



## Case report

# Breath-holding spells in infants as a defense emotional reaction: a case presentation

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### ABSTRACT

**Introduction:** Emotional affect in infants can occur without identifying a stimulus and can be based on an automatic reconstruction of a reaction pattern. Nonepileptic paroxysmal disorders, such as breath-holding spells (BHSs), are a frequent pattern of emotional reaction in toddlers. Intense development of nervous system is closely connected with both social and emotional development and is influenced by most immediate family environment.

**Aim:** Aim of this work was to present clinical case of a child with respiratory arrest and effects of psychological therapeutic interventions.

**Case study:** An 11-month-old child with manifestations of respiratory arrest while crying was examined using the child's developmental scale in order to determine the child's developmental resources in psychomotor area. An interview and a neurological examination confirmed the initial diagnosis of BHSs. Psychological tests assessed development of the patient as average/high in relation to a peer group. Therapeutic sessions with parents aimed at implementing positive changes in child's home environment.

**Results and discussion:** Therapeutic psychological interventions resulted in cessation of fits of apnea in the patient. Psychological testing performed 6 months later still described the psychomotor development of the child as average/high in the performance scale. However, important differences in the area of temperamental features were recorded.

**Conclusions:** (1) Improvement observed after implemented psychological indications allows to conclude that BHSs presented by the child were a defense emotional reaction to an unfavourable home environment. (2) Emotional development of a child should be understood in a multifaceted way.

## 1. INTRODUCTION

Emotional reactions of a child in the first year of life take the form of biological templates, which activate physiological arousal. It is not interpreted as a conscious feeling, but is only based on reflex reactions towards specific stimuli, which are associated by means of the senses of taste, hearing, eyesight and touch.<sup>1</sup> Functioning of the child is based on reactivity and self-regulation, which is not subject to conscious cognitive control.<sup>2</sup> Emotions, which have their origin in an automatic reaction, reflect the consequence of internal excitement directly, and constitute a response to environmental stimuli.<sup>3</sup>

Learning emotional reactions to incoming affective signals of positive and negative valence, helps the child to build competences to deal with excitement and form a specific reaction pattern. The environmental context generates the intensity and the quality of emotions experienced by the child.<sup>4</sup> Bowlby's theory, in the psychoanalytic trend, refers to the relationship of attachment between a mother and her baby, which the author described as a system of relationship based on attachment.<sup>5</sup> Depending on the experiences which a child acquires from birth in relation to the mother, he or she builds a matrix of representation for later psycho-affective development and the potential for creating future interactions.<sup>6</sup> The more secure, predictable and based on a sense of stability the relationship is, the more consistent the development of an infant is, and it also generates further development coherence. The impact of family experiences is crucial for emotional and behavioural well-being or lack of it in children.<sup>2</sup> The quality of parenthood of a mother and a father, based on commitment, emotional warmth, positive and predictable behaviour of carers, influences the development and the shape of positive affect in infants between 4 and 12 months of life.<sup>7</sup> An increase in the awareness regarding the regulation of emotional arousal is formed along with a comprehensive child development. Older infants gain competences to connect the expression of experienced emotions along with feeling them, which results in creating the first form of empathy, which is possible to observe in interactions with other people.<sup>8,9</sup> A frequent form of a defense reaction to the incoming emotional information which the nervous system of a child cannot cope with is a breath-holding spell (BHS). This form of reaction can appear in healthy infants without neurological disorders, and it does not affect the correct course of the organism development at further developmental stages. The reaction of a child to negative extrinsic factors usually takes the following sequence of steps which lead to BHS: emotional injury based on disappointment and frustration triggers crying, which turns into the form of silent crying and ultimately into BHS causing the change of skin colour: paleness, cyanosis, which eventually may result in loss of consciousness with muscle hypotonia and convulsions.<sup>10</sup> In 5% of the population of infants BHS occurs on average with one spell a week. The occurrence of fits can also be repeated during the day. Usually the frequency of spells first grows and then

decreases.<sup>10</sup> Behavioural disorders were reported in 20% of children having fits of apnea.<sup>11</sup> The clinical picture of pallid BHS constitutes 19%–20% of all spells. Each factor received by a child as unpleasant e.g. pain or fear can contribute to the occurrence of BHS. Common characteristics of a fit in children include: skin layers turning pale, apnea and loss of consciousness with the following loss of muscle tone. The sequence of symptoms during subsequent fits is identical. The pathomechanism of pallid BHS is based on overstimulation of the vagus nerve, which results in bradycardia or asystole. Imbalance in the autonomous regulation of the cardiovascular system is the cause of pallid BHS.<sup>12</sup> Cyanotic fits are the second form of BHS, and at the same time the most prevalent, constituting about 54%–62% of all fits.<sup>13</sup> A sudden crying of a child which causes respiratory arrest in the exhalation phase is an aetiological factor provoking a cyanotic fit. Next, the colour of the child's skin, lips and mucous membranes changes, the last stage is loss of consciousness and muscle tone. Beside pallid and cyanotic BHS, the literature distinguishes complex BHS associated with the occurrence of convulsions. Complex BHS constitute 24% of all episodes of BHS. These episodes are usually tonic, generalized clonic or tonic-clonic; involuntary urination may also occur.<sup>13</sup> Scientific reports indicate anaemia resulting from sideropenia as a factor triggering fits of affective apnea, apart from a dysfunction in the area of the autonomous nervous system.<sup>14</sup> The influence of sideropenia on the occurrence of BHS is based on the role of iron in the metabolism of catecholamines and its influence on neurotransmitters; deficiency of this element translates into lower oxygen saturation of blood, which is consequently reflected in deficient oxygenation of the brain tissue.<sup>15</sup>

The period from birth up to 3 years of age involves areas associated with learning self-regulation with regard to the emotional and physical sphere. The classical Freud's theory defines the stages of psychosexual development as a predictor of cohesion or its lack in the personality structure, which is influenced by the child-carer relationship.<sup>16</sup> The whole developmental process includes control of arousal and expansion of autonomy. Besides the socioemotional development, intense development of the nervous system takes place, and both processes are closely connected with each other.<sup>17</sup> Damasio in his concept referring to the nature of emotions described the formation of somatic markers in relation to experiences, which are stored in the nervous system, connected with receiving stimuli from the outside world. These stimuli generate in the body and in emotions arousal which translates into specific psychosomatic reactions. The psychomotor activity of a child, quality of interaction with the carer and the amount of provided stimuli determines further developmental stages. Thus, for instance, Rolls in his concept points to the path of emotion formation, which is dependent on verbal valuation and considers the existence of two mechanisms of emotion formation, directing qualitatively and regulatively separate states. He takes into account the development of emotional activity, dependent on the biological conditioning – the lower

subcortical activation path.<sup>18</sup> Emotional affect on this path can occur without identifying a stimulus and be based on the automatic reconstruction of a reaction pattern. Hence the environmental context might constitute an essential aetiological factor of BHS.<sup>19</sup> BHS often takes the form of reactions associated with feeling negative emotions, such as anger, wrath, pain, and can be related to reactions based on the need to attract attention or to force the environment to behave in a desired way.<sup>20</sup> BHS can appear in healthy infants and pre-school children and are regarded as the most frequent nonepileptic disorders in childhood.<sup>11</sup>

## 2. AIM

The aim of this work was to present clinical case of a child with respiratory arrest and effects of psychological therapeutic interventions.

## 3. CASE STUDY

An 11-month-old child was admitted to the Rehabilitation Clinic of the Department of Medical Sciences of the University of Warmia and Mazury in Olsztyn in order to assess the psychomotor development of the child in relation to the observed manifestations of breath holding while crying. Prenatal and perinatal interview with history of gestational diabetes, hypothyroidism, with a risk of premature delivery in 28th week of pregnancy. The second pregnancy child, born through natural labour in 40th week. Birth weight of 3700 g, Apgar score 8/9/10 points. In the physical examination in the course of hospitalization heterologies were not found. Correct structures of the encephalon in the parietal ultrasound scan. In 5th day of life the child was hospitalized due to protracted jaundice, with the level of total bilirubin 20.4 mg/dL. Increased hematocrit, hyperbilirubinemia and negative direct antiglobulin reaction were reported in laboratory investigations. Indicators of an inflammatory condition were negative, the level of thyroid hormones correct, parietal and abdomen ultrasound scan correct. During hospitalization a general condition of the child was good, a 5-day phototherapy was applied, resulting in reduced yellowing of the skin and the lowered level of bilirubin. Based on the clinical picture and additional findings it was concluded that jaundice was caused by increased hematocrit and the woman's milk. The child was discharged from hospital in a good general condition. To 11 months of age the child stayed at home with good general psychomotor development; the child was raised by parents, mainly by the 34-year-old mother, 39-year-old father, and grandparents from both sides. Parents of the child have a secondary education. Sister of the patient is 8 years old. Due to unfavourable house conditions (30 m<sup>2</sup> for 4 persons), the child situationally experienced parents' quarrels. Particularly intense conflicts took place after the consumption of alcohol by the child's father. Fits of affective apnea started

with crying, breath holding, skin colour turning blue with incidental loss of consciousness, without convulsions. The child was referred to a neurological consultation. The electroencephalography (EEG) record was correct. And the the diagnosis of BHS was confirmed.

Patient and his caregivers were referred to a psychological consult and therapy. The indicators of psychomotor and temperamental development of the child were measured using the children's development scale. The examination was conducted twice – before commencing intervention (Tables 1 and 2) and 6 month later, after the reduction of fits of apnea (Tables 3 and 4). The aim of the psychological intervention was an assessment of the child's development resources, identification of BHS stimuli as well as parent's education. Caregivers were explained that affective apnea episodes were a serious condition relating from disturbed child–father relationship as a consequence of father alcohol abuse. As a part of intervention psychoeducational meetings with the child's parents were introduced. They aimed at improving communication competences between the spouses and making the father of the child aware of his developing drinking problem.

## 4. RESULTS AND DISCUSSION

Intervention activities brought beneficial changes in the functioning of the family system, which after about 2 months resulted in cessation of symptoms of affective apnea in the child. The described case of BHS shows the importance of integral understanding of the psychomotor development. Diagnoses, carried out by means of the child's developmental scale (Tables 1–4) showed that individual functions, which form the complementary development, reflected the developmental continuity. The child's development varied between the average and high level.<sup>21</sup> As to the temperamental characteristics of the examined child (Table 4), it should be stressed that the resources associated with the natural process of the nervous system development, as well as positive changes which took place in the life environment of the girl, contributed to the reduction of frequency and intensity of affective apnea. A child from the moment of birth has personal needs and constitutes an entity that takes an active part in the home environment relations, and as such requires developmental homeostasis in the biopsychosocial area.<sup>22</sup> Attentive observation of the child's developmental needs and predispositions, as well as quick responses of the most immediate environment are necessary for the continuous and appropriate development of the child.<sup>22</sup> When examined in the sphere of activity – vigour, the patient moved from the low level to the average level, which enabled the child spontaneous motor reactions, undoubtedly contributing to the reduction of emotional stress and arousal. It is also essential to highlight that the child's abilities of adaptation to changing conditions rose from the average to high level, which in turn allows to minimize affect stimulation in situations of novelty for the child. An

**Table 1. Test I child's developmental scale – performance scale results obtained by an 11-month-old infant (in points).**

Manipulation	Perception	Scribbling, drawing	Toy blocks	Comparing	Memory	Speech	Vocabulary	Social behaviour	Motor activity
23	8	3	4	1	1	2	5	11	11

Comments: overall result – 69, centile – 91, sten – 8, with 85% probability  $w = (65 - 73)$ ; centile 83 – 98, sten 7 – 10 average / high result.

**Table 2. Test I child's developmental scale – monitoring scale results verifying temperament factors obtained by an 11-month-old infant (in points).**

Vigour	Adaptability	Rhythmicality	Sensitivity
8 low level	14 average level	4 average level	4 high level

**Table 3. Test II child's developmental scale – performance scale results obtained by an 17-month-old child (in points).**

Manipulation	Perception	Scribbling, drawing	Toy blocks	Comparing	Memory	Speech	Vocabulary	Social behaviour	Motor activity
23	10	3	9	4	1	6	15	12	13

Comments: overall result – 96, centile – 76, sten – 7, with 85% probability  $w = (91 - 101)$ ; centile 60 – 85, sten 6 – 8 average / high result.

**Table 4. Test II child's developmental scale – monitoring scale results verifying temperament factors obtained by an 17-month-old child (in points).**

Vigour	Adaptability	Rhythmicality	Sensitivity
11 average level	15 high level	5 high level	4 high level

increase in the rhythmicality within physiological functions was also observed, such as circadian rhythm, sleep rhythm, appetite and bowel movement. That reflects the feeling of constancy and predictability, and elimination of inducing unaware stimulation into the somatic sphere. Sensitivity reflected in the level of stimulation which triggered reactions of the child, both in the first and the second examination was high. It can be assumed that this resource is an innate characteristic, which will be reflected in the future in the high level of sensory sensitivity. What is more, in the situation of imbalance, this variable in constellation with the remaining components of the temperament translates into the remaining spheres of the child functioning, also organic ones. Clinical neurological examination, brain wave activity record were intact, what confirmed the diagnosis of BHS

The literature gives first earliest emotions – satisfaction, interest and distress, from which emotions of joy, sadness and disgust emerge before 3rd month of life, and about 6th month of life the emotion of surprise develops from interest.<sup>24</sup> The emotion of anger differentiates itself from negative emotions between 4th and 6th month of life, whereas the emotion of fear of strangers is observed between 7th and 8th month of life. The next stage of the emotional development is connected with the formation of self-awarenesses, which enables a child to understand more compound emotions; this stage falls on 15th–24th month of life.<sup>22</sup> The developmental stages of experiencing emotions described above closely correlate with the occurrence of BHS, which proves that BHS should be considered in relation to the child's functioning in the biopsychosocial area.

## 5. CONCLUSIONS

- (1) Improvement observed after implemented psychological indications allows to conclude that BHS presented by the child were a defense emotional reaction to an unfavourable home environment.
- (2) Emotional development of a child should be understood in a multifaceted way. Apart from a neurological examination, it is necessary to include the component of emotional arousal in the diagnosis of BHS.
- (3) Dysfunctional family environment might be a factor triggering the formation of abnormal organic patterns of reaction when the physical and psychological resources of a child are excessively strained. Raising the parents' awareness of a detrimental effect which the housing conditions has on the family functioning is vital.

### Conflict of interest

The authors declare that they have no competing interests.

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## Ethics

No approval was required by the institutional Ethics Committee of Provincial Specialist Children's Hospital. Parents provided written informed consent on behalf of their children for diagnosis and medical treatment, and for publication of this case report.

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