Predicting Outcomes in Food Challenges: What's the Score?

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Charles May introduced physician-supervised diagnostic double-blind placebo-controlled oral food challenge into mainstream clinical practice in 1976 [1]. Since then, the oral food challenge has been accepted as a procedure that can be used to definitively establish whether a food is the cause of adverse reactions [2,3].

OFC may be performed to confirm that an allergic or other adverse reaction to a food or food additive exists or that it has resolved [4]. The decision to proceed to OFC is complex and may be influenced by many factors, including the patient's medical history, age, past adverse food reactions, skin-prick tests and serum food-specific immunoglobulin E antibody tests, and concomitant food allergies [5]. The decision is also influenced by the importance of the food to the patient due to its nutritional value, its universal presence in commercial foods or ethnic diets, and by the patient's/family's preferences.

Oral food challenges can be performed openly or in a single or double-blinded manner. OFCs are expensive, time and labor-consuming and usually are not easily available for patients. They are considered safe; there have been no associated deaths from OFC reported in the literature indexed since 1976 in Pubmed. However, OFCs do have inherent risks, including acute allergic reactions with potentially life-threatening anaphylaxis, exacerbation of atopic dermatitis, and emotional distress – particularly in older children, teenagers and adults who may become more anxious about their food allergy. In patients with cardiovascular disease, anaphylaxis or its treatment could result in morbidity. A possible effect of a positive OFC on preventing or delaying resolution of a food allergy has not been studied systematically. The benefits of a positive OFC include a conclusive diagnosis of food allergy demonstrating the need for continued counseling in strict avoidance of the food, reduced risk of inadvertent exposures, reduced anxiety about the unknown, and validation of the patients' and families' efforts to avoid a food. The benefits of a 'negative' OFC include expanding the diet and improving the patient's nutrition and quality of life.

In spite of the clear benefits of the OFCs, they are frequently deferred due to the concern regarding severe reactions. To address this obstacle, Cianferoni and colleagues [6] developed a Food Challenge Score, a system that could predict the anaphylactic reaction as an outcome of an OFC. They retrospectively analyzed data from over 1000 OFCs to cow's milk, egg and peanut performed openly over a 5 year period. Overall, 47% of the challenges resulted in an allergic reaction; 24% patients developed anaphylaxis (defined as a multisystem reaction), and 10.7% reacted to less than 1 g (eliciting dose) of the challenge food. They observed no significant differences in reaction severity of the eliciting dose between children with or without prior reaction history. The children with a multisystem reaction were older and had a past history of non-cutaneous reactions. Among the children with prior history of reactivity, 21% had multisystem reactions. Using a multivariate regression analysis they identified factors independently associated with a positive OFC. These factors included age older than 5 years, prior reaction with gastrointestinal or respiratory symptoms or anaphylaxis, skin-prick test wheal greater than 9 mm, and serum food-specific IgE concentration greater than 5 kU/L. The probability of anaphylaxis and anaphylaxis to less than 1 g of food during an OFC increased with increased score for all tested foods.

These findings are interesting and could be used to facilitate selection of the optimal candidates for office food challenges. However, the proposed system has some limitations. First, even with the score of 4, the probability of anaphylaxis during challenge was only 0.45 for milk and about 0.05–0.1 for egg and peanut. Second, with the score of 0, the probability of anaphylaxis to milk was about 0.65. This underscores the critical importance of having emergency medications immediately available at the bedside during oral food challenges and close monitoring during and following the OFC. Third, there were no data provided regarding the distribution of the challenge score in the studied population and whether the scores were distributed normally or skewed towards lower or higher scores, which might have affected the probability curves. Finally, clinical judgment might override the scoring system. For example, a 3 year old child who recently developed diffuse hives following ingestion of a food contaminated with peanut and whose peanut-IgE is 4 kU/L and SPT 6 mm has a score of 0 but would not usually be considered for a

OFC = oral food challenge

challenge in clinical practice. In contrast, a teenager with a distant history of peanut anaphylaxis, peanut IgE 5 kU/L, SPT wheal size 10 mm and a recent accidental ingestion of a small amount of peanut candy without symptoms would be considered for a challenge with a score of 3. The authors also did not discuss the difference between their proposed score and the epidemiological risk factors for anaphylaxis, such as asthma, that was not included in their score. It might have been due to the high frequency of asthma among the study subjects, but without a better characterization of the baseline clinical features of the study population it is not possible to draw conclusions on this issue.

Nevertheless, the Food Challenge Score seems to identify subjects at high risk for a severe reaction during the oral food challenge and may merit validation in studies with a more rigorous design and in different patient populations.

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