet history information to assess dietary intake and patterns and provide detailed education to the parent (and child if age-appropriate) regarding a CMPA-appropriate diet/feeding plan
    - Provide breastfeeding mothers with encouragement and dietary recommendations for alleviating symptoms in breastfed infants with CMPA
    - Provide feedings with prescribed formula that replaces cow’s milk and educate parents on the risks, benefits, and details of the prescribed feeding regimen
  - Assess parental anxiety level and for knowledge deficits regarding CMPA; provide emotional support and educate about CMPA signs and symptoms, treatment risks and benefits, and individualized prognosis
  - Request referral, if appropriate, to a social worker for identification of local resources for inexpensive formula and/or for subsidy programs to offset cost of formula

Red Flags

› Parents commonly suspect food allergy when their infant/child develops signs and symptoms of CMPA and often attempt to restrict or make changes in the diet to prevent allergic reactions. Dietary changes that are often made by parents include switching to goat’s milk, soy milk, or rice milk; watering down formula; and/or giving juice instead of formula. These dietary changes can result in the development of nutrient deficiencies, gastrointestinal manifestations, and in some cases failure to thrive. It is important to educate parents regarding healthy alternatives for feeding infants and children with CMPA

What Do I Need to Tell the Patient/Patient’s Family?

› Exclusive breastfeeding for the first 6 months of the infant’s life is the best choice for most babies with CMPA
› If an exclusively breastfed infant continues to exhibit signs and symptoms of CMPA, it may be helpful for the mother to eliminate all CMPs and soy from her diet to prevent the transfer of CMPs and soy proteins through breast milk
When exclusive breastfeeding is not possible, giving extensively hydrolyzed or free amino acid-based formulas is recommended as the best feeding option.

Introduction of solid food should be delayed until the infant with CMPA is at least 6 months of age. Foods should be offered one at a time for a period of several days in order to monitor for allergic reactions. All foods containing CMPs or soy should be avoided until the child is at least 12 months of age and should then be introduced in very small amounts in order to monitor tolerance.

It is important to read product labels when introducing solid foods. Terms that indicate the presence of cow’s milk include casein, caseinates, curd, lactoglobulin, lactose, milk solids, whey, buttermilk, milk sugar, whey sugar, and whey syrup sweetener.

In most affected children, CMPA resolves by 3 years of age.

Discharge Planning

Provide dietary and feeding recommendations to the parent (and child if age-appropriate) according to the specific needs of the individual patient. Plan should include recommendations as outlined in What do I Need to Tell the Patient/Patient’s Family, above.

References