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Update on Autism and its Dental Management- An Overview

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Abstract:- Autism is a neurodevelopmental disorder characterized by severe impairment in reciprocal socialization, impairment in communication, and repetitive behavior.

This review attempts to provide an overview of the history, prevalence, etiology, clinical manifestations, behavioral technique and oral health status of autistic children.

Keywords:- *Autism, Oral Hygiene, Management.*

I. INTRODUCTION

Autism Society of America (ASA) describes autism as a complex developmental disability that typically appears during the first 3 years of life and is the result of a neurological disorder that affects the normal functioning of the brain, impacting development in the areas of social interaction and communication skills. It is included as Pervasive Developmental Disorder in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV). [1]

II. HISTORY

The term "autism" which has the meaning of "living in self" was coined by Eugen Bleuler in 1911. A report on ''Autistic disturbances of affective contact'' which included 11 studies of children aged from 2 years and 4 months to 11 years was published in 1943 by Leo Kanner. [2] He observed sensory sensitivities, repetitive behaviors, an unusual language development and failure to initiate communication.

Hans Asperger in 1944, published a paper on ''autistic psychopathy''. He described children with nonverbal communication and their social skills. His observation was important as Kanner's work as the symptoms were of same type. Lorna Wing in 1981, renamed ''psychopathy as ''Asperger syndrome'' [3] She found out similarities between the criterias proposed by Kanner and Asperger. Later the initial diagnostic criteria was redefined from ''Kanner's autism'' to ''Asperger's syndrome'' to "typically-developing individuals", with the criteria of Asperger's syndrome. [3]

III. OVERVIEW OF AUTISM IN INDIA

As compared to developing countries sparse literature is available on autism in developing countries. India has by far the greatest number of literature among the developing countries.

In Indian literature Autism was first mentioned in 1944, by a Viennese pediatrician Ronald. He termed the observations as 'abnormal children'. In the late 1970s few centers were opened in India that started to diagnose children with autism.

IV. PREVALENCE WORLDWIDE

Prevalence rates per country are varies and it is difficult to determine. According to study conducted by Posserud et al, [4] and Wong [5] approximate prevalence rates in the nations worldwide is as follows:

- 6.25 in 1000- Australia
- 1.1 in 1000- China:
- 9 in 1000- Denmark:
- 1 in 154- Canada:

V. PREVALENCE IN INDIA

In India, the prevalence ranges from 0.15% to 1.01%, depending on the screening method, and the areas surveyed [6, 7]. According to the INCLEN study the prevalence is 1 in 125 children among 3-6 years and 1 in 85 among 6-9 years of age. In rural areas the prevalence was found to be 0.90% and 1.01% in urban areas.

VI. GENETICS

Genetic plays an important role in understanding the pathophysiology of ASD. Three main areas support the genetic contributions in ASD: 1) Twin studies- comparing monozygotic twins (MZ) and dizogotic twins (DZ), 2) family studies comparing the rate of autism in first degree relatives of affected probands versus the population, and 3) studies of rare genetic syndromes associated.

MZ twins share 100% and DZ twin's share 50% of their genetic material and both share in utero environment with their twin because of which, higher disease co-occurrence is observed in MZ twins than DZ twins with a heritability of 70–80%. [8, 9]
Various genetic syndromes which are seen in association include Joubert Syndrome, Tuberous Sclerosis, Fragile X. neurofibromatosis, Angelman syndrome and this account for less than 10% of autism [10, 11]

VII. CLSSIFICATION AND DIAGNOSIS

The DSM-IV criteria for autistic disorder consist of three levels

- **Lowest-level (L3)** - combinations of specific phenotypes or single specific phenotypes.
- **Mid-level (L2)** - L3 phenotypes. Level 2 includes three categories with specific L3 phenotypes
- **Upper-level (L1)** - Incorporates the lower levels as well as diagnostic criteria not in the L2 and L3 phenotypes.

The commonly used method for the diagnosis of ASD are the **Autism Diagnostic Interview–Revised (ADI-R)** [12-15] and the **Autism Diagnostic Observation Schedule (ADOS).** [16, 17]

The ADI-R is a structured interview conducted with the parent or caregiver. 93 items are considered divided into seven domains:

- early development
- acquisition and loss of language
- language and communication function
- social development
- interests
- general behaviors
- Any others [12]

In ADOS the subject is observed by the examiner based on a series of structured and semi-structured tasks involving social interaction. The ADOS was developed to accompany the ADI-R. [12] These approaches to measure the social deficits in children reduce the likelihood of diagnosis based on severe deficits in only one or two domains.

VIII. INDIAN SCALE FOR ASSESSMENT OF AUTISM (ISAA)

ISAA is a valid tool for diagnosing and grading severity among the age groups of 3-22. ISAA comprises of 40 items covering 6 domains; Social relationship and reciprocity, Emotional responsiveness, Speech-language and communication, Behavior patterns, Sensory aspects and Cognition. Diagnosis of autism is made when the total score is ≥70. Severity is categorized as, when the score is 70- 108 as mild, 109-153 as moderate and >153, as severe. [18- 21]

IX. CLINICAL FEATIRES

Autism can be suspected when the child avoids eye contact, wants to be alone, has delayed speech and language skills, repeats words or phrases, gives unrelated answers to questions, or has obsessive interests.

In infancy, they tend to be unusually quiet, prefer to be on the bed, may not engage in in social games such as peek-a-boo, Child may not reciprocate smile with the caregiver. The development may be normal till 12–18 months after which slowdown in their language and social skills are observed. [22, 23, 24]

During childhood the child may not respond to his/her name, tend to express their needs by "hand-on-hand gesture", become very independent and may have lots of self-talk

The main challenge to the dental team in treating an autistic child includes

- Limited attention span
- Repetitive body movements.
- Hyperactivity.
- Tactile and auditory hypersensitivity
- Reactions to light and odors. [25-28]
- May not like the new environment. [27, 28]

X. ORAL HEALTH STATUS

The oral health is often comprised due to the difficulty in maintaining the hygiene, excess drooling and due to poor muscle tone not because of excessive saliva production. [29]

- *Dental Caries*

Autistic children tend to consume soft, sweetened food mostly and because of poor tongue coordination they have a tendency to pouch food inside the mouth rather than swallowing it, which increases the caries susceptibility. Shapira et al conducted a study among institutionalized autistic individuals and reported that they exhibit lower caries rate than the institutionalized schizophrenics. [30] Morinushi et al. examined Japanese autistic children in 1980 and in 1995 and concluded that the caries experience in 1995 showed a clear decline from 1980. [31] Orellana et al carried out a prospective case-control study on adults

with ASD, and of a healthy control group and found put they have higher caries experience. [32] In a study conducted in primary and permanent dentitions in comparison with non-autistic healthy children, similar dental caries experiences were observed. [33, 34] Santos in his study reported that autistic individuals do not have higher salivary flow rate or a better buffer capacity of the saliva compared with non-autistic individuals.

- *Gingival and Periodontal Health*

Majority of autistic children have poor oral hygiene, and almost all of them have gingivitis. [35] These changes could be related to irregular brushing and flossing habits, because of the difficulties the care takers encounter. They consume psychoactive drugs or anticonvulsants, antidepressants, stimulants, and antipsychotics which can cause gingivitis as side effect which could be another possible reason. [36- 38]

These drugs can also cause delayed tooth eruption due to phenytoin-induced gingival hyperplasia.

- *Self-Injurious Behavior*

It is nothing but self-harm mainly causing tissue damage. Self-Injurious Behavior occurs in 4-5% and the prevalence of these lesions is 13%, but it was far lower than that seen in other studies, in the order of 68%. [39] With respect to frequency and intensity, it varies from mild and infrequent to severe and chronic in children. Head banging is one of the most common; other forms include head hitting, biting, scratching or picking the skin, hair pulling, and ingestion of non-edible substances.

- *Malocclusion*

Patients with ASD do not have any specific malocclusions, but few of them exhibits ogival palate and anterior open bite. [40]

XI. BEHAVIOR GUIDANCE

Goals of behavior guidance are to develop rapport, reduce anxiety, and provide quality dental treatments while building a trusting and positive relationship for a lifetime between the professional and patient. Limitations in social interactions can be a significant barrier to effectively utilizing tells show do methods as modeling is difficult. [41- 43]

- *Communication*

Communication is the basic step in managing a child. It helps to establish trust with the practitioner and builds needed cooperation for the treatment. Oral commands and hygiene instructions should be short, clear, and simple sentences. It is important to maintain good, ongoing communication throughout the visits and even after that.

- *Picture Exchange Communication System (PECS)*

PECS is an alternative communication technique with no or little verbal skills and is used to express desires, observations, and feelings with the help of a book or pictures. It can be used to give instructions in oral health maintenance with step wise commands. It helps to achieve a "way" of communication between the child and the surrounding environment. With the PECS the child replaces a picture or photo for desired need.

XII. APPLIED BEHAVIOL ANALYSIS

Applied Behavior Analysis (ABA) is a branch of psychology that is focused on the analysis and modification of human behavior and has been ABA accepted by American Academy of Pediatrics in the management of autism. The various procedures include video modeling, pictures prompting, visual prompt; computer based video instruction and video prompting. Visual Pedagogy was first used in 1999 by Backman B & Pilebro C in dentistry for increasing the cooperative levels of the children with ASD for dental treatment. [44, 45, 46] It was utilized with colored photographs describing tooth brushing to improve oral hygiene in children. [47, 48]

- *Video Modeling*

Video Modeling (VM) is an effective method for developing skills in children with ASD such as social and communication. Shipley-Benamou et al & Rehfeldt et al [49, 50] taught brushing skills to children with autism with the help of video modeling. It consists of a video which shows a model perform a task which has to be trained and has to perform the skills presented in the video. Asma'a MS [51] conducted a study to evaluate the effectiveness of audiovisual modeling on behavioral change and found that VM is useful tool for helping Autistic children to improve their oral hygiene. Studies on VM in dental office have also reported it to be effective in teaching children to be compliant with dental check- up. [49- 51, 52] In addition, recent findings have demonstrated that children with ASDs are able to contextualize pictures and use them to guide their behavior in real situations. [53] The children watching the video do not expect any social interactions, as they would with demonstration modeling, and they do not have any added pressure, such as eye contact. [54]

XIII. ADVANCED BEHAVIOR GUIDANCE

- *Protective Stabilization*

It was formerly referred as physical restraint or medical immobilization. It can be active immobilization by another person such as parent, dentist, assistant or passive immobilization using a restraining device. Children with autism exhibit uncontrolled movements in the dental office during a dental check-up or during the procedure. Protective stabilization calms the autistic child due to the deep pressure produced by its placement. It should be handled with care to avoid injuries to the child as well as to the parents and clinicians. It is indicated when a patient requires immediate diagnosis and/or urgent limited treatment and cannot cooperate due to emotional and cognitive developmental levels, lack of maturity, or medical and physical conditions. The dental provider should always acknowledge the principle "do no harm" when considering immobilization with protective stabilization. AAPD recommends documentation for the

indication, type, reason, duration of application, behavioral ratings in the patient's record.

➢ *Sedative Procedures*

Sedation is the procedure in which particular medications (sedatives) are used to create a state of relaxation. The use of sedation may be considered for patients with autism when basic management techniques have failed. There are three levels of sedative procedures- Conscious sedation, Deep sedation, General Anesthesia. Benzodiazepines, nitrous oxide, antihistamines and hypnotics (barbiturics and non-barbiturics) are usually suggested. Diazepam and midazolam in combination with nitrous oxide administration has reported success rates of 77% to 100%. [55] A detailed medical history and an opinion from the child's physician should be taken prior to the procedure. For deep sedation, drugs like propofol and the neuroleptics, are prefered but should be used in a hospital setting. The risks involved in this technique are: depression of protective airway, depression of the cardiovascular system, adverse reactions including anaphylaxis, inadvertent loss of consciousness based on individual variations in response to medicines used. To reduce the risk the practitioner should have basic emergency drugs and kit. The professional and the staff should be prepared to handle any kind of emergency situation that would endanger the physical and the mental health of the individual.

➢ *Nitrous Oxide*

Conscious sedation used dentistry to manage autistic children are with the help of nitrous oxide in combination with oxygen gas. Nitrous oxide acts on the nervous system and has analgesic and sedative properties by reducing its sensitivity to pain. It is safe, effective and influences the behavior of the child by decreasing the anxiety levels. It acts fast and the dosage is obtained incrementally by inhalation compared to benzodiazepines. Not just the uptake and distribution, elimination is also very fast. It is important to know about the behavioral problems and medical condition; because the administration duration and concentrations required for autistic patients may be higher than usual to achieve the desired level of sedation A study conducted by Edelson in patients with autism was reported to have a success rate as high as 87.5% with 50% N2O. [56]

➢ *General Anesthesia*

General Anesthesia is an induced state of unconsciousness. The patient cannot respond to physical or verbal stimulation of any kind and losses the ability to maintain ventilatory and neuromuscular function independently. The procedure should be done in a hospital setting in the presence of a specialist and considered only when other management alternatives have failed or when the patient is planned for any procedures under GA by other medical services which can be combined with dental. The dentist should provide accurate information to the anesthesia provider about the child's condition and behavioral problems. Under GA preventive, restorative and surgical treatment can be performed and completed in a single appointment. Airway management remains to be an important aspect during sedation. The distance from the base of the tongue to the roof of the mouth should be assessed. Usually for dental procedure nasotracheal intubation is preferred and the inspection of nasal cavity should be done. While GA is generally considered as a safe procedure, adverse effects usually include nausea and vomiting which are considered to be minor complications. Elevated temperature and decrease in apatite have also been observed.

➢ *Oral Hygiene Maintenance*

The care provider should be made aware on the need for maintaining the oral health as there is a huge lacunae on awareness. Regular brushing habits accompanied by mouth rinse and flossing should be emphasized. Powered tooth brush is an effective alternative as it has novelty effect and can be grasped easily. Regular check up every 3 months should be advised with topical fluoride application based on individual caries risk. Oral health assessment should be performed on every visit.

XIV. CONCLUSION

Each child is unique in their own way. Comprehensive dental care of AD child needs flexible approach with thorough understanding of the behavioral profile, behavioral guidance techniques and personalized therapeutic approach. Compassion towards the child is the key towards the management. A multidisciplinary team is required for the effective management and the team should understand how each factor would be relevant to each individual.

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