Infantile Colic – a guideline emphasising simple measures of support – and when Cows' Milk Allergy should be considered the cause

Kate Maslin, Trevor Brown & Carina Venter

Authors

Kate Maslin MSc. RD.
Allergy Research Dietitian
David Hide Asthma and Allergy Centre
St. Mary's Hospital
Isle of Wight
PO30 5TG
kate.maslin@port.ac.uk

Trevor Brown MRCP FRCPCH
Consultant in Paediatric Allergy
The Children's Allergy Service
Ulster Hospital
Northern Ireland
BT16 1RH
trevorbrown65@hotmail.co.uk

Carina Venter PhD. RD.
Allergy Specialist Dietitian
David Hide Asthma and Allergy Centre
St. Mary's Hospital
Isle of Wight
PO30 5TG

Senior Lecturer, University of Portsmouth
2 King Richard the 1st Road
Portsmouth
PO1 2FR
carina.venter@port.ac.uk

Key learning points
1. Infantile Colic is common and often causes both infants and their carers considerable distress.
2. The cause or causes remain largely unexplained and there is little evidence to support therapeutic interventions. For most infants the key management approach is to advise simple measures and to ensure there is appropriate support in place for families.
3. In a small subset of infants, the cause will be Cows' Milk Allergy (CMA) and it is important to recognise which infants need this diagnosis to be properly explored.

Introduction

Colic is characterised by inconsolable excessive crying in the early weeks of life in an otherwise healthy infant. It is a common problem, estimated to effect between 5-19% of infants (1). Although the exact causative mechanism of colic remains unclear, it has been hypothesised that in some cases dietary allergens may be implicated in its cause and treatment (2). This article will provide an overview of colic and explore the possibility of a link between colic and Cows' Milk Allergy (CMA).

Diagnosis of colic

Although different definitions of colic exist, the most commonly accepted definition was first published in 1954 by Wessel et al. (3) and follows a 'rule of threes': "unexplained crying lasting > three hours a day, for > three days a week for > three weeks of duration". During the episodes of crying, infants may also draw up their legs, arch their back, have a flushed face, pass wind and have a rigid abdomen. Infants presenting with these symptoms should be assessed by a qualified medical practitioner to rule out other diagnoses (4). In some cases, excessive crying may mean an infant is presenting in pain, needing urgent investigation (see "warning signals" in Figure 1). Box 1 lists factors that should be considered before making a diagnosis of infantile colic.

History taking and examination in suspected infantile colic

- General health of the infant
- Antenatal and perinatal history
- Onset and length of crying
- Stool pattern (is the infant constipated?)
- Feeding assessment (check feeding technique)
- Maternal diet if breastfed (is it high in caffeine, carbonated drinks or spicy food?)
- Family history of allergy
- Parent's response to colic episodes
- Factors which lessen or worsen the crying episodes

Box 1. History taking and examination in suspected infantile colic (4)

Natural history and consequences of colic

Colic is thought to be largely a benign and transient condition that presents in the first 6 weeks of life and resolves spontaneously by approximately four months of age. Despite its short-lived nature, understandably the repeated bouts of crying can cause considerable parental distress. Perhaps unsurprisingly unexplained crying is the most common presentation to paediatricians in the first 16 weeks of life (5). In general, colic is not thought to have any long term health consequences, however it has been suggested that infants with colic may be more likely to have feeding difficulties (6) and that infants with severe cases of colic may be more likely to

experience recurrent abdominal pain and allergic disorders at the age of 10 years old (7).

Causes of colic

Despite several decades of research, the precise cause or causes of colic remain unknown. Numerous mechanisms have been proposed; including food hypersensitivity, gut dysmotility or immaturity, behavioural factors, maternal smoking and altered gut microflora, however it is possible that the cause is multifactorial, with inconsolable crying as the final common outcome (8). Breastfeeding does not appear to be protective against colic, as colic affects both breast and formula fed infants equally (1).

Colic as a presentation of Cows' Milk Allergy

In the UK, it is estimated that approximately 3% of infants experience CMA (9). Infants are exposed to cows' milk protein via the maternal diet if breastfed, via standard infant formula, or when solids are introduced. It is therefore not surprising that cows' milk is often identified as a possible cause for gut and skin problems, particularly in early infancy. It is known that parents may incorrectly perceive their child to have a food allergy (10) and that cows' milk free diets are sometimes initiated unnecessarily (11,12).

As can be seen in Table 1, infantile colic is listed by the National Institute of Clinical Excellence (NICE) food allergy guideline as one of the symptoms of food allergy (13). However, infants with CMA don't often present with colic as an isolated symptom. Typically, there may be some other skin and/or respiratory symptoms in addition to gastrointestinal symptoms.

Gastrointestinal	**Skin**	**Respiratory**
Gastro-oesophageal reflux disease Loose or frequent stools Blood and/or mucus in stools Abdominal pain ***Infantile colic*** Food refusal or aversion Constipation Perianal redness Angioedema of the lips, tongue and palate Oral pruritus Nausea Vomiting Diarrhoea Faltering growth plus one or more gastrointestinal symptoms above	Pruritus Erythema Acute urticaria Acute angioedema (most commonly in the lips and face, and around the eyes) Atopic eczema	Upper respiratory tract symptoms – nasal itching, sneezing, rhinorrhoea or congestion (with or without conjunctivitis) Lower respiratory tract symptoms (cough, chest tightness, wheezing or shortness of breath)

Table 1. Signs and symptoms of food allergy (13)

The NICE guideline (13) emphasises that food allergy should be particularly considered:
1) in infants where there is a family history of allergic disease (but no family history of allergy does not exclude the possibility of becoming allergic)
2) in infants where symptoms are persistent and affecting different organ systems and
3) in infants who have been treated for moderate to severe atopic eczema, Gastro Oeosphageal Reflux Disease (GORD) **or other persisting gastrointestinal symptoms (including 'colic'**, loose stools, constipation), but have not responded to the usual initial therapeutic interventions.

Colic and exclusion diets

Studies of exclusion diets, both maternal and infant, have yielded conflicting results, perhaps because many of the studies have small sample sizes and are prone to bias (14). In one study, maternal consumption of cruciferous vegetable (e.g. broccoli, cabbage, cauliflower) and onions was associated with increased colic, with no effect of chocolate or garlic (15). A systematic review concluded that changing the maternal diet to reduce the burden of allergy-associated foods can provide some benefit in reducing infantile colic in breasted infants (14). However, this must be weighed against the difficulties and practicalities of ensuring a balanced and adequate maternal diet to meet the demands of breastfeeding when excluding major food groups. In addition, it has been acknowledged that a placebo effect is often seen, with improvements in colic symptoms also reported in the control group of infants (16).

The evidence from the systematic review also suggests that the use of hydrolysed infant formula can be effective in reducing the symptoms of infant colic in formula fed infants, however consideration should be given to the resource and cost implications of such a measure. The NHS guidelines on routine postnatal care of women and their babies (4) which are due for review in September 2014, state that "use of hypoallergenic formula in bottle fed babies should be considered, but only under medical guidance". Unsupervised dietary exclusions can put infants at risk of nutritional deficiencies (17) or at risk of a more serious allergic reaction when cows milk is reintroduced (18), hence they should only be initiated under the advice and guidance of an experienced dietitian.

Case study one

Lucy was born at full term and was exclusively breastfed. From the age of four weeks she began to develop symptoms of colic, crying inconsolably for several hours every evening. Usual soothing techniques and colic drops were unsuccessful in reducing Lucy's crying episodes. Lucy continued to feed on demand and her weight gain was tracking along the 25th centile, but she regurgitated large volumes after each feed and her stools were very hard and difficult to pass. Lucy developed eczema at seven weeks of age. The areas of eczema on her face became more inflamed and irritated after each feed. Lucy was brought to her GP at 10 weeks old, who recommended a strict maternal milk free diet for four weeks, with a prescription of a calcium and vitamin D supplement. Although Lucy's mother found the exclusion diet difficult to follow initially, after four days there was a considerable reduction in the length of Lucy's crying. Her stools become softer and easier to pass, she was no longer regurgitating her feeds and the eczema on her face had cleared. Lucy was referred to a paediatrician and dietitian at age 14 weeks where the diagnosis of Cows' Milk Allergy was confirmed and appropriate weaning advice was provided.

Management and treatment of colic

NHS guidelines recommend that colic is best managed by providing parental reassurance that colic is a phase that will resolve spontaneously (4It emphasises the importance of peer support and suggests that such measures as gentle motion, 'white noise', baby massage and holding the infant may provide some comfort and relief during the crying episodes. There is insufficient evidence that medical treatments, such as lactase and simeticone drops are effective and they should only be tried if parents are unable to cope despite advice and reassurance, and discontinued if there is no improvement after one week. A systematic review of manipulative therapies (chiropractic, osteopathy and cranial manipulation), found some reduction in crying, however overall the studies had too few participants and were of insufficient quality to recommend manipulative therapies as a treatment for colic (8). The accompanying algorithm (Figure 1) provides a summary of the diagnosis and management of infantile colic.

Case study two

William was formula fed from birth and fed approximately every 3-4 hours. From three weeks old he became increasingly uncomfortable after each bottle, he passed large amounts of wind and began to refuse some feeds. Around six weeks old the symptoms worsened and he became very unhappy, crying for prolonged periods of time inexplicably between feeds. This caused a lot of stress for his parents, who suspected his milk was the cause of his symptoms. Three different brands of formula were trialled, including a 'comfort' milk, with no improvement. William was brought to his GP at nine weeks of age and was diagnosed with colic. There was no family history of atopy and William did not develop eczema at any stage. William's symptoms worsened over the next few weeks and he was brought back to his GP aged 13 weeks. He was given a two week trial of a hypoallergenic formula milk, which appeared to improve his crying bouts a little, but overall there was no dramatic improvement, indicating William did not have CMA. William returned to his usual formula milk aged 15 weeks. At 17 weeks, William's symptoms began to settle and he was sleeping better at night. At 21 weeks, William was started on a normal weaning diet.

Conclusion

In the majority of cases, colic is a transient and self-resolving condition that is not related to food allergy. However, in infants with persisting symptoms of colic, particularly if there are other symptoms suggestive of CMA, a 2-4 week trial of a maternal milk free diet or hypoallergenic formula is indicated. This should be supervised by a healthcare professional with knowledge of food allergy.

Unfortunately despite extensive research, the exact cause of colic still remains unknown in most cases. The most practical treatment advice at present is to provide parental reassurance, advise simple measures of management and to ensure that there is appropriate support for the family. Therefore we have developed a combined diagnostic and management algorithm for infantile colic that attempts to set out such a practical approach (Figure 1).

Useful Resources:

- UK National Support Group http://www.cry-sis.org.uk/
- For further information on managing infants with cows' milk allergy in primary care, please see: Venter et al. Diagnosis and management of non-IgE-mediated cow's milk allergy in infancy - a UK primary care practical guide. *Clinical and Translational Allergy* 2013; **3**:23. Available online at**:** http://www.ctajournal.com/content/3/1/23

References

1. Lucassen PL, Assendelft WF, van Eijk JT, Gubbels JW, Douwes AC, Geldrop WJ. Systematic Review of the occurrence of infantile colic in the community. *Arch Dis Child* 2001; 84: 398-403.

2. Jakobsson I, Lothe L, Ley D, Borschel MW. Effectiveness of casein hydrolysate feedings in infants with colic. *Acta Paediatr* 2000, 89:18-21

3. Wessel MA, Cobb JC, Jackson EB et al. Paroxysmal fussing in infancy, sometimes called colic. *Pediatrics* 1954; 15: 421-435.

4. Dermott K, Bick D, Norman R, Ritchie G, Turnbull N. et al. Clinical Guidelines and Evidence Review for postnatal care: Routine Post Natal Care of Recently Delivered Women and their Babies. 2006. London: National Collaborating Centre for Primary Care and Royal College of General Practitioners.

5. Miller J. Cry-babies: a framework for chiropractic care. *Clin Chiropract* 2007; 10:139–46.

6. Miller-Loncar C, Bigsby R, High P, Wallach M, Lester B. Infant colic and feeding difficulties. *Arch Dis Child* 2004; 89: 908-912.

7. Savino F, Castagno E, Bretto R, Brondello C, Palumeri E, Eggoero R. A prospective 10-year study on children who had severe infantile colic. *Acta Paediatr Suppl* 2005; 94: 129-32.

8. Dobson D, Lucassen PLBJ, Miller JJ, Vlieger AM, Prescott P & Lewith, G. Manipulative therapies for infantile colic. *Cochrane Database Syst Rev* 2012, Issue 12, Art. No.: CD004796.

9. Venter C, Pereira B, Voigt K, Grundy J, Clayton CB, Higgins B, et al. Prevalence and cumulative incidence of food hypersensitivity in the first 3 years of life. *Allergy* 2008; 63,354-9.

10. Venter C, Pereira B, Grundy J, Clayton CB, Roberts G, Higgins B, Dean T. Incidence of parentally reported and clinically diagnosed food hypersensitivity in the first year of life. *J Allergy Clin Immunol* 2006; 111:1118-24.

11. Eggesbo M, Botten G, Stigum H. Restricted diets in children with reactions to milk and egg perceived by their parents. *J Paediatr* 2001; 139:583-7.

12. Sinagra JL, Bordignon, V, Ferraro, C, Cristaudo A, Di Rocco M, Amorosi B, Capitanio B. Unnecessary milk elimination diets in children with atopic dermatitis. *Paediatr Dermatol* 2007; 241-6.

13. NICE. Diagnosis and assessment of food allergy in children and young people in primary care and community settings . Clinical guideline 116. 2011.

14. Iacovou M, Ralston RA, Muir J, Walker KZ,Truby H. Dietary Management of Infantile Colic: A systematic Review. *Matern Child Health J* 2012;16: 1319-1331.

15. Lust KD, Brown JE, Thomas W. Maternal intake of cruciferous vegetables and other foods and colic symptoms in exclusively breast fed infants. *J Am Diet Assoc* 1996; 96: 46-48.

16. Hill D, Roy N, Heine RG, Hosking CS, Francis D.E. et al. Effect of a low-allergen maternal diet on colic among breastfed infants: A Randomised Controlled Trial. *Pediatrics* 2005; 116, e709.

17. Noimark L, Cox HE. Nutritional problems related to food allergy in childhood. *Pediatr Allergy Immunol*. 2008; 19:188-95.

18. Al Dhaheri W, Diksic D, Ben-Shoshan M. IgE-mediated cow milk allergy and infantile colic: diagnostic and management challenges. *BMJ Case Rep*. 2013; Feb 6.

19. Reijneveld SA, Brugman E, Hirasing RA. Infantile colic: Maternal smoking as a potential risk factor. *Arch Dis Child* 2000; 83: 302-3.