

Oral defensiveness: children with a dysfunction of sensory regulation

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Oral defensiveness is a relatively newly discussed cluster of behavioral symptoms with a theorized physiological basis, which may manifest itself during a child's dental visit. Dentists aware of oral defensiveness and its distinct manifestations will be able to discuss with their patient's parents regarding this condition and if necessary modify their approach when treating children diagnosed with oral defensiveness. The purposes of this paper are to acquaint dentists with this controversial disorder, to increase awareness of its occurrence, and to suggest possible interventions for alleviating aversive responses to typical dental experiences when no other cause is apparent. A review of pertinent literature is presented. A list of characteristics and a list of other types of sensory defensiveness are also presented.

J Clin Pediatr Dent 29(2): 119-122, 2005

INTRODUCTION

Oral defensiveness (OD) is considered a sub-component of regulatory disorders in which the child is hypersensitive to sensory stimuli including auditory, tactile, visual, and vestibular stimulation.¹ Not intrinsically a neurological or developmental disorder, it is more typically characterized as an extreme stress response. The fear/defense pathway, which has been programmed by evolution to deal with danger in routine ways, and which operates independently of consciousness, produces a system of defensive behaviors, both hormonal and immunological, and through the nerves of the autonomic nervous system.² Identified primarily by occupational therapists, treatment of the full scope of the dysfunctions typically consists of a long-term intervention program.

Oral tactile hypersensitivities can interfere with early feeding. The baby may pull away from the breast; have difficulty sustaining a suck, or reject uneven food textures. The older child may experience stress in

general, and particularly during dental treatment. Examples might include distress at high-speed hand-piece sounds, aversion to smells and textures of cements and impression materials, reluctance to lower one's body backwards with the dental chair, or fearful refusal to allow the dentist into the oral cavity with distress at actual touch inside.

OD is a controversial disorder that lacks strict criteria for diagnosis and management. In addition, no dental protocols have been evaluated for effectiveness. The purposes of this paper are to acquaint dentists with the dysfunction, to increase awareness of its occurrence, and to suggest possible interventions for alleviating aversive responses to typical dental experiences when no other cause is apparent. A review of pertinent literature is presented. A list of characteristics and a list of other types of sensory defensiveness are also presented. Dentists should be aware of the signs and symptoms of a child who comes into their office with the label of OD from an occupational therapist and be able to communicate with the child and parents accordingly.

REVIEW OF LITERATURE

OD is reviewed within the context of development and refinement in the literature. Original articles in professional journals began to appear in the 1980's, focusing solely on tactile defensiveness.³⁻⁵ The more general term "Sensory Defensiveness" (SD) which was expanded to include not only the tactile system, but all sensory systems, was introduced by the mother-daughter occupational therapist team of Patricia and Julia Wilbarger,⁶ who described OD and introduced treatment methods that became widely popular, however, were lacking in evidence based studies. Another term used in the literature is oral sensitivity.⁷ Related literature began to

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appear in the mid 1990's including adult studies.⁸ The continuing investigation of SD began to include specific sub-populations by the end of the 1990's and early 2000's, including Fragile X syndrome, autism, ADD, and Rett Syndrome.⁹⁻¹¹ Articles relating specifically to OD are sparse and inferred. They begin in the new millennium and include a paper of the effect of OD on breastfeeding.¹² Concurrently in the mid 90's, a diagnostic category of regulatory disorders, with three main types, was proposed by Greenspan and Wieder.¹³ Regulatory disorders include problems in attention and arousal, and hyper or hyposensitivity to sensory stimulation. This group began to research hypersensitivity with the hypothesis that SD is a predictive factor for later developmental difficulties.

Initial studies, most notably the Fragile X study¹¹ of electro-dermal reactivity are among the first serious research articles concerning the physiological constructs of SD. Electro-dermal reactivity (EDR) has been used to study behavioral and/or medical conditions. EDR is quantified by measuring changes in the electrical conductance of the skin associated with sweat gland activity. EDR was tested and found to occur in the presence of startling or threatening stimuli or defensive feelings.¹⁴ An absence of electro-dermal habituation to repeated stimuli may be related to defensive reactions to stimuli.¹⁵ Several studies have demonstrated atypical EDR's with specific medical or behavioral diagnoses, including Down's syndrome, Schizophrenia, Attention Deficit Disorder, Autism, and Fragile X.¹¹ In a pilot study¹⁴ measuring EDR's of a group of children diagnosed as having a sensory modulation dysfunction with no other medical diagnosis, the authors concluded that sensation is the core deficit in children with SD, including extreme physiological hyper-reactivity after sensation, and extreme behavioral over responsiveness to sensation. A recent review on the subject has been published in a state medical journal.¹⁶

ETIOLOGY

The etiology of OD is unknown and unproven. It is considered to be a sub-type of SD (see Table 1), and may present with common general characteristics (see Table 2) as well as its own specific sub-type characteristics (see Table 3).

Several hypotheses exist, mostly relating to stress syndromes and hyper- aroused states of alertness, or 'regulation of state'. A hypothesis suggested by Cool¹⁷ investigates brain neurochemistry of the interaction between the autonomic nervous system, the reticular formation, and the limbic structures. In particular, biogenic amines such as epinephrine, norepinephrine, dopamine, serotonin, and histamine are considered key chemicals which assign meaning and value to a given sensory experience and may have a modulating effect within the nervous system for either 'waking up for

action' or 'relaxing for rest'.¹⁸ Occupational therapy sensory interventions are largely based on this theory, giving sensory inputs designed to facilitate release of the above-mentioned neurotransmitters, in an attempt to achieve modulation of the hyper-reactive nervous system. Other theories include: The Polyvagal Theory of Neural Regulation,¹⁹ The Pituitary-Adrenal Axis mechanism²⁰ of the autonomic nervous system in relation to social engagement and a new theoretical model called Sensory Modulation Dysfunction.¹⁴

EVALUATION AND TREATMENT

Evaluation

Several sensory evaluations exist which measure sensory reactivity, such as the Sensory Challenge Protocol¹⁴ and the Sensory Profile,¹⁰ which specifically tests oral sensory processing as a sensory category. The Oral-Motor/Feeding Rating Scale includes a section rating oral-motor sensitivity in feeding.²¹ These evaluations may help to identify sensory defensiveness, and specifically oral defensiveness as a significant dysfunction. Typically, a sensory history is taken concurrently in an interview with the parents or caretakers.

Treatment

OD is in the early stages of being established as a dysfunction or disorder. Hence, treatment is presented in a general theoretical manner, as suggestions; not as substantiated empirical conclusions:

There are two possible avenues of treatment. One is for the child to undergo a sensory program of everyday activities over several months to attempt to reduce the overall over-reactivity to sensations. For OD, this includes an oral protocol of firm touch to the palatal aspect of upper teeth where they meet the hard palate. Parents are taught the following maneuver: three back and forth swipes of the adult's pinky are thought to excite the touch receptors palatal to the incisor teeth. Then three downward pushes of the adult's first two fingers, laid as a "v" on the occlusal biting surfaces of the entire lower jaw are thought to give calming proprioceptive input to the system. This is done prior and after each meal, for the duration of the sensory program, and is taught to parents by the occupational therapist. The therapist may recommend gum massagers for home use.

The second approach to treatment is to provide calming or inhibitory input for the immediate duration, in order to achieve function to task in the classroom, dental clinic, or other situation at hand. This approach to treatment will include the following:

1. Medical issues must first be ruled out, for example open sores in the mouth, or adverse reactions to medications that might cause swelling, pain or burning mouth syndrome in the tongue or gums.

Table 1. Types of Sensory Defensiveness.

- **Tactile Defensiveness** – Avoidance of touch, aversion to dirty, messy materials, difficulty wearing specific clothing types or textures ex- turtlenecks or wool
- **Oral Defensiveness** – Dislike of putting objects in mouth, clear preferences as regards food texture or spiciness/blandness of food, aversion to oral hygiene
- **Gravitational and Postural Insecurity** - Fear of change in position or movement especially head tipping backwards, difficulty having feet leave the ground, decreased postural mechanisms
- **Visual Defensiveness** - Sensitivity to light, visual distractibility, gaze aversion, easily startled
- **Auditory Defensiveness** – Oversensitivity to certain sounds or frequencies
- **Taste & Smell Defensiveness** – Sensitivities to spicy/preference to bland food, smoke sensitivity, severely limited food choices

Table 2. Characteristic Features of Sensory Defensiveness.

- Exaggerated avoidance of specific sensations
- Unpredictable episodes of dramatic behavior
 - Sleep difficulties: getting to sleep, staying asleep
 - Doesn't like to such or nurse, sucks frantically then refuses more
 - Persistent sensory seeking, self-stimulation, self injurious behaviors
 - Hypervigilance
 - Irritability/ Colic
 - Recurring gastro-intestinal problems including bowel impaction, reflux
 - Poor transitions, rigid to change

Table 3. Characteristic Features of Oral Defensiveness.

- Avoidance/aversion to touch around mouth, gums, in the oral cavity
- Gags on textures- e.g. bitewings, dental impressions, tooth-paste
- Dislike of mixed textures ex- mushroom barley soup, preference to all mushy or all crunchy items
- Nurses in gulps and ejects nipple and refuses to nurse more
- Temperature sensitivity in mouth

2. An environment that avoids over stimulating the child is recommended. For example- secretarial noises and phones or any other background noise may be located away from the treatment room or dampened through partitions, soothing simple colors of pastels may be used to decorate the room, clear simple language in mid- range tones should be used when instructing or explaining to the child.
3. Calming of the child's behaviors through active participation of the child in the session.
4. Physiological calming through sensory inhibition is suggested primarily through: a) deep pressure/ or 'heavy work' b) linear vestibular or vibratory movement and c) firm sustained touch. The modulating

effect of proprioception (deep pressure) is thought to decrease over-responsiveness to touch²² and to promote calming.¹⁵

Dental applications

Possible suggestions for use in the dental office based on these principles include:²³

1. At the initial visit and examination, placing two hands firmly and still on the child's shoulders for a long moment, or two fingers on the child's face in the perioral area in a similar firm sustained manner before attempting to examine or touch the intra-oral cavity. Avoid sudden movements and always adhere to the principals of Tell Show and Do (TSD).
2. Adhering to the same routines in each appointment, paying attention to easing the child through transitions. On the one hand, allowing many choices, for example, choice of - the music, the color of mirror to be held, the color of the dental dam, positive visual imagery – to 'kiss' the saliva ejector or suction tube for example, and on the other hand providing clear limits as to permissible behaviors in the dental clinic,
3. laying the weighted x-ray apron on the child throughout the session (up to one half hour) -if this is accepted by the patient and seems to have a calming effect,
4. biting on a 'chewy tube' at the beginning of the session,
5. objects held in hand to fidget with quietly,
6. Avoid background noise. Do not play lively music, which may have a calming effect on the average child but may be detrimental in children with OD, stick with quiet classical and lullaby type sounds.

DISCUSSION

When parents bring their child, who has been labeled with OD to the dentist, it is crucial that the dentist be familiar with the term and entity to facilitate a positive dental experience for both the child and parents. A dentist unfamiliar with the term may perceive the child as being overindulged by his or her parents and may mistakenly incorporate patient management techniques that are inappropriate and even contraindicated. For example, a child with SD may exhibit the following symptoms:

1. Avoids having the face and head touched. The child may not like to have his or her face washed, teeth brushed, or hair cut.
2. Reacts negatively when dressing. In addition, the child may be very particular about the clothes he or she wears.²⁴
3. Seeks out touch, but responds negatively to touches he or she has not initiated.
4. Dislikes hugging, holding, and cuddling.

Previously, a child displaying any of these signs would be traditionally labeled as a “sensitive” or “over-protected” child, however the dentist must now be aware of the possibility that such a child may be showing signs of OD or SD. The presence of physiological sensitivities in addition to behavioral issues may be used to differentiate between true defensiveness and that of defiance to the dental experience. Each label requires a different approach to the child.

For the defensive child, the dental environment may be a source of great difficulty for the child and parents. For example, children with auditory defensiveness may be distressed by the sound of the suction or high speed. The symptoms may not be obvious. Such a child may talk when others are talking, make strange noises to drown out the offending noise, or ask adults not to talk. Children with olfactory defensiveness are acutely aware of even the hint of an offensive odor. They are often hypersensitive to scents that are not usually offensive to other people. The smells of nitrous oxide, IRM, fluoride may all be a threat to such a child. Gravitationally insecure children react negatively to movement. They become distressed when their head is moved to any other position other than a vertical one. The inverted movement of reclining and actual position of a reclined dental chair may be particularly threatening. It would be appropriate to preset the chair in the reclined position before seating the child.

It is not within the scope or authority of this paper to determine if indeed OD is a distinct medical condition, but rather it is the intent of the authors to bring this information to the attention of dentists. The informed pediatric dentist when confronted with a patient diagnosed with OD will be able to relate and communicate with the child and parents to bring about a successful and positive dental experience.

SUMMARY

Oral defensiveness is a recently discussed dysfunction, primarily identified and treated by occupational therapists. Initial recognition by the medical establishment has begun in only the most minimal numbers, and within the last two years. There are very few studies in scientific journals that have evaluated this disorder. Further research and discussion of sensory defensiveness, and in particular, oral defensiveness, are crucial to the acceptance of the symptoms as a distinct and recognized category.

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