



## The Crying Baby: Differential Diagnosis and Management Plan

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### Abstract

Crying baby is one of the most common causes of Emergency Room visits during infancy and is associated with adverse outcomes for some mothers and babies. 20% of parents report problems with their Infant crying in the first 3 months. 5% of crying babies have organic causes that could be serious or life threatening if not diagnosed early. The aim of this article is to illustrate the organic and non-organic causes of crying baby and to outline a professional approach and management plan.

**Keywords:** Crying Baby; Infantile Colic; Formula Intolerance; Cow'S Milk Allergy; Breast Feeding Problems; Organic Causes; Crying Medication

### Introduction

Crying is the first communication skill to be developed in early infancy; an explosion of feelings that might be disclosed or delivered in the form of the systemic activity of crying. Crying could be a message of discomfort, sadness, anger, pain, or all of them at the same time. For each negative emotion, the baby uses different crying sound frequencies and /or wave lengths. Up to 20% of parents report a problem with their infant crying in the first 3months. The majority of babies have no organic cause of crying and most crying subsides by 3-4 months [1]. Cry-fuss problems are among the most common clinical presentations in the first few months of life and are associated with adverse outcomes for some mothers and babies [2]. Crying in early infancy can be classified to normal crying, organic abnormal crying, and dysfunctional abnormal crying.

#### Normal or abnormal crying?

Depending on the etiology of crying, it can be classified to normal crying with no pathogenic cause, and abnormal crying with a primary medical cause or dysfunction that needs specific treatment. Normal crying occurs almost at the same time daily, in the form of anger episodes of 10 to 30 minutes duration in each, and less than 3 hours in total. The baby usually responds to parental soothing and calming approaches. Unsettled behavior in infants is commonly a transient neurodevelopmental phenomenon that

peaks at 6 weeks of age. Abnormal crying, by contrast, may occur at any time, with no response to parental soothing, and could be associated with painful characters, pallor, cyanosed or mottled skin, tearing, sweating, vomiting, or abnormal movements. Excessive crying is defined as crying more than 3 hours daily for more than 3 days a week. However, many babies present with less amounts of crying, as the parents perceive it as excessive. Having received conflicting advice from various health professionals and lay sources, the parents are often distressed, exhausted, and confused [3]. Expert mothers and pediatricians usually have the skill to receive the message of "crying baby" and discriminate between the normal and abnormal crying. Gastro-esophageal reflex, food allergies, and lactose intolerance are often mistakenly over diagnosed in crying unsettled babies. Treatment with acid suppressive medications like proton pump inhibitors should be avoided in this population due to concerns about increasing the risk of food allergies [2].

#### Organic abnormal crying

Miscellaneous causes of pain

- **Otitis media:** It is a common cause of crying in infants, and a challenging diagnosis due to the small and immature tympanic membrane landmarks. A history of recent flu-like symptoms, fever, or any watery or mucoid ear secretions should draw the attention to this. Ear pulling in infants less than 4 months of age has no clinical signifi-

cance as the range of hand movement in the supine position at this age is in the ear and head level.

- **Congenital glaucoma:** Could be unilateral or bilateral. Painful crying with tears could be the only presentation of congenital glaucoma even before cornea cloudiness.
- **Seizures:** different types of convulsions might cause excessive sharp crying, the most typical one is infantile spasm, asking parents about any abnormal recurrent hands and/or feet movement, head nodding, or eye rolling is helpful.
- **Hyperthyroidism:** Excessive crying with poor weight gain and sweating is a typical presentation of hyperthyroidism in early infancy, with or without goiter, before the development of exophthalmos.
- **Angina:** cardiac ischemic attack is the first thing to be noted by parents when the baby has aortic stenosis, ectopic coronary artery origin, or hypertrophic obstructive cardiomyopathy. An episode of crying may increase oxygen demand and cardiac workload triggering ischemia and causing angina-like pain with pallor, sweating and a worsening crying.
- **Gastro Esophageal reflux:** Is an uncommon cause of chest pain in infants, and could be silent without vomiting, aspiration, or obstructive apnea.
- **Genitourinary pain:** Urinary tract infection is the most common organic cause diagnosed in acute crying infants in ER [3,9]. Pelvic ureteric junctional stenosis (PUJ), vesical ureteric reflux (VU reflux), meatal stenosis, inguinal hernia, and testicular torsion may present as painful cry in early infancy.
- **Hair or band tourniquet around penis or toe:** Most incidents go unwitnessed until complications develop after days of bad painful cry.
- **Metabolic disorders:** Hypoglycemia, hyponatremia, hypernatremia, and hypocalcemia may present solely as episodes of bad cry that might be explained as colic.
- **Withdrawal syndrome:** Irritability and inconsolable crying are the main features of withdrawal of many substances like heroin, cocaine, benzodiazepines, and even caffeine.

### Formula intolerance

By definition is adverse events to formula feeding without immune mechanism. Presentation is usually as nonspecific crying, irritability, agitation, discomfort, fussiness, gas, spitting up, and diarrhea. All are possible presentations. Formula intolerance can be due to lactose intolerance, protein intolerance, or lipid intolerance.

- **Lactose intolerance:** Frothy watery acidic diarrhea with perianal erythematous dermatitis is the typical features of lactose intolerance. Primary lactase deficiency may develop at any age but it is extremely rare in babies. Babies may acquire transient secondary lactose intolerance from damaged intestinal villi, most commonly caused by

gastroenteritis or cow milk allergy, but perhaps also by functional lactose overload [10]. High volume breast feeds with low fat content may result in functional lactose overload in breast fed babies in the first weeks and months, causing poor satiety, low grade intestinal inflammation and an irritable hungry infant with tympanic abdomen, excess flatus and frequent, explosive stools [10]. It is resolved with appropriate feeding management [11]. Weaning is not indicated in breast fed babies with secondary lactose intolerance, although probiotics, lactase enzyme supplementation, and CMA maternal elimination diet may have a role [10]. Breast feeding in laying back position, timed feeding schedule, and giving one breast only for 4-6 hours, may help to address and manage the problem of lactose functional overload in breast fed babies [11]. In formula fed babies, secondary lactose intolerance may respond to lactose free formula. Formula fed babies with CMA who are mistakenly diagnosed with lactose intolerance could experience perpetuation of their gut lesion if the lactose free formula contains milk protein [10,16].

- **Formula protein intolerance:** The standard cow milk protein based formula has a higher level of Casein compared with breast milk. A large molecular weight protein that needs long time of processing in the digestive system of small babies. Crying, irritability, discomfort, and constipation may develop. Hydrolyzed and \or whey based formulas offer a good therapeutic options for this group [13].
- **Lack of oligosaccharides in formula:** Oligosaccharides are the third most abundant component of human milk [13]. These indigestible sugars form the main nutrient for intestinal microbiota in infants. As a prebiotic, oligosaccharide is fermented by the intestinal probiotics into short chain fatty acids that soften the stool and have many local and systemic immune modulating effect. Constipation, discomfort, crying and fussiness are the main symptoms of oligosaccharides scarcity in formula. Oligosaccharides fortified formula is a good solution [13].
- **Lipids intolerance:** Standard baby formula contains vegetable oils, mainly palm oil, as lipids. Free palm oil binds with calcium to form insoluble soap which makes the stool dense and results in Crying, gas, and constipation. Treatment with partially hydrolyzed formula with prebiotics and without palm oil. Symptoms usually vanish within few days [13].

### Cow's Milk protein Allergy (CMA)

By definition is any adverse event to formula feeding that results from immune reaction. It could be Ig E mediated, non Ig E mediated (cellular mediated), or mixed. It many involve one or more of the following systems: skin: rash, atopic dermatitis.

- Digestive: Reflux, vomiting, diarrhea, colic, gas.
- Respiratory: Rhinitis, wheezing.
- Systemic: Anaphylaxis, poor weight gain, crying.

Formula protein antigenicity and allergenicity increase as its molecular weight increases. Standard formula protein molecular weight ranges between 14 to 67 KD, while that of partially hydrolyzed formula and extensively hydrolyzed formula is 3 to 10 KD and 1 to 3 KD respectively.

Suspect cow milk /soya protein allergy if one or more of the following is present [3]:

- Family History of First Degree Relative.
- Vomiting, G E reflux.
- Diarrhea with mucous
- Blood in vomit or stool.
- Poor weight gain
- Significant feeding problems worsening with time.
- Signs of atopy like eczema, wheezing.
- Any case of secondary lactose intolerance without clear cause

Treatment of cow milk protein induced allergy is by complete avoidance of cow milk protein as well as other kinds of animal milk, and soya based formula. Only EHF or Elemental Formula can be used. Maternal avoidance of cow milk protein also recommended. It may take 2 to 6 weeks for allergy induced problems to resolve after the onset of treatment [13].

### Dysfunctional abnormal crying

#### Infantile colic

Crying, fussiness, spitting, gas, loose motions, and intermittent constipation are common problems in babies with infantile colic as well as those with formula intolerance and/or protein allergy. Unfortunately, it could be difficult to differentiate clinically between these three groups. At the same time, there is no specific diagnostic tests to differentiate between them. Infantile colic by definition is episodes of unreasonable crying that last at least 3 hours daily for three days in one week at least. It is not related to any food intolerance or allergy; common in breast fed and formula fed babies. Infantile colic starts at age 3 weeks and resolves spontaneously at the age of 3 months. Many theories were put to explain infantile colic. Immaturity of the digestive system and nervous system, homesickness to uterus environment, and the need for some sporting activity all are possible causes. Luckily, parents soothing maneuvers like direct skin contact with mother in peaceful place, hugging the baby with folded legs and arms while his head close to mother chest, wrapping the baby with flexed limbs without using ropes are helpful. Rocker bed or swing are old solutions but with known efficacy. Instructing parents to place the crying baby in a safe place and

walk away if they feel at risk of harming the crying baby is a recommended strategy for reducing the risk of child abuse [4]. Sensory stimulation in the form of skin-to-skin contact from birth promotes self-regulation in the neonate [5]. A small number of crying babies may have sensory over-responsivity to touch movement or sound and require referral to a pediatric occupational, speech or physical therapist [6]. Chiropractic and craniosacral therapy have not been found to be efficacious in this population [7]. Parents of crying babies may find that infants massage with moderate touch has some benefit, and swaddling- once satiety is assured and safe-helps settle some babies [8]. There is no evidence that pacifier use interferes with prevalence or duration of breast feeding in motivated mothers [9]. Cross- professional collaboration with feeding experts and perinatal and infantile mental health experts is important if outcomes for crying babies and their families are to be optimized [20].

#### Breast feeding difficulties

Inadequate breast feeding management and poor definitions concerning breast feeding are significant confounders of crying baby research [6]. Breast feeding difficulties including problems of attachment and positioning, poor suck-swallow-breath coordination, oral motor dysfunction, ankyloglossia, and sensory processing problems, may interfere with self-organizing neurohormonal and autocrine feedback loops, causing cry-fuss behavior, failure to thrive or both, and these problems also remain under identified and under researched [14]. Aversive feeding behaviors may result in maternal anxiety, disrupted maternal –infant interactions and long term feeding problems [14]. A cue-based breast feeding enhances mother infant bonding. Crying babies whose mothers complain they feed overly frequently require prompt intervention by a feeding expert. Assessing mothers of crying babies for psychosocial risk factors and perinatal anxiety and depression is essential [15]. Paternal depression during pregnancy is also related to excessive crying at 2 months [16]. Older maternal age and having a first child have also been implicated in cry-fuss problems [17]. Maternal depression negatively affects an infant's neurodevelopmental adaptation [18]. Breast feeding is more likely to be successful if mother and baby co-sleep; there is no evidence that parents of breast fed infants have less total sleep at night than parents of infants receiving formula [19]. motivated mothers [9]. Cross- professional collaboration with feeding experts and perinatal and infantile mental health experts is important if outcomes for crying babies and their families are to be optimized [20].

### Hunger and tiredness

During the first month of life the baby becomes tired after being awake for 1 hour. At 1.5 months after 1.5 hours, and after 2 hours at age 3 months. Parents should be encouraged to recognize signs of tiredness like frowning, clenched hands, jerking arms or legs, crying, and grizzling [3]. Hunger is likely the cause if the baby has frequent feeds less than 3 hourly, wets less than 5 diapers daily, or has poor weight gain.

### Approach to the crying baby

#### History and physical examination

Sudden onset of crying should not be diagnosed as colic [1]. Full and detailed history and physical examination from head to toe is the corner stone to exclude all the serious causes. First and most important step is to be sure that the baby is stable, Has normal color, no increased work of breath, and no dehydration. It is better to keep the angry baby close to his mother, but if both parents are available it might be better to have a full history from one parent in a relatively calm environment away from the angry crying baby and noisy ER. It is helpful to know first if it is an acute crying episode or a usual behavior. Additional symptoms like fever, vomiting, or feeding refusal may indicate a cause. The baby is breast or bottle fed; the medication history of the baby and his parents could be of great help if they use antidepressant or anti migraine, for example. Asking about the baby neonatal and pregnancy incidents should not be missed. Thorough physical examination is the next step and could be more informative than history taking as most parents attend ER frustrated. First evaluate the baby posture, spontaneous movement, and cooperation with his mother. Inspect the baby general appearance, cleanliness, clothes, and strange odor. Then examine the baby from head to toe. Look for a bulging fontanel, otitis media, ecchymosis or rash, abnormal eye movement or pupils, asymmetric mouth opening or twitching movements. Any of these signs may indicate intracranial lesion. Eyes examination for a foreign body, corneal erosion, or cloudiness. Tears in a small baby is definitely abnormal. Neck examination for goiter, or dermatitis. Chest examination for finger like marks, painful points, or swelling that may indicate rib fracture. Tachyarrhythmia, murmur, tachypnea, or asymmetric air entry. Abdominal examination for inguinal hernia, testis torsion, organomegaly, or abdominal wall rigidity (use warm hand and palpate during inspiration or when baby relaxed). Diaper area examination for abnormal stool or urine, tourniquet on penis, ambiguous genitalia, rash or dermatitis. Limbs examination for any rash, fractures, tourniquet around digits, or cellulitis.

### Investigations

In most cases investigations are not necessary. However simple urine test for microscopy and culture might be helpful as urinary tract infection is the most isolated organic cause in acute crying [3]. Stool analysis for reducing substances and PH when the stool is frothy, watery, and perianal excoriation. The presence of fecal reducing substances more than 0.5% and PH less than 5 indicates lactose intolerance, and the response to lactose free formula confirms the diagnosis [3].

### Management

After excluding organic causes that needs special Therapeutic intervention, we need a good partnership with parents for a successful management. Crying, as a normal behavior, should be explained to parents. Using a sleep/crying diary for a week may help parents to understand the normal crying and sleep patterns. Parent should be advised to avoid excessive stimulation and handling and to avoid excessive quiet also. A low level of background noise is soothing to most babies. Advise them how to carry the baby in papoose in front of the chest. Providing printed information to parents is of great importance keeping in mind their frustration and inability to remember. Follow up referral for early ongoing support is essential. The design and evaluation of an integral, evidence-based multidisciplinary Primary care approach to management of unsettled babies and their mothers is a priority [2].

### Medications

Colic mixtures, gripe water, simethicone has no effect on infant crying. When compared with placebo. Anticholinergic medications are banned, due to the risk of apnea and seizures [3].

### Conclusion

20% of parents report problems with their Infant crying in the first 3 months. 5% of crying babies have organic causes that could be serious or life threatening if not diagnosed early. Inconsolable crying can be associated with parental depression, frustration, and abuse. It is critical to exclude any possible organic cause that may present as acute or chronic recurrent abnormal agitation or crying. G E Reflux is an uncommon cause of baby crying and proton pump inhibitors should be avoided in early infancy as much as possible. Professional approach, trustful partnership with care givers, and multidisciplinary follow up team approach are recommended for best results.

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