A MINIREVIEW ABOUT PRETERM BIRTH AND MAIN SPECIFIC NEURODEVELOPMENTAL DISORDERS

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ABSTRACT

The preterm birth interrupts the physiological processes that allow the development of the Nervous System and of the body apparatus. Preterm children present a multi-organ dysfunction inversely proportional to the gestational age, leading to respiratory, cardiovascular, haematological, metabolic, infectious, and neurological problems.

Keywords*: neurodevelopmental disorders, specific learning disorders, sensorial disability, very low birth weight.*

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Introduction

The preterm birth interrupts the physiological processes that allow the development of the Nervous System and of the body apparatus. Preterm children present a multi-organ dysfunction inversely proportional to the gestational age, leading to respiratory, cardiovascular, haematological, metabolic, infectious, and neurological problems. Infections, both viral and bacterial, may be of a systemic (septicemia) or localized type (pneumonia, urinary tract infections, meningitis, etc.). The most frequent respiratory problems are the Respiratory Newborn Respiratory Syndrome (RSD) due to the lack of surfactant, the wet lung or transient tachypnea of the newborn, pulmonary malformations and chronic lung disease.

Metabolic problems can result from glycemic disorders, dyselectrolyticemia, hyperosmolar syndrome, feeding difficulties and necrotizing enterocolitis (NEC). Among the haematological complications there are anemia of prematurity, thrombocytopenia and hyperbilirubinemia. Another frequent problem is retinopathy of the premature (ROP) caused by neovascularization of the retina[1-5].

Among the neurological effects of preterm birth, we can consider as mainly neurodevelopmental disorders the sensorial disability, intellectual disability (ID), speech/communication disorders, Attention Deficit/Hyperactivity Disorders (ADHD), Autism spectrum disorders (ASD), specific learning disabilities (SLD).

Sensorial disability linked to the preterm birth (auditory and visual disability)

This group may include deficits of auditory function divided into transmission hearing loss (caused by changes in the sound transmission system in the external and middle ear) and sensorineural hearing loss (due to problems with the inner ear or the auditory nerve).

Among Very Low Birth Weight (VLBW) infants about 1-9% have sensorineural hearing loss with a prosthetic request, while 11-13% have a slight alteration.

Moreover, VLBW children may present also visual disorders such as Visual Deficit of Central Origin (DVOC) and Peripheral Visual Deficit (DVP). DVOC is due to the involvement of the retrogenic pathway (optical radiation, calcarine cortex, visual associative areas) and almost always involves minimal and potentially improvable visual competence (Figure 1).

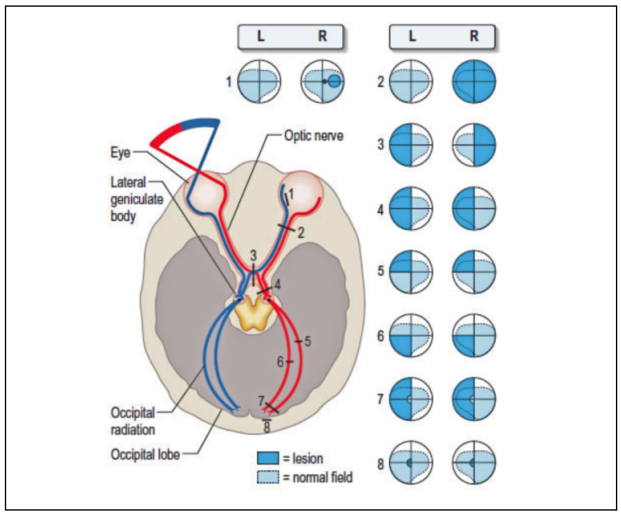

Figure 1: shows the visual areas involved in Visual Deficit of Central Origin (DVOC).

In the DVP there is the involvement of the prechiasmatic visual pathway (retina, optic nerve, dioptric means) and the visual function is absent or severely impaired. In 1 to 10% of ELBW children there is unilateral or bilateral blindness, milder disorders such as myopia, strabismus, and lack of stereopsis are present in 9-25%. The most frequent visual impairment is Premature Retinopathy (ROP), the lower the gestational age at birth the greater the risk. About 20% of children born before 32 weeks develop ROP at various stages. Visual impairment is generally evident in grade III PVL and is usually severe in neonates with grade IV PVL; the incidence of low visual acuity in children with PVL is about 60%. It has been shown that VPT and EPT in the absence of brain lesions have a more mature visual function than those born on term with regard to eye movements[1-5].

Neurodevelopmental Disorders (ND)

According to the DSM-5 ND are a group of conditions with onset in the development period and with impairment of personal, social, educational or work functioning, including Intellectual disability (ID), communication disorders, Attention Deficit / Hyperactivity Disorders (ADHD), Autism spectrum disorders (ASD), Specific learning disabilities[6-20].

Intellectual Disability (DI)

Intellectual Disability is a neurodevelopmental disorder characterized by:

1) intellectual impairment (reasoning, problem solving, abstract thinking, scholastic learning and learning from experience) confirmed by clinical evaluation and testing of individualized and standardized intelligence;

2) deficit of adaptive functioning (failure to achieve the development and socio-cultural standards of autonomy and social responsibility);

3) onset during the development period. Severity levels (mild, moderate, severe, extreme) are defined according to adaptive functioning.

ID implies impairment in global mental abilities that affects adaptive functioning in 3 domains:

- conceptual: language skills, reading, writing, mathematics, reasoning, knowledge, memory
- social: awareness of other people's thoughts and feelings, empathy, social judgment, ability in interpersonal relationships, ability to make and maintain friendships
- practical: self-management such as personal care, work responsibilities, money management, recreational activities, organization of school and work assignments.

Intellectual disability is the most common severe disability in preterms. The deficit may affect between 4 and 47% of children born between 22 and 34 weeks or weighing between 750 and 1500 grams. Approximately 25% of VLBW infants and up to 62% of ELBW infants require school support, 15-34% repeat a class; he graduated in high school only 56-74% of premature babies, significantly less than adolescents of normal birth weight, while only 66% of VLBW males graduate compared to 75% of term males, and 81% of VLBW females compared

to 90% of full-term females. The cognitive scores of preterm subjects in school age remain significantly correlated with gestational age and birth weight, and when comparing preterm subjects of school age without mental retardation with term children, a mean difference of 10.9 points is observed[21-30].

Communication disorders

Communication disorders include language disorder (developmental deficit and use of language), phonetic-phonological disorder (speech production deficit), disturbance of flu with childhood debut or stuttering (deficiency of fluence and frequency of speech), the disturbance of social communication or pragmatics (deficit in the use of social communication). These disorders can produce permanent functional damage. Premature children have language delays or phono-articulatory changes compared to those born term. A meta-analysis on preterm infants between 3 and 12 years has shown that they show significantly lower scores in tests that evaluate both simple and complex language functions[31-50].

Attention Deficit / Hyperactivity Disorders (ADHD)

ADHD is a neurobiological syndrome, with onset within 12 years, characterized by inattention, impulsivity and hyperactivity present in a variety of children's life. These symptoms impact the quality of social and scholastic functioning. The most accredited pathogenetic model suggests that at the base of the disorder there are volumetric and functional alterations of the prefrontal cortex and the basal ganglia, structures involved in executive and attentive functions. -analysis shows that verbal fluency, working memory and cognitive flexibility are reduced in children with EPT or VLBW compared to children born at term. Attentional difficulties and ADHD symptoms are more frequent in LPT and MPT children[51-57].

Autism Spectrum Disorders (ASD)

ASD are neurodevelopmental disorders characterized by:

• persistent deficits in communication and interaction social;

• patterns of behavior, interests or restricted or repetitive activities, with sensory hypo-responsiveness;

• symptoms present in the early period of development;

• symptoms that cause significant impairment of functioning in the social, occupational or other important areas;

• symptoms not better explained by intellectual disability or global developmental delay. Specifiers related to the presence in association of intellectual impairment and / or language, known medical or genetic conditions, other neurodevelopmental, mental or behavioral disorders etc. can be used.

In particular, it is possible to identify a severity level[1-3] to describe the current symptomatology, corresponding to the need for a more or less significant level of support. Preterm birth (<37 weeks) and low birth weight (<2500) they have long been considered as risky conditions for DSA, with a higher risk than the prematurity and weight loss are more severe (Larsson et al, 2005)[51-57].

Specific Learning Disorders

They are neurobiological disorders characterized by learning deficits in one or more specific areas (reading, writing, calculation), for which school abilities are markedly below those expected. for the chronological age of the individual and cause significant interference with academic or work performance or with activities of daily life. Such impairment is not better justified by intellectual disability, impaired visual or auditory acuity, mental or neurological disorders, psychosocial adversity, inadequate schooling or lack of knowledge of the language of schooling. They manifest during the years of schooling, particularly when the The request relating to these school abilities exceeds the limited abilities of the individual affection. VLBW children without sensory or cognitive impairment more frequently present Learning Specific Disorders (25-40%), especially in mathematics. Difficulties in learning are more common in LPT and MPT children[51-57].

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