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Infant Colic

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INTRODUCTION

The term "colic" implies abdominal pain of intestinal origin. However, it has never been proved that colicky crying is caused by pain in the abdomen or anywhere else. The previous edition of the Rome Criteria excluded infant colic from consideration as a functional gastrointestinal disorder. Nevertheless the abdominal pain attribution persists and pediatric gastroenterologists receive referrals of babies with refractory colic or infants who cry excessively due to unsuspected colic. Therefore, familiarity with the "colic syndrome" is necessary for the avoidance of diagnostic and therapeutic misadventures. (1)

DEFINITION

Colic has been described as a behavioral syndrome of early infancy involving large amounts of crying, long crying bouts and hard-to-sooth behavior(2). Although, "colic"-like crying may occur in infants who are sensitive to cow's milk proteins (3-5), by definition, infant colic is not caused by organic disease (6). Infant colic was defined heuristically by Wessel (7) as "paroxysms of irritability, fussing or crying lasting for a total of more than three hours per day and occurring on more than three days in any one week." Crying bouts start and stop suddenly without obvious cause (8) and are more likely to occur late in the day (9, 10). Colicky crying tends to resolve spontaneously by three to four months of age or, in the case of babies born prematurely, three to four months after term (11, 12). Normal infants cry more during the early months of life than at any age thereafter (8). On average, crying peaks at about six weeks and then steadily

diminishes by 12 weeks (13, 14). "Colicky" crying probably represents the upper end of the normal "crying curve" of healthy infants and is not the result of pain (15). Colic "is something infants do, rather than a condition they have." (16)

EPIDEMIOLOGY

About 20% of infants are perceived by their mothers to be colicky by Wessel's criteria (17). However, the prevalence of infant colic is influenced by parents' perceptions of the intensity and duration of crying bouts (18), the method by which data on crying is collected (19), the psychosocial wellbeing of the parenting couple (20) and culturally determined infant care practices. Barr found, in his study of caregiving practiced by !Kung San hunter-gathers of the Kalahari Desert, that the frequency of onsets of crying conform to the Brazelton-Barr "crying curve," but the amount of crying was much less than in Western cultures. This may be due to the almost continuous contact between mother and infant the consistently prompt comforting responses provided to the infant within the family group. (21).

CLINICAL EVALUATION

Many disorders cause irritability and crying that can mimic colic, including cow's milk protein intolerance, fructose intolerance, maternal drug ingestion during pregnancy causing withdrawal irritability in the infant, infantile migraine, GERD, and anomalous origin of the left coronary artery with meal-induced angina.(6) (22) (23) The colicky crying pattern results from organic disease in 10% or less in colicky babies. (22) Behaviors associated with colicky crying, e.g. prolonged bouts, unsoothable crying,

crying after feedings, facial expressions of pain, abdominal distention, increased gas, flushing, and legs over the abdomen are not diagnostic clues indicative of pain or organic disease but they do explain and justify parents' concerns. (24-26)

A presumptive diagnosis of colic can be made in any infant under four to five months of age whose crying has the temporal features of infant colic, who has no signs of CNS or intrinsic developmental difficulties, is normal on physical examination and has normal growth patterns.(6, 27) It is reasonable to apply time-limited therapeutic trials appropriate for two etiologies of colic-like crying: switching to a protein-hydrolysate formula or deleting milk and milk products from the diet of a breast feeding mother should result in sustained remission of colic-like behavior due cow's milk sensitivity. (28) Relief should be apparent within 48 hours. (29) A similarly time-limited trial of gastric acid suppression may be useful as a test of the etiologic significance of reflux esophagitis. The satiated infant's response to non-analgesic, non-nutritive soothing maneuvers, such as rhythmic rocking and patting to two to three times per second in a quiet, non-alerting environment, may quiet the baby who may nevertheless resume crying as soon as it is put down. (30-32) Repeatedly demonstrating a common maneuver that could not eliminate pain, but does quiet the colicky crying has great diagnostic and therapeutic value.

PHYSIOLOGIC FEATURES

Significant differences have been found in comparisons of colicky infants and infants who did not cry excessively, such as increased muscle tone (8), heart rates during

feedings (8), ease of falling asleep and soundness of sleep (33), stool patterns, post-prandial gallbladder contraction (34) and other features (28, 35-38). However, non of these findings have been shown to be more than epiphenomena or have provided a basis for successful treatment in 90% or more of babies with colic syndrome. On the other hand, no differences between colicky and non-colicky infants were found with respect to gastrointestinal transit times (38), fecal alpha-1 antitrypsin (23), or intraluminal gas or flatulence. (39, 40)

Current evidence suggests that colicky crying is behavior originating in the CNS rather than the gut. Colicky babies have been shown to have different temperament characteristics (41, 42). Another hypothesis for the genesis of colic is based on differences in infants' reactivity (i.e. the excitability and/or arousability of behavioral and physiologic responses to stimuli) and infants' inherent ability to self-regulate responses to stimuli and benefit from externally-applied soothing procedures.(43)

PSYCHOLOGIC FEATURES

Understanding infant colic requires an appreciation of the subject experience and development of the infant, the mother, their dyadic relationship and the family and social milieu in which they exist. (44)

At about two to three months of age, normal infants become more attentive, socially responsive, and aware of the distinction of "self" and "other." (45) They become better able to sooth themselves and interact and give pleasure to their caregivers. This

developmental shift occurs at about the age that colic subsides. These developmental advances are smoother if the infant's temperament is easy, the mother is caring, intuitive, and self-confident, and if the dyadic relationship between them proceeds with smooth reciprocity. (46)

Parents usually have conscious and unconscious ambivalence toward their infant. If the infant isn't fussy or difficult to regulate, and if the circumstances of their lives are pleasant, positive feelings predominate and family life is happy. However, if the infant is colicky, resentful feelings may rise to the surface of the mother's awareness. (47) Recognition of angry feelings towards her own infant triggers anxiety and guilt which may prompt her to intensify her efforts at being "a good mother." If she is unsuccessful at controlling her baby's crying, her guilty anxiety and her reaction to it may develop into a vicious cycle causing profound physical and emotional exhaustion. (48) This is made more likely when the mother's relationship with her partner is unsupportive (49). This stressful state impairs her ability to sooth her infant and causes her to doubt her competence as a mother (49, 50). The emergence of adversarial or alienated feelings towards the un-soothable infant lowers the threshold for abuse (51). Infant colic may then present as a clinical emergency. Even in non-critical cases, excessive crying may be associated with transient developmental delay in the infant (52) and family dysfunction 1 to 3 years after the infant's birth (53, 54).

MANAGEMENT

Any measure that parents perceive as definitely helpful is worth continuing, providing it is harmless. If there is a question of milk intolerance(55-57) or reflux esophagitis (58, 59), a time-limited therapeutic trial of an hydrolysate formula or medication to suppress gastric acid secretion is warranted. Relief in such cases should become apparent within 48 hours (3, 29). However, in more than 90% of cases, management consists not of "curing the colic," but of helping the parents get through the challenging period in their baby's development (60-64).

There are at least 12 elements to consider in the office management of infant colic.(1)

- A painstaking history that elicits a detailed picture of the baby's symptoms is reassuring to parents and strengthens rapport. The clinical interview can explore the conditions of family life, past and present, that may impair coping.
- Acknowledge the importance of the problem and how disruptive it usually is to family life.
- Try to schedule the consultation during a time when the infant is likely to be fussy. With luck, the clinician will be able to experience the infant's crying bout. This gives parents the satisfaction of showing the clinician what they've been going through and it allows for observation of their attempts at soothing. It also provides the clinician with the opportunity to assess the infant's soothability.
- A thorough, gentle physical examination impresses the parents that the physician is diligent and open-minded in looking for organic disease (the parents' chief concern).

- Gently dismantle the pain hypothesis in favor of the developmental hypothesis for colicky crying.
- Inform the parents that a colicky baby taxes even the most experienced, devoted parents who also have more trouble soothing their infant when they are exhausted. Explain that infants sense parents' tension and react to it with more crying (46, 65).
- Affirm the infant's good health, great promise, and the realistically optimistic outlook for subsidence of colic by three to five months of age.
- Offer suggestions for soothing maneuvers. Management is likely to fail if parents don't have methods of calming their infant at least temporarily. Review and demonstrate the list of common techniques such as rocking and patting, secure swaddling, rhythmic rolling back and forth in a pram, car rides, pacifiers, and monotonous noise (30, 31, 66-68). Crying bouts gain momentum rapidly, but are easier to stop if soothing measures are applied promptly (64, 69).
- Individualize advice. Find out what has worked in the past and what is easiest for each family; support them in doing it their easy way. Avoid stock recommendations regarding feeding, burping, or holding techniques especially if they might increase the infant's or the mother's stress. For example, after every ounce is a recommendation based on the unsubstantiated notion that swallowed air causes colic. Actually, such repeated interruptions may make feedings frustrating for both infant and mother.
- Relieve guilt and restore confidence. Parents of colicky babies experience feelings of hostility and rejection towards the baby they want and love. The more

conscientious the parent, the more prone he or she is to self-reproach feelings. Such feelings are experienced on some level by all parents.

- Address parent's needs. Parents may minimum or deny their distress and fatigue, but they always evince it during the clinical interview. They need scheduled times when they can withdraw from caring for their infant, leave the house, indulge in rest or recreation and return to their baby refreshed. Such free time is helpful if it is regularly scheduled in advance and a competent surrogate caregiver is available. Mothers need a " rescue" arrangement, a pre-arrangement contingency plan whereby a trustworthy relative or friend can take over should the mother feel overwhelmed. The more confidence the parents have that help is accessible, the less vulnerable they feel and the less likely they will need a rescue (70). Parents of nocturnal criers need sleep. They might divide the night in to two 4-hour shifts. The parent who is "off" can sleep, and the parent who is "on" knows that when his or her shift is over, sleep is guaranteed. Four hours of guaranteed sleep is likely to be more restful than 8 hours of apprehensive dozing in anticipation of the next crying bout.
- Be available for support. The physician's promise to remain available enables parents to continue to cope with their colicky infant without turning to unnecessary diagnostic procedures or false "cures."

REFERENCES

1. **Fleisher DR.** Coping With Colic. *Contemporary Pediatrics*. 1998;15(6):144-156.
2. **Rutter M.** Child Psychiatry: Modern Approaches. In: Rutter M, Hersov L, eds. Oxford: Blackwell Scientific Publications; 1977:359-386.
3. **Jakobsson I, Lindberg T.** Cow's milk as a cause of infantile colic in breast fed infants. *Lancet*. 1978;2:437-439.
4. **Jakobsson I, Lindberg T.** Cow's milk proteins cause infantile colic in breast fed infants: a double blind crossover study. *Pediatrics*. 1983;71:268-271.
5. **Lothe L, Lindberg T.** Cow's milk whey protein elicits symptoms of infantile colic in colicky formula-fed infants: a double-blind crossover study. *Pediatrics*. 1989;83:262-266.
6. **Treem WR.** Infant colic, a pediatric gastroenterologist's perspective. *Pediatric Clinics of North America*. 1994;41:1121-1138.
7. **Wessel MA, Cobb JC, Jackson EB, Harris GS, Detwiler AC.** Paroxysmal fussing in infancy, sometimes called "colic." *Pediatrics*. 1954;14:421-433.
8. **Lester BM.** Definition and Diagnosis of Colic. In: Sauls HS, Redfern DE, eds. *Colic and Excessive Crying - Report of the 105th Ross Conference on Pediatric Research*. Columbus, OH: Ross; 1997:2, 18-29.
9. **Paradise JL.** Maternal and other factors in the etiology of infantile colic. *Journal of the American Medical Association*. 1966;197(3):123-131.
10. **St. James-Roberts I.** Distinguishing Between Infant Fussing, Crying, and Colic: How Many Phenomena? In: Sauls HS, Redfern DE, eds. *Colic and Excessive*

Crying - Report of the 105th Ross Conference on Pediatric Research. Columbus, OH: Ross; 1997:3-14.

11. **Pierce P.** Delayed onset of three months colic in premature infants. *Am J Dis Child*. 1948;75:190-192.

12. **Barr RG, Chen S, Hopkins B, Westra T.** Crying patterns in pre-term infants. *Dev Med Child Neurol*. 1996;38:345-355.

13. **Brazelton TB.** Crying in infancy. *Pediatrics*. 1962;29:579-588.

14. **Barr RG.** The normal crying curve: what do we really know? *Dev Med Child Neurol*. 1990;32:356-352.

15. **Geertsma MA, Hyams JS.** Colic - a pain syndrome of infancy? *Pediatric Clinics of North America*. 1987;36(4):905-919.

16. **Barr RG.** "Colic" is something infants do, rather than a condition they "have": a developmental approach to crying phenomena, patterns, pacification and (patho)genesis. In: Barr RG SJ-RI, Keefe, MR, ed. *New Evidence on Unexplained Early Infant Crying: Its Origins, Nature and Management*: Johnson & Johnson Pediatric Institute; 2001:87-104.

17. **St. James-Roberts I, Conroy S, Wilsher K.** Clinical, developmental and social aspects of infant crying and colic. *Early Dev Parenting*. 1995;4:107.

18. **St. James-Roberts I, Hubie T.** Infant crying patterns in the first year: normal community and clinical findings. *Journal of Child Psychology and Psychiatry*. 1991;32:951-968.

19. **St. James-Roberts I.** Infant crying and its impact on parents. In: Barr RG, St. James-Roberts I, Keefe MR, eds. *New Evidence on Unexplained Early Infant Crying*: Johnson & Johnson Pediatric Institute; 2001.

20. **Rautava P, Helenius H, Lehtonen L.** Psychosocial predisposing factors for infantile colic. *British Medical Journal*. 1993;307:600-604.

21. **Barr RG, Konner M, Bakeman R, Adamson L.** Crying in !Kung San infants: a test of the cultural specificity hypothesis. *Dev Med Child Neurol*. 1991;33:601-610.

22. **Gormally S.** Clinical Clues to Organic Etiologies in Infants With Colic. In: Barr RG, St. James-Roberts I, Keefe MR, eds. *New Evidence on Unexplained Early Infant Crying: Its Origins, Nature and Management*: Johnson & Johnson Pediatric Institute; 2001:133-148.

23. **Thomas DW, McGilligan K, Eisenberg LD, Liberman HM, Rissman EM.** Infantile colic and type of milk feeding. *Am J Dis Child*. 1987;141:451-453.

24. **Barr RG.** Infant Colic. In: E. HP, ed. *Pediatric Functional Gastrointestinal Disorders*. New York: Academy of Professional Information Services, Inc.; 1999:2.1-2.23.

25. **Hyams JS, Ricci A, Lichtner AM.** Clinical and labratory correlates of esophagitis in young children. *Journal of Pediatric Gastroenterology and Nutrition*. 1988;7:52-56.

26. **Dellert SF, Hyams JS, Treem WR, Geertsma MA.** Feeding resistence and gastroesophageal reflux in infancy. *Journal of Pediatric Gastroenterology and Nutrition*. 1993;17:66-71.

27. **Miller AR, Barr RG.** Infantile colic - is it a gut issue? *Pediatric Clinics of North America*. 1991;38(6):1407-1423.

28. **Jakobsson I.** Cow's milk protiens as a cause of infantile colic. In: Sauls HS, Redfern DE, eds. *Report of the 105th Ross Conference on Pediatric Research*. Columbus, OH: Ross; 1997:39-47.

29. **Lothe L, Lindberg T, Jakobsson I.** Cow's milk formula as a cause of infantile colic: a double blind study. *Pediatrics*. 1982;70(1):7-10.

30. **Wolff PH.** *The Development of Behavioral States and the Expression of Emotions in Early Infancy* Chicago: University of Chicago Press; 1987.

31. **Dunn J.** *Distress and Comfort* Cambridge, MA: Harvard University Press; 1977.

32. **Brackbill Y.** Continuous stimulation reduces arousal level: stability of the effect over time. *Child Devel*. 1973;44:43-46.

33. **Pinyerd BJ.** Mother-Infant Interaction and Temperment When the Infant Has Colic. In: Sauls HS, Redfern DE, eds. *Report of the 105th Ross Conference on Pediatric Research*. Columbus, OH: Ross; 1997:101-112.

34. **Lehtonen L, Korvenranta IT, Eerola E.** Intestinal microflora in colicky and non-colicky infants: bacterial cultures and gas-liquid chromatography. *Journal of Pediatric Gastroenterology and Nutrition*. 1994;19:310-314.

35. **Lothe L, Ivarsson SA, Lindberg T.** Motilin and infantile colic. *Acta Paediatr Scand*. 1990;79:410.

36. **Lehtonen L, Svedstrom E, Korvenranta H.** Gallbladder hypocontractility in infantile colic. *Acta Paediatr Scand*. 1994;83(11):1174-1177.

37. **Forsyth B.** Infant formulas and colic: where are we now? In: Sauls HS, Redfern DE, eds. *Report of the 105th Ross Conference on Pediatric Research*. Columbus, OH: Ross; 1997:49-56.

38. **Treem WR, Hyams JS, Blankenschen E, al. e.** Evaluation of the effect of fiber-enriched formula on infant colic. *Pediatrics*. 1991;119:695-701.

39. **Illingworth RS.** Three months colic. *Arch Dis Child*. 1954;29:165.

40. **Sferra TJ, Heitlinger LA.** Gastrointestinal gas formation and infant colic. *Pediatric Clinics of North America*. 1996;43(2):489-510.

41. **Carey WB.** Clinical applications of infant temperment measures. *Journal of Pediatrics*. 1972;81:823-828.

42. **Fox NA, Polak CP.** The possible contribution of temperment to understanding the origins and consequences of persistent and excessive crying. In: Barr RG, St. James-Roberts I, Keefe MR, eds. *New Evidency on Unexplained Early Infant Crying*: Johnson & Johnson Pediatric Institute; 2001:25-41.

43. **Barr RG, Gunnar M.** Colic: the "transient responsivity" hypothesis. In: Barr RG, Hopkins B, Green JA, eds. *Crying as a Sign, a Symptom, and a Signal*. London: Mac Keith Press; 2000:41-66.

44. **Tronick EZ.** Affectivity and sharing. In: Tronick EZ, ed. *Social Interchange in Infancy*. Baltimore: University Park Press; 1982:1-6.

45. **Stern DN.** *The Interpersonal World of the Infant* New York: Basic Books; 1985.

46. **Brazelton TB.** Joint regulation of neonate-parent behavior. In: Tronick EZ, ed. *Social Interchange in Infancy*. Baltimore: University Park Press; 1982:7-22.

47. **Lyons-Ruth K, Zeanah CH.** The Family Context of Infant Mental Health. In: Zeanah CH, ed. *Handbook of Infant Mental Health*. New York: Guilford Press; 1993:14-37.

48. **Papousek M, von Hofacker N.** Excessive Crying and Parenting: Search for a Butterfly in a Dynamic System. In: Sauls HS, Redfern DE, eds. *Report of the 105th Ross Conference on Pediatric Research*. Columbus, OH: Ross; 1997:91-101.

49. **Murray L, Cooper P.** The Impact of Irritable Infant Behavior on Maternal Mental State: A Longitudinal Study and a Treatment Trial. In: Barr RG, St. James-Roberts I, Keefe MR, eds. *New Evidence on Unexplained Early Infant Crying*: Johnson & Johnson Pediatric Institute; 2001:149-164.

50. **Stifter CA, Bono MA.** The effect of infant colic on maternal self-perceptions and mother-infant attachment. *Child: Care, Health, and Development*. 1998;24:339-351.

51. **Barr RG.** Infant Crying Behavior and Colic: an Interpretation in Evolutionary Perspective. In: Trevathen W, McKenna JJ, Smith EO, eds. *Evolutionary Medicine*. Oxford: Oxford University Press; 1999:27-51.

52. **Sloman J, Bellinger DC, Krentzel CP.** Infantile colic and transient developmental lag in the first year of life. *Child Psychiat Hum Dev*. 1990;21(1):25-36.

53. **Raiha H, Lehtonen L, Korhenen T, al. e.** Family life one year after infantile colic. *Arch Pediatr Adoles Med*. 1996;150:1032-1036.

54. **Rautava P, Lehtonen L, Helenius H, al. e.** Infantile colic: child and family three years later. *Pediatrics*. 1995;96(1):43-47.

55. **Stalberg M.** Infantile colic: occurrence and risk factors. *Eur J Pediatr*. 1984;143:108-111.

56. **Liebman W.** Infant colic: association with lactose and milk intolerance. *JAMA*. 1981;245:732-733.

57. **Evans RW, Fergusson DM, Allardyce RA, al. e.** Maternal diet and infantile colic in breastfed infants. *Lancet*. 1981:1340.

58. **Berezin S, Glassman M, Bostwick H, al. e.** Esophagitis as a cause of infant colic. *Clin Pediatr*. 1995:158-159.

59. **Berkowitz D, Naveh Y, Berant M.** "Infantile colic" as the sole manifestation of gastroesophageal reflux. *Journal of Pediatric Gastroenterology and Nutrition*. 1997;24:231-233.

60. **Meyer E, Garcia C, Lester B, et a.** Family-based intervention improves maternal psychological well-being and feeding interaction of pre-term infants. *Pediatrics*. 1994;93:241.

61. **Wolke D, Gray P, Meyer R.** Excessive infant crying: a controlled study of mothers helping mothers. *Pediatrics*. 1994;94:322.

62. **Boukydis CF, High PC, Cucca J, Lester B.** Treatment of Infants and Families: The Infant Crying and Behavior Model. In: Sauls HS, Redfern DE, eds. *Report of the 105th Ross Conference on Pediatric Research*. Columbus, OH: Ross; 1997:128-138.

63. **Keefe MR, Froese-Fretz A, Kotzer AM.** The REST regimen: an individualized nursing intervention for infant irritability. *The American Journal of Maternal Child Nursing*. 1997;22:16-20.

64. **Taubman B.** Clinical trial of the treatment of colic by modification of parent-infant interaction. *Pediatrics*. 1984;74(6):998.

65. **Papousek H, Papousek M.** Intuitive Parenting: A Dialectic Counterpart to the Infant's Integrative Competence. In: Osofsky JD, ed. *Handbook of Infant Development*. New York: John Wiley & Sons; 1987:669-720.

66. **Lester BM.** There's More to Crying Than Meets the Ear. In: Lester BM, Boukydis CF, eds. *Infant Crying*. New York: Plenum Press; 1985:1-27.

67. **Pinyerd BJ.** Strategies for consoling the infant with colic: fact or fiction? *J Pediatr Nursing*. 1992;17(6):403-411.

68. **Brackbill Y.** Cummulative effects of continuous stimulation on arousal level in infants. *Child Devel*. 1971;42:17-26.

69. **Bell SM, Ainsworth MD.** Infant crying and maternal responsiveness. *Child Devel*. 1972;43:1171-1190.

70. **Schmitt BD.** The provention of sleep problems and colic. *Pediatric Clinics of North America*. 1986;33(4):763.