Clinical Parameters for the Diagnosis of ASD

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Abstract—Autism spectrum disorder (ASD) is characterized by disorders of neurological development, typically diagnosed within the first 4 years of life, clinically presents with impairment in social interaction, deficits in verbal and non-verbal communication, and repetitive and purposeless stereotypic behaviors. One thousand of pre-diagnosed ASD patients, randomly selected, to be part of this study, where attended at the Unidade de Gastroenterologia, Alergia Alimentar e Autismo (UGAAA) at Unigranrio University, School of Medicine. This evolutionary report aims to evaluate the presence of the 6 most common clinical disorders of neurological development in ASD patients, selected to be the core for the table for the diagnosis of ASD.

Index Terms—autism spectrum disorder; objective evaluation of ASD; social interaction.

I. INTRODUCTION

The autistic spectrum disorder (ASD) is a neurodevelopmental disorder, typically diagnosed within the first four years of life, which clinically presents with persistent impairment in social interaction, deficits in verbal and non-verbal communication and repetitive purposeless behavior [1-4]. It occurs in one out of 68 individuals and can affect any child regardless of sex, race or socioeconomic status and is four to five times more frequent in males [5].

As we can see in figure one there are a overlap of time between the beginning of the ASD and the diagnosis. Several factors could be involved in this delay but most prominent are the difficulties of the pediatricians to recognize the disease (and the absence of a score easily to be used by the doctor.

A major effort of this paper is to summarize those two parameters in one score easily done by the pediatrician during his clinical interview dealing with this problem.

Existing forms for evaluation of ASD are too extensive to be filled by the physician at the time of a medical appointment. And due to the need to evaluate the possible diagnosis of ASD, we structured a table for objective evaluation. This table was based in the most frequent complaints on the occasion of the first medical appointment by over 1000 patients with this disorder treated at UGAAA. (Figure 1).

The 6 most frequent complaints were: verbal communication, eye contact, social interaction, sleep, restrictive and repetitive behaviors and activity level. This evaluation was performed at any time according to the availability of return of the patients who undergo

ambulatory follow-up.

II. VERBAL COMMUNICATION

Individuals with ASD tend to have unique and atypical acoustic patterns in speech. These behaviors affect social interactions and social development and may represent a non-invasive marker of ASD. Functional neuroimaging and electroencephalography recent studies demonstrate that aberrant voice processing could be a promising marker to identify ASD early [6].

We propose in our scale 4 steps in verbal communication: 1-do not speak or babble words; 2-echolalia or words out of context; 3-babble or speak words with context and 4-speak sentences.

III. EYE CONTACT

Patients with ASD tend to avoid eye contact [7-9]. In our scale we propose four steps for eye interaction: 1-patients tend to avoid eye contact; 2-did so sporadically; 3-patients make eye contact only after tactile, visual or auditory stimulation or 4-patients could have frequent and spontaneous eye contact.

IV. SOCIAL INTERACTION

Deficits in communication and impairments in social interaction are main characteristics of children and adolescents with ASD. Children with ASD have less social skills [10], are more often victims of bullying [11] and spend less time interacting with others. [12-15]

In our evaluation we select four steps in the main scale for interaction: 1-no social interaction; 2-interaction only with family members; 3-interaction with strangers and 4-good social interaction with everyone.

V. SLEEP

Between 2 and 3 years of age there are long periods of nocturnal sleep followed by one or two daytime naps not exceeding a total of 2 hours. At age 3, usually only the afternoon siesta takes place. At 5 years of age, nocturnal sleep should already be fully consolidated, with no more nocturnal awakenings or need for daytime naps [6-9,16-18]. Only between 5 and 10 years of age a gradual decrease of the total time in nocturnal sleep occurs. In adolescence, nocturnal sleep reduction (mean of 7 hours) tends to occur, ranging from 8.6 to 6.4 hours from 14 to 16 years of age. [19] Children 3 to 5 years of age should sleep from 10 to 13 hours for 24 hours (including naps), children from 6 to 12 years of age should sleep from 9 to 12 hours for 24 hours, adolescents from 13 to 18 years of age should sleep 8 to 10 hours for 24 hours. [20]

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In our scale we propose the next evaluation: 1-patients slept less than 4h a day, 2-slept less than 7h per night and had sleep interruptions, 3-slept more than 7h per night also with interruptions and 4-could sleep more than 7h of continuous sleep, despite of large portion of patients making use of hypnotics, sleep inducers, anxiolytics and sedatives.

TABLE FOR EVALUATION OF ASD TREATMENT

SPEECH	DO NOT SPEAK OR BABBLE WORDS	ECHOLALIA OR WORDS OUT OF CONTEXT	BABBLE OR SPEAK WORDS WITH CONTEXT	SPEAK SENTENCES
SOCIAL INTERACTION	NO INTERACTION	INTERACTS WITH FAMILY ONLY	INTERACTS WITH STRANGERS	GOOD INTERACTION WITH EVERYONE
EYE CONTACT	NEVER	OCCASIONALLY	AFTER TACTILE, VISUAL OR AUDITORY STIMULATION	FREQUENT AND SPONTANEOUS
LEVEL OF ACTIVITY	CATATONIC	HYPOACTIVE	HYPERACTIVE	REGULAR
SLEEP	<4h/DAY	<7h/DAY WITH INTERRUPTIONS	>7h/DAY WITH INTERRUPTIONS	>7h/DAY CONTINUOUS SLEEP
RESTRICTED AND REPETITIVE BEHAVIOURS	CONSTANT	OCCASIONALLY	RARE	NO STEREOTYPIC BEHAVIORS

Fig. 1. Table for the diagnosis of patients with ASD, to be completed by the physician at the time of the outpatient visit. Based on the existing assessment and focusing on the six most frequent complaints of patients with the disorder.

VI. RESTRICTIVE AND REPETITIVE BEHAVIORS

Although considerable progress has been made in understanding the underlying mechanisms of social and communicative impairments in ASD, the neurofunctional architecture of repetitive and stereotyped behaviors as well as other cognitive conditions related to response and action control remain poorly understood [21].

We select four steps regards restrictive and repetitive behaviors: 1-patients with constantly restrictive and repetitive behaviors, 2-patients with occasionally restrictive and repetitive behaviors, 3-rarely and 4-patients did not present that kind of behavior.

VII. ACTIVITY LEVEL

Autism and catatonia have common symptoms such as mutism, echolalia, stereotyped speech and repetitive behaviors, postures, facial mimics, stiffness, mannerisms, and purposeless agitation [22]. Comorbidities such as hyperactivity, impulsivity and attention deficit occur in 41% to 78% of children with ASD [23, 24].

We grade our level of activity in those 4 steps: 1-patients in catatonic state; 2-patients hypoactive; 3-patients hyperactive, and 4-patients with regular activity level.

We propose in our scale 4 steps for each one of the selected 6 most frequent complaints: verbal communication, eye contact, social interaction, sleep, restrictive and repetitive behaviors and activity level.

Each step for the six more frequent complain is diagnosed in our patient. According to the next scale each level get a number. The somatorium of all six diagnosed complain could go from zero to 18. In our experience less than 12 points after the application of the scale is suggestive of ASD.

Pontuation: Level 1 equal to zero points
Level 2 equal to one point
Level 3 equal to two points
Level 4 equal to tree points

VIII. CONCLUSION

Based on the six most frequent complaints of about 1,000 patients previously included in the ASD spectrum, who were diagnosed at the UGAAA, the table proposed for the diagnose of ASD is a useful tool to be used by all physicians dealing with the diagnosis of patients in the spectrum of ASD.

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