

Alterations in languages in Autism Spectrum Disorder

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Abstract

We have examined 75 infant patients ranging from 3 to 15 years-old with autism spectrum disorder. We have found language disorders such as delay in the onset of language or early vocalization, regressive changes of language, mutism, gestual language, escatologic language, and digital language. Language disorders are analyzed in relationship with delay in the onset of language or early vocalization, regressive changes of language, mutism, gestual language, escatologic language, and digital language. between microstructural integrity and functional activation, epilepsy, altered modular organization of structural cortical networks, specific deficient connectivity of the arcuate fascicle, epileptiform activity, a decline in their social and school insertion, disorders in language child decline in their social and school insertion, and altered lingual frenum.

Key words: autism spectrum disorder; language disturbances; child social interaction

Brief history

Alteration of language function have been described in children with autism spectrum disorder [1,2,3,], epilepsy [4, 5], congenital and acquired hemiparesis [6] learning disorders, mental retardation, and attention deficit and disruptive behaviour disorders [7], delay in maturation of the auditory pathway [8], Seitelberger's infantile neuroaxonal dystrophy [9], child maltreatment and domestic violence [10], Adenoid hypertrophy [11], congenital bilateral sensorineural hearing [12], congenital hypothyroidism [13,14], lingual frenum [15], stroke in childhood [16] and Angelman syndrome [17].

Material and Methods

We have examined 75 infant patients ranging from 3 to 15 years-old with autism spectrum disorder. The children were clinically studied at the Clinical Neuroscience Outpatient Clinic of Clinical Neuroscience Institute at Clinical Home San Rafael de Maracaibo. Venezuela They were previously examined from the psychological point of view at CETRO, Maracaibo, or at different Public Psychology Centers of Maracaibo City.

Results

In the present study we have found language disorders such as delay in the onset of language or early vocalization, regressive changes of language, mutism, gestual language, escatologic language, and digital language.

Discussion

Language disorders in ASD and sensory processes alterations

Sensory processing alterations are highly prevalent in autism spectrum disorder (ASD). Neurobiologically-based theories of ASD propose that abnormalities in the processing of temporal aspects of sensory input could underlie core symptoms of ASD. For example, rapid auditory temporal processing is critical for speech perception, and language difficulties are central to the social communication deficits defining the disorder. Results indicate a domain-specific impairment in rapid auditory temporal processing in ASD that is associated with greater difficulties in language processing. [1]. There is significant clinical heterogeneity in language and communication abilities of individuals with Autism Spectrum Disorders (ASD). However, no consistent pathology regarding the relationship of these abilities to brain structure has emerged



[2]. Lo et al. [3] (2013) hypothesized that the dual stream language network is altered in autism, and that this alteration could be revealed by changes in the relationships between microstructural integrity and functional activation. Microstructural integrity of the left dorsal and left ventral pathways responsible for language processing and the functional activation of the connected brain regions were studied in youths with high-functioning autism. The altered structure-function relationships in autism suggest possible involvement of the dual pathways in supporting deficient semantic processing. The association between atypical language localization and network integration implies a widespread disruption of neural network development in epilepsy [4].

Autism spectrum disorders (ASD) are characterized by the alteration of three basic areas of behaviour, qualitative alterations in reciprocal social interaction, qualitative alterations in communication and patterns of behaviour, and stereotyped, repetitive and restrictive activities and interests. Specific language impairment (SLI) is a disorder in which language is slow and retarded with respect to the patient's chronological age, and which is not related to a sensory-auditory or motor deficit or to a pervasive developmental disorder. In both disorders, epilepsy has an important role [18].

Deficits in language and communication are among the core symptoms of autism, a common neurodevelopmental disorder with long-term impairment. Despite the striking nature of the autistic language impairment, knowledge about its corresponding alterations in the brain is still evolving. We hypothesized that the dual stream language network is altered in autism, and that this alteration could be revealed by changes in the relationships between microstructural integrity and functional activation [19].

Disturbance in language was observed in epilepsy with centrotemporal spikes. The patients also showed increased driving effect from the epileptic zone in Broca's area to the right prefrontal lobe, and decreased effects to the frontal lobe and posterior parts of the language network [20]. The apparently causal relationship between autism and epilepsy has been recently questioned by Besag [21].

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Deficits in language and communication are among the core symptoms of autism, a common neurodevelopmental disorder with long-term impairment. Despite the striking nature of the autistic language impairment, knowledge about its corresponding alterations in the brain is still evolving. Altered structure-function relations of semantic processing in youths with high-functioning autism have been also reported by Lo et al. (2013, [22]).

Structural alterations of the language connectome in children with

specific language impairment was reported by Vydrova et al (2015) [23] with specific deficient connectivity of the arcuate fascicle. Patients with ASD showed specific epileptiform activity predominantly distributed in the perisylvian areas. In patients with Asperger's syndrome, epileptiform activity was mostly found in the right hemisphere. In patients with autism, no lateralized epileptiform activity was observed, although there was predominant activity in the left hemisphere. Subclinical epileptiform activity was found in the perisylvian areas in patients with ASD [24].

The direct impact on children who are not adequately diagnosed is the alteration in acquisition of language and cognitive skills and a decline in their social and school insertion, jeopardizing their professional and potentially productive life. Universal screening programs for hearing loss are essential for the diagnosis [10].

Brain development during the first three years of life is highly dependent on thyroid hormones. Children affected patients have low or absent thyroid hormone concentrations. The importance of this fact is that brain development during the first three years of life is highly dependent on thyroid hormones. Congenital hypothyroidism children exhibit lower scores in cognitive, language and gross motor assessments, receptive communication, expressive communication, fine motor and gross motor skills compared to healthy children [25].

Altered lingual frenum modifies the normal tongue mobility, which may influence the stomatognathic functions, resulting in anatomical, physiological and social damage to the subject [26]. Social perception skills, such as understanding the mind and emotions of others, affect children's communication abilities in real-life situations. In addition to autism spectrum disorder (ASD), there is increasing knowledge that children with specific language impairment (SLI) also demonstrate difficulties in their social perception abilities [27]. Language impairments, a hallmark feature of autism spectrum disorders (ASD), have been related to neuroanatomical and functional abnormalities. Abnormal lateralization of the functional language network, increased reliance on visual processing areas, and increased posterior brain activation have all been reported in ASD and proposed as explanatory models of language difficulties [28].

Difficulties with both executive functions and language skills are common but variable in autism spectrum disorder (ASD). Executive functions and language skills are related to one another, such that vocabulary, syntax, and pragmatics are related to domains of working memory, shifting, and inhibition in ASD, although the directionality of these relationships remains unclear. [29].

The specific relationship between ASD, epilepsy, and language development in this population has not been well-studied. Analysis of language variables and epilepsy characteristics from 6 to 36 months and ASD diagnosis at 36 months revealed significant relationships between all three variables. While the direction of these relationships needs further research, epilepsy, language, and the development of ASD are integrally related in young children with TSC [30].

Semantic processing impairments are present in a proportion of individuals with autism spectrum disorder (ASD). Despite the



numerous imaging studies investigating this language domain in ASD, there is a lack of consensus regarding the brain structures showing abnormal pattern of activity. This meta-analysis aimed to identify neural activation patterns present during semantic processing in ASD. Findings reveal activation of areas associated with semantic processing and executive functions in ASD. This provides strong support for impaired semantic processing in ASD that is consistently associated with abnormal patterns of neural activity in the semantic network [31].

Conclusions

We have found language disorders such as delay in the onset of language or early vocalization, regressive changes of language, mutism, gestural language, escatologic language, and digital language. Language disorders are analyzed in relationship with delay in the onset of language or early vocalization, regressive changes of language, mutism, gestural language, escatologic language, and digital language. The relationship between language disorders in autism spectrum disorder have been discussed with the microstructural integrity and functional activation, epilepsy, altered modular organization of structural cortical networks, specific deficient connectivity of the arcuate fascicle, epileptiform activity, a the decline in their social and school insertion, and altered lingual frenum.

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