



of allergy

Cow's Milk Protein Allergy

Cassie visits Dr Do-a-lot with Clover her 6-month old baby girl.

A gentle 'Tell me how you are,' from Dr Do-a-lot elicits floods of tears from an exhausted mother as she tries to explain why she has come to see an allergy specialist.

Clover has eczema. Cassie thinks that she may be allergic to milk. Even cheese and yogurt appear not to agree with her.

She is not sure what else she may be allergic to, and between her friends, the Internet and the baby clinic, she is desperate for consensus on what to feed her child, and when and how to start.

Dr Do-a-lot gleans the following history:

Clover was born by caesarean section at term. She weighed a respectable 3,1 kg, and appeared entirely well.

The family slept poorly for the first few months as Clover suffered from colic.

She was breast-fed until Cassie had to return to work when Clover was 4-months old. She tried to express milk but could not produce the volumes required, so Clover was weaned onto a cow's milk formula. She seems irritable after feeds and sometimes develops a red flare around her mouth after feeds with occasional associated small, raised, red itchy hives. Her eczema appears to have become more severe since then. It is hard to tell if the eczema flares are directly related to feeds because Cassie is at work much of the time. She also wonders if perhaps the symptoms are due to separation anxiety and an aversion to the bottle.

She has introduced solids and Clover eats well. She has only allowed her fruit, rice, lamb and biscuits as she is afraid that Clover may develop allergies to potentially allergenic proteins like peanuts, egg and fish.

Clover's 4-year old brother, Cleo, has asthma and her father suffers from persistent allergic rhinitis.

Dr Do-a-lot examines Clover.

She is miserable and has severe eczema on her trunk, face and arms. She has dropped a centile line for weight but she is growing well. Her ears and chest are clear and the rest of her examination is unremarkable.

With the calm and expert help of Sister Sweet, Dr Do-a-lot performs skin prick tests on a clear area of skin on Clover's back.

She tests positive to milk with a wheal of 7 mm and a flare of 17 mm. She also reacts to egg, but the wheal is smaller at 4 mm with a flare of 10 mm. The rest of the paediatric food panel, including wheat and soya, is negative.

Dr Do-a-lot also tests for allergies to inhaled allergens. She reacts to house dust mites.



Cassie and Clover

References:

1. World Allergy Organization Disease Summaries. Cow's Milk Allergy in Children. Updated July 2012 http://www.worldallergy.org/professional/allergic_diseases_center/cows_milk_allergy_in_children/
2. Koletzko et al. Diagnostic approach and management of cow's milk protein allergy in infants and children: ESPGHAN GI Committee practical guidelines. *J Pediatr Gastroenterol Nutr* 2012;55(2):221-9

Shaunagh Emanuel

MBChB

The Asthma Clinic, Rondebosch, Cape Town, South Africa

Di Hawarden

MBChB

Division of Allergology, Department of Medicine, Groote Schuur Hospital, Observatory, Cape Town, South Africa

Dr Do-a-lot concludes that Clover probably has Cow's Milk Protein Allergy (CMPA) on the basis of a compelling history and a strongly positive SPT result with a wheal of over 6 mm in diameter.

She advises Cassie that in order to confirm the diagnosis, and the possible relationship to her eczema symptoms, it will be necessary to eliminate all milk products from Clover's diet for a few weeks.

Should her symptoms improve she will be 'challenged' with a milk feed to see if she develops symptoms again.

Dr Do-a-lot discusses various milk substitute options, taking into account availability and cost.

They decide upon an extensively hydrolysed formula for the elimination test, with a view to possibly introducing soya milk as a long-term solution, should the elimination test confirm cow's milk allergy.

Dr Do-a-lot recommends that Cassie consult a dietician with experience in allergy in order to successfully accomplish absolute elimination of obvious and hidden sources of cow's milk from the diet.

Dr Do-a-lot arranges open food challenge testing for baked egg in response to Clover's possible egg allergy. She tolerates baked egg. The cooked egg challenge that follows is less successful and Clover vomits shortly after ingesting a spoon of scrambled egg. Egg is therefore excluded from her diet. She is allowed baked products like muffins that contain small amounts of baked egg.

Wheat has been part of Clover's diet since she was able to hold a 'finger biscuit'. She appears to tolerate wheat and her SPT is negative for wheat, so Dr Do-a-lot recommends that wheat remain a regular part of her diet.

She plans for a follow-up appointment to discuss introducing other highly allergenic proteins like soya, peanut, fish and tree nuts that have until now been carefully excluded from her diet. Should she tolerate these proteins they will be included in her diet regularly in order to maintain tolerance.

The dietician assists Cassie in planning a 4-week strictly milk-free diet for Clover. Clover adapts well to the plan and when she returns to see Dr Do-a-lot a month later, she is a much happier child. Her eczema is well controlled and she has gained weight.

An open milk challenge is conducted in a unit with resuscitation facilities, as anaphylaxis is a potential risk, especially after prolonged elimination of an allergenic food.

Clover develops mild urticaria and gastrointestinal symptoms shortly after exposure to a milk feed and her eczema flares spectacularly a few hours later.

Milk sensitivity (and a relationship to eczema flares) is confirmed by the elimination and open challenge test. A baked milk oral challenge test is scheduled for a later date.



Dr Do-a-lot discusses a long-term plan for a milk substitute with Cassie.

Soya milk is a possible option, but there is a 15% chance of cross reactivity with cow's milk protein, and a 25% chance that Clover will become sensitive to it.

An extensively hydrolysed formula is an option. These may trigger allergic reactions in patients with CMPA because they are not broken down to their amino acid building blocks and therefore may be recognisable to the immune system, however in infants that have tolerated breast milk they are a good option.

The safest processed milk feed is an amino acid formula but this is also the most expensive.

More affordable amino acid formula feeds are, however, becoming available. Clover continues on the extensively hydrolysed formula as she tolerated it well. Soya milk formula remains an option for her in the future.

Dr Do-a-lot discusses milk and egg avoidance measures. Risk reduction measures are put in place. Cassie receives education regarding anaphylaxis and how to use an adrenaline auto injector, as well as a written action plan and advice regarding a MedicAlert bracelet. A follow-up appointment is made which will include education regarding house dust mite avoidance. A repeat visit to the dietician is arranged for ongoing support, education and advice regarding feeding and supplementation



Cassie has some questions for Dr Do-a-lot...

Q: Why did we do an elimination test when the SPT for milk protein was positive?

A: A positive SPT indicates that a patient has been sensitised to a protein, but this does not necessarily mean that their clinical symptoms are caused by the allergen. It is important to confirm the clinical manifestation of the sensitivity by performing a food challenge, or, especially in a patient with eczema, by eliminating then re-introducing the protein. Unfortunately many children have foods to which they are not truly allergic, excluded from their diets unnecessarily on the strength of a SPT or Specific IgE test alone.



Q: What is the difference between CMPA and Lactose intolerance?

A: CMPA is an IgE-mediated allergy to the PROTEINS in milk.

Milk is made up of casein and whey proteins. The casein proteins form the 'curds' when milk is left to sour. The watery part is called whey. It is heat labile, so patients who are allergic to alpha-lactalbumin and/or beta-lactoglobulin in the whey fraction may tolerate 'Long Life' milk as it is heated to temperatures that denature whey proteins.

Lactose intolerance occurs in individuals who cannot break down milk SUGAR because they lack the enzyme to do this.

The gastrointestinal symptoms that they suffer are due to the osmotic action of the undigested sugars in the intestine, and bacterial metabolism of the sugar.

There are no reliable tests for the diagnosis of non IgE-mediated CMPA.

Q: What are some of the common symptoms of CMPA?

A: CMPA may present with GIT symptoms like vomiting, diarrhoea or cramps, skin manifestations like urticaria or eczema or respiratory manifestations like rhinorrhoea or wheeze. Anaphylaxis may occur in severe food allergy.

Q: Specific IgE and skin prick tests measure IgE-mediated sensitivity to allergens. Is all milk allergy IgE-mediated? Can other parts of the immune system be implicated in a reaction to milk? If so, how do we test for these?

A: Milk allergy may be IgE-mediated, non IgE-mediated, or mixed. Other immune cells like Eosinophils and T-cells may play a role in sensitivity to cow's milk protein.



Blood sample for Specific IgE testing



Skin Prick Test

Q: How common is CMPA?

A: CMPA occurs in about 2-5% of children. It is most common in infants, peaking in the first 3 years of life. Most children (80%) will have outgrown their allergy by 6 years of age. Common food allergens in children include egg, cow's milk, peanut, fish and wheat.

Q: Can I use goat's milk as a feed if my child is allergic to cow's milk?

A: These are both mammalian milks that are immunologically similar and have a high level of cross reactivity. Goat's milk is also high in sodium and is not recommended as a whole cow's milk substitute.

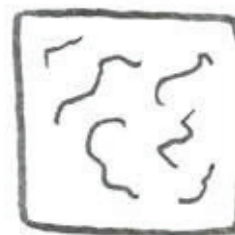
Q: I find the different cow's milk formulae confusing. Can you explain the difference between them?

A: The immune system recognises protein structures that are built out of elements called amino acids. Whole cow's milk formulae contain intact milk proteins that are easily recognised by the immune system and are therefore allergenic. Partially hydrolysed formulae contain protein structures that have been broken down to smaller molecules. Extensively hydrolysed formulae are made up of very small peptide chains that are less easy for the immune system to recognise. Amino acid formulae are made up of the building blocks of proteins called amino acids. The immune system does not recognise these.

Dr Do-a-lot makes a sketch to illustrate her explanation.



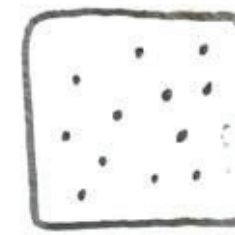
Cow's milk formula



Partially hydrolysed cow's milk formula



Extensively hydrolysed cow's milk formula



Amino acid formula

Dr Do-a-lot's sketch of proteins, peptides and amino acids