

Autism: The Dental Perspective

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ABSTRACT

Background: Autism spectrum disorders, or ASD, are an umbrella term commonly used to describe several developmental disorders in which individuals have substantial differences in the nature of their social development and communication skills, as well as unusual behaviors and interests.

This disorder needs the administration of multiple medications to help the affected person participate effectively in the educational and rehabilitative process. Dental professionals must also be familiar with the drugs used to treat the disorder because many of them cause unpleasant oral and systemic side effects. Dentists treating the children with autism must be familiar with the manifestations of the disease and its associated features so that they can provide the highest level of patient satisfaction. This article deals with the challenges faced by the dentist in managing autistic patients.

Keywords: Autism, Developmental disorders, Dental management. Dentistry and autism, Autistic patients.

INTRODUCTION

Autism is a developmental, neuropsychiatric disorder that begins in early childhood, Kanner. (1) first described it in 1943. The phenotype is described in three diagnostic behavioral domains impairments in social interactions, impairments in communication, and repetitive or restrictive behaviors. (2) Epidemiologic studies from the early 1990s estimated that one in 1,500 children had autism. In 2002, this number was one in 150. (3) A recent article stated the prevalence as roughly one in 100 children aged 3 to 17 years. (4) It is not clear whether this is a true increase or related to broader and more vigilant diagnosis. What is clear is that dentists who treat children likely will encounter a child whose autism has been diagnosed. There may even be confusion among parents that certain dental care treatments could have adverse effects on their children who have autism.

Because of the variability in the observed degree of the three domains of autism, the disorder is described as a spectrum. Autism spectrum disorder is divided into various diagnostic groups: autistic disorder, Asperger syndrome and pervasive developmental disorder not otherwise specified. Impairments within the three diagnostic behavioral domains vary within these groups. (5) For the purpose of this article, "autism" refers to the complete spectrum and may include any of these three diagnostic groups.

There are no biological tests for autism. Its diagnosis is made on the basis of the presence and extent of the three domains. As a result, controversies related to autism have arisen. Researchers debate as to whether the disorder is due to genetic defects, environmental factors or combinations of both factors. (6,7,8,9,10) Some investigators have suggested that autism has an immunological component. (11,12,13,14) These investigators suggest that autism appears to be a

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genetically influenced, multisystem model in which environmental factors affect biological processes in the body or modulate gene expression within the nervous system.

Numerous genes and biochemical pathways can be affected by environmental toxins.(15) Higher rates of autism have been found in regions of the country in which there are higher levels of environmental pollutants. (8) There is no direct proof that environmental factors are the cause for this increase however, some web sites and parent organizations believe these viewpoints are true on the basis of anecdotal reports by parents of children who have autism. (16,17) Parents' concerns about environmental toxins and their potential associations with autism may result in their having conflicting opinions with dental practitioners when their child requires dental treatment.

DENTISTRY AND AUTISM

Not only do dental health care workers have to address behavior management challenges when treating patients who have autism, but also they must be prepared to discuss family members' concerns.(18,19,20) Some of the controversial issues related directly to the treatment of dental patients who have autism are based on the biomedical and alternative medical literature. These issues may not be well researched, but parents of children who have autism can hold strong opinions on them.

A patient with autism seen in the dental office frequently may have multiple allergies, immune system dysfunction, gastrointestinal (GI) disturbances, seizures, mood disorders and aggressive or self-injurious behaviors. (8,21,22,23) Many children with autism undergo biomedical treatments in an attempt to reverse the traits of autism through integrative medicine (the combination of conventional and alternative medical practices). (24) A parents' group web site includes anecdotal reports describing children who have recovered from autism to various extents after the use of alternative therapy or integrative medicine. (25) This has led to strong emotions and many parents' being at odds with conventional medical treatments. Family members may voice concerns about the use of mercury, fluoride, nitrous oxide, antibiotic agents and acetaminophen. The

parents asking about the safety of dental materials and related care often are highly educated and have researched the topic. On the other hand, dental health care workers may not be aware of these concerns, which can lead to adversity between and a lack of confidence on the part of both parties.

MERCURY

Although dental amalgam generally is considered to be a safe and effective restorative material. (26) for parents of children who have autism, the use of dental amalgam can be an especially sensitive issue. The alternative medical literature suggests that children who have autism are genetically predisposed to an inability to clear the body of heavy metal contaminants such as aluminum or mercury. (27,28,29,30) Some children who have autism have low levels of glutathione, which is important in the body's detoxification system. Mercury is an inhibitor of glutamate transporters. Despite the fact that this issue needs more research to be verified, some children undergo biomedical chelation therapies to have these metals removed from their bodies. (29)

The results of an unreplicated 2007 study showed an excess of mercury in the dental pulps of primary teeth in children with autism . (31) From the results of this study, the authors inferred that children who have autism have an inability to clear the metal. Dentists should be aware of this study and be able to discuss with family members the lack of additional research to substantiate its conclusion.

Family members' concerns about mercury can be tempered in the dental office. There are several restorative options that can be used. Both resin based composites and resin reinforced glass ionomers are viable choice. Unfortunately, neither can withstand moisture contamination during placement as well as amalgam can. Patients with autism can have a difficult time keeping still, and moisture contamination is a distinct possibility.

FLUORIDE

Another area of concern among some parents of children who have autism is the use of fluoride. There is a philosophy put forth in the alternative medical literature about avoiding fluoride use in children with autism. (32) Proponents of this belief

suggest that fluoride inhibits critical antioxidant enzymes and has been linked to excitotoxic reactions within the brain. There are parents who believe that minimizing fluoride exposure in their children with autism is an important part of bio-medical treatment. (33) This practice, however, could be a problem for children who are susceptible to developing dental caries. Parents whose children eat the toothpaste or are not able to rinse and spit after tooth-brushing have real concerns about GI irritation and fluorosis. Children who are not able to understand and follow directions also often swallow fluoridated mouthwashes. (34) Dentists should be aware that the parents of children who swallow toothpaste and mouthwash may try to avert their concerns about fluoride by providing their children with a fluoride-free dentifrice. Fluoride is a GI irritant, which can cause abdominal discomfort and vomiting when excessive amounts are swallowed. With prolonged ingestion, it can damage the gastroduodenal mucosa.

Small children can develop fluorosis of the permanent incisors when excessive amounts of toothpaste are placed on their toothbrushes. (35,36) Although children with developmental disabilities are at a higher risk of developing caries than are children in the general population, children who have autism tend to have a lower caries rate. (37,38)

GLUTEN, CASEIN & CPP-ACP

Autism frequently is treated with applied behavioral and occupational therapy. However, when the GI problems are treated, many parents have stated that their children's behavior also improves. (8,27,39) In light of these observations, a gluten-free, casein-free diet has become popular. (40,41) The results of one study suggested that non-immunoglobulin E-mediated food allergy, mainly against the milk protein casein, may play a role in causing GI symptoms. (42) In the alternative medical literature, antibiotic agent overuse has been related to an increase in autistic symptoms owing to intestinal damage caused by the resulting dysbiosis in the gut.

Alternative medicine practitioners prescribe antifungal agents and probiotic agents to help patients who have autism maintain intestinal mucosal immune homeostasis. (25,42) For some

patients, these special diets may affect preventive dental treatment. For example, parents may ask if the prophylaxis paste is gluten-free. (19) There is a lack of scientific evidence on the benefits of gluten-free or casein-free diets for children with autism. (39)

However, alternative medical practitioners theorize that an inability to adequately metabolize gluten and casein results in a release of peptides that are transferred from the intestine into the bloodstream. (21,23,24) These peptides are said to become biologically active as they cross the blood-brain barrier and bind to opioid receptors, leading to the abnormal behaviors associated with autism spectrum disorders. (24) On the other hand, the authors of a literature review found that on the basis of the scientific research they reviewed, they did not recommend exclusion diets as standard treatment. (43) Nevertheless, dentists are likely to encounter patients who are following special diets. If parents request confirmation about the gluten contents of dental materials, there is a Web site that contains this information that dentists can consult. (44) In addition, manufacturers' sales representatives may know if their products are gluten free. The use of products containing casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) (Recaldent, Recaldent Pty, Melbourne, Australia) often is recommended to enhance remineralization of tooth enamel. GC America states on its Web site that part of the active ingredient of Recaldent (CPP-ACP) is milk derived and should not be used by patients with milk protein allergies. GC America recommends the use of MI Paste (GC America) if the suspected milk allergy. (45)

ANTIBIOTIC AGENTS

The relationship between autism and a defective GI system is not clear. (39,46) However, dental professionals may treat children with autism who are undergoing some type of GI treatment. Asking the children's parents questions about the children's use of probiotics is appropriate. Probiotics are available to consumers mainly in the form of dietary supplements and foods. So as not to disrupt the intestinal flora, dentists should be especially judicious when prescribing antibiotic agents, since they may affect the balance of microorganisms in the intestines. (5,24,27)

Dentists may want to consult with the patient's medical practitioner before writing a prescription.
ACETAMINOPHEN

There is one unsubstantiated study with results that suggest that acetaminophen use after receiving a measles, mumps and rubella vaccine could be associated with autistic disorder. (47) This association was not found in children who were given ibuprofen. Sulfation is the primary pathway for acetaminophen metabolism in children through age 10 or 12 years. There may be a sulfation deficit in some children with autism, which can allow the toxic metabolite N-acetyl-p-bezoquinoneimine to accumulate. (48) This toxic metabolite may interfere with the immune system or have direct neurotoxic effects. (46)

NITROUS OXIDE

Another controversial issue is related to the use of nitrous oxide. (49) Some dentists might find the use of nitrous oxide useful in calming apprehensive children. The authors of two studies recommend the use of nitrous oxide for dental patients who have mild behavioral issues associated with autism. (18,19) The authors of another study suggest that the use of nitrous oxide would not be valuable for dentists who instead use effective behavior guidance techniques recognized by the American Academy of Pediatric Dentistry. (50) There is even a recommendation that certain people who have autism not receive nitrous oxide anesthesia owing to the potential for serious systemic adverse effects. (51) Nitrous oxide inhibits the enzyme methylenetetrahydrofolate reductase (MTHFR), which can limit the synthesis of DNA severely, causing megaloblastic changes in blood cells and bone marrow. In healthy, neurotypical patients, there generally is no problem when DNA synthesis is inhibited, and MTHFR is synthesized quickly. However, there are case reports describing the death of children with a specific genetic enzyme deficiency involved in these chemical pathways. (51,52) The enzyme is involved with the metabolism of folate. Children with vitamin B 9 deficiency also are at risk of experiencing morbidity or mortality. (52)

CONCLUSION

The general dentist should have a working knowledge of autism and the issues related to its management to ensure safe and pleasant dentistry in such patients.

CONFLICT OF INTEREST

No potential academic conflict of interest relevant to the above article was reported.

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