

Review Article

**Gag Reflex: No More A Gag To A Dentist
The Behavioral Techniques, Pharmacological Techniques, Acupressure and
Acupuncture in Controlling the Gag Reflex - A Review**

Shriprasad S¹, Shilpashree HS²

Abstract

Gagging in dental patients can be disruptive to dental treatment and may be a barrier to a patient care, preventing the provision of treatment and the wearing of prostheses. Many management techniques have been described to control the gagging. This article reviews the literature on various management strategies described to prevent and control the gagging.

Key Words: acupressure, acupuncture, gag reflex, hypnosis, systematic desensitization

Introduction

The gag reflex is considered a normal, protective, physiological mechanism that occurs in order to prevent foreign objects or noxious material from entering the pharynx, larynx or trachea. The origin of gagging has been categorized as either somatic (initiated by sensory nerve stimulation from direct contact) or psychogenic (modulated by higher centres in the brain). In somatic gagging, any stimulation of "trigger zones": palatoglossal and palatopharyngeal folds, base of the tongue, palate, uvula and posterior pharyngeal wall induce the gagging. Psychogenic gagging can be induced without direct contact and the sight, sound, smell and even thought of dental treatment can be sufficient to induce the gag reflex in some individuals. A proportion of the population has a profound and exaggerated reflex that can cause acute limitation of the patient's ability to accept dental treatment.¹

Gagging is often considered to have a multifactorial etiology and a variety of precipitating or modifying factors have been proposed. Local disorders like nasal obstruction, postnasal drip, catarrh, sinusitis, nasal polyps and dry mouth are responsible for gagging. Systemic disorders like chronic gastritis, peptic ulceration, hiatus hernia and uncontrolled diabetes have been suggested as predisposing factors.

Psychological factors such as fear, stress, phobia and sights and sounds of clinical dentistry could trigger gagging. Iatrogenic factors like manipulations of the oral tissues, over loaded impression trays, overextended posterior borders in dentures, restricted tongue space, poor retention, increased vertical dimensions are capable of inducing the gag reflex in patients.^{3,4}

When stimulation occurs intraorally, afferent fibres of the trigeminal, glossopharyngeal, and vagus nerves pass to the medulla oblongata. From here, efferent impulses give rise to the spasmodic and uncoordinated muscle movement characteristic of gagging. The center in the medulla oblongata is close to the vomiting, salivating, and cardiac centers, and these structures may be stimulated during gagging.² A number of strategies have been used in an attempt to control problematic gagging in the dental setting, so that patients can cope with treatment and dentists can provide it. The purpose of this article is to review the different management strategies available for treating the mild to severe gag reflex that pose problems in the dental procedures.

Management

Assessment and Intervention

Assessment of a patient with a gagging problem

1. Dr. Shriprasad Sarapur, M.D.S, Reader, Department of Prosthodontics, RKDF Dental College and research centre, Bhopal
2. Dr. Shilpashree H.S, M.D.S, Sr. Lecturer, Department Of Oral Medicine and Radiology, KDF Dental College and research centre, Bhopal

Corresponds to: Dr. Shriprasad Sarapur, C/O Shankarmurthy H.T, 337/32, Banashri Nilaya, I main, 3rd cross, Ganesh Layout, Near KSRTC Busstand, Davangere-577002, Karnataka (State) **Email:** sarapur@rediffmail.com

starts with a good history. Spending time discussing the nature and problems associated with a patient's gagging problem will build rapport and understanding between the clinician and the patient. If the dentist attempts to identify the situations that trigger disruptive gagging, this may optimize patient care and operative success. The management techniques should be completely explained to the patient to allay as many fears as possible and to obtain valid consent.²

The management strategies fall into a number of conventional and complimentary categories:

1. Behavioral Techniques^{2,5}

- ◆ Behavior modification
- ◆ Relaxation
- ◆ Distraction
- ◆ Systematic desensitization
- ◆ Training bases (continued systematic desensitization)
- ◆ Cognitive behavioral therapy
- ◆ Sensory flooding
- ◆ Teaching patients to swallow with their mouth open

2. Pharmacological Techniques^{2,4,6}

- ◆ Local anesthesia
- ◆ Conscious sedation
- ◆ General anesthesia

3. Complimentary Therapies^{4,7,8,9,10}

- ◆ Acupressure
- ◆ Acupuncture
- ◆ Trans-cutaneous electrical nerve stimulation (TENS)
- ◆ Hypnosis

4. Miscellaneous Techniques

1. Behavioral Techniques

Behavioral modification: All disruptive gagging should be viewed and presented to the patient as a behavioral response and, therefore, amenable to behavior modification. An exaggerated or extended period of gagging in the absence of a normal stimulus is usually a learned response. Theoretically, this response can be unlearned and extinguished. Behavioral modification is the most successful long-term method of managing the gagging patient. The objective of this treatment is to reduce the anxiety and "unlearn" the behaviors that provoke gag-

ging through relaxation, distraction and systematic desensitization singly or in combination.¹¹

Relaxation: Relaxation technique may be helpful in reducing or abolishing the gag reflex. Relaxation can help ameliorate or override unhelpful thought process. An example of this is to ask the patient to tense and relax certain muscle groups, starting with the legs and working upwards, while continuously providing reassurance in a calm atmosphere.²

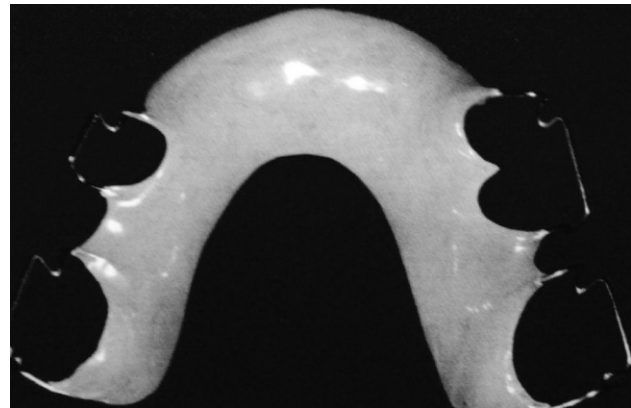


Fig.I. Training denture without teeth

Distraction: Distraction may be used to temporarily divert a patient's attention which will help to perform the short dental procedures while the mind is dissociated from a potentially distressing situation. Distraction techniques include conversations, inhaling through the nose and exhaling through the mouth, asking patient to think of and visualize a safe, comfortable, relaxing place and then describe it to the dentist, asking a patient to raise a leg off the dental chair and the hold the position until the muscles get fatigued, thus diverting attention from dental procedures.^{2, 4} Landa suggests patient count rapidly to 50 then read out loud.¹²



Fig.II. Training denture with artificial teeth



Fig.III. Neiguan point, concave area at medial aspect of forearm below the palm

Systematic desensitization: The technique consists of incremental exposure of the patient to the feared stimulus. The intensity, duration and frequency of the noxious stimuli is slowly increased, thereby allowing the patient to gently habituate by developing coping strategies to deal with the feelings of discomfort or panic experienced. Many re-education techniques have been described in which the patient is given an object to place in the mouth for a period of time. A tooth brush, radiograph, marbles, acrylic discs, buttons and dentures have been used to help patients overcome the gagging problem.² Singer described a technique where ordinary glass marbles are sucked in the patient's mouth essentially for 1 week while awake. Once these are tolerated, maxillary and mandibular denture record bases are made and later converted into conventional dentures. Alternatively, acrylic balls or discs may be used. Relaxation techniques are often employed at the

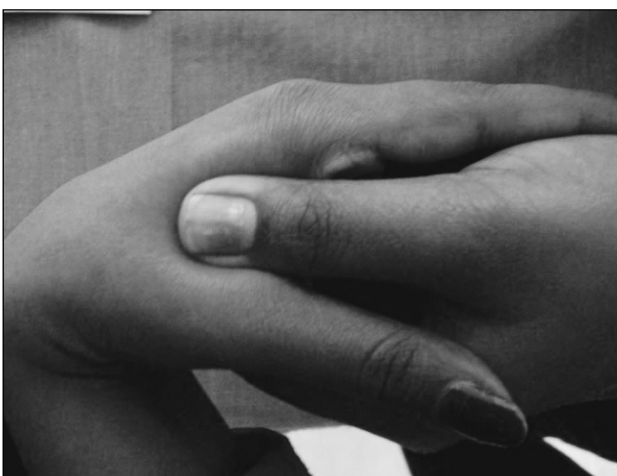


Fig.IV. Hegu point, concave area between first and second metacarpal bones

same time as undertaking the intraoral exercise.¹³



Fig.V. Chengjiang (REN-24) point, in horizontal mentolabial groove approximately midway between chin and lower lip

Training bases: This is a further desensitization technique, whereby a patient is progressively supplied with a series of small to full-sized denture bases. This is useful for the patients who are to become denture wearers. A thin acrylic denture base, without teeth (fig 1), is fabricated and the patient is asked to wear it at home. A suitable regime may be 5 minutes once each day, then twice each day and so on. After 1 week patient is asked to increase this to 10 minutes 3 times each day, then 15 minutes, 30 minutes, and 1 hour. It can be advantageous to use distraction techniques with this approach. The patient is asked to initially wear the training base when busy or concentrating on a non stressful task such as watching a favorite television program. Later, anterior artificial teeth are added to the original (fig 2)



Fig.VI. Ear acupuncture point used to control gagging and, when the patient is able to tolerate this, posterior teeth are added.^{2,4}

Cognitive behavioral therapy: This method focuses

on changing irrational thought process. Alteration or elimination of unhelpful cognitions may lead to a change of behavior. Cognitive behavioral therapy invites patients to challenge strongly held beliefs about the consequences of gagging. Some Patients Believe dental treatments induce the breathing problems, choking, heart attack or even death. Cognitive behavioral therapy allays these perceptions of patients by evidence based true facts.²

Sensory flooding:It relies on a rapid extinction of the link between the stimulus (for example a denture) and gagging. It is accomplished by encouraging the patient to retain the denture in the mouth for as long as possible with the reassurance that the aversive reactions encountered will diminish. The basis of this method is to inform the patient that the physiological system cannot maintain the strength of the initial response and that habituation will occur within 30 minutes or so. This method would not be appropriate with severe gagging problems, and compliance would be unlikely.¹⁴

Teaching patients to swallow with their mouth open:The patients have the tendency of swallowing with their teeth clenched and using the teeth, lips and cheeks as a buttress for the tongue to push against. Teaching the patient to swallow with the teeth apart, the tip of the tongue placed anteriorly on the hard palate and the orbicularis oris muscle relaxed, has been advocated.¹⁵

2. Pharmacological Technique

Local anesthesia:The proponents of use of local anesthesia for gagging have suggested that if the mucosal surfaces are desensitized, the patient is less likely to gag.¹¹The agents may be applied in the form of sprays, gels, lozenges, mouth rinses or injection. The deposition of local anesthetic around the posterior palatine foramen has been recommended for patients, who gag when the posterior palate is touched during the maxillary impressions.¹⁶ Lee-Singer uses swab to apply local anesthetic topically,¹³ whereas Hattab recommends incorporation of local anesthetic solution in the alginate impression material.¹⁷

Conscious sedation:When a disruptive gag reflex is thought to be a manifestation of anxiety, removal of the anxiety may prevent gagging. The use of conscious sedation with inhalation, oral or intravenous

agents may temporarily eliminate gagging during the dental treatment while maintaining reflexes that protect the patient airway. Psychological approaches such as distraction or relaxation techniques may be enhanced when used in conjunction with sedation.²Robb and Crothers states: Sedation should be considered as a useful part of the general dental practitioners' armamentarium and as an alternative to general anesthesia in selected cases. They conducted tests on sedation with midazolam. They also stated that nitrous oxide can give a constant depth of sedation to control gagging and hence be useful in longer dental procedures.¹⁸ Another drug propofol has been effective in controlling the gag at sub-anesthetic doses, but this drug is not indicated for routine sedation.¹⁹

General Anesthesia:A minority of patients does not respond to any form of sedation or behavioral therapy and dental treatment under general anesthesia may be appropriate as a last resort.²

3. Complimentary Therapies

Acupressure:Acupressure uses direct pressure over certain points without puncturing the skin as in acupuncture. RenXianyun suggests pressing two acupuncture caves, as an alternative to reduce the gag reflex. In his technique, these acupuncture caves are "Neiguan point (PC.6)" and "Hegu point (L.14)". Neiguanpoint is a concave area at medial aspect of medial forearm and slightly below the palm (fig 3). This point is of approximately one horizontal finger width. Hegupoint is a concave area between first and second metacarpal bones (fig 4). In this technique, light pressure is applied to Neiguan and Hegu points with a thumb and increased to a heavy pressure until the patient feels soreness and distention. This procedure should be carried for 5 to 20 minutes during which impression procedures are performed.⁹

Another acupressure point is Chengjiang (REN-24) which is located in horizontal mentolabial groove approximately midway between chin and lower lip (fig 5). Applying light to increased pressure with an index finger for 5 minutes will cause soreness and distention to a patient, during which impressions can be made.⁸

Acupuncture:Acupuncture originated in China more than 3000 years ago and involves insertion of a single, disposable acupuncture needle into acupuncture

points with the intention of curing disease. Acupuncture has been used successfully to control the gag reflex. Acupuncture activates small myelinated nerve fibres in muscle, which send impulses to the spinal cord and then activate the mid brain and pituitary hypo thalamus. It has been shown that enkephalin, beta-endorphin, dynorphin, serotonin and nor adrenaline are involved in this process. The acupuncture needle is inserted subcutaneously 0.3-0.5 mm in PC-6, L-14 AND REN-24 and rotated clockwise and anticlockwise for five seconds. The needle is left in situ when the impression procedures are performed. It is generally accepted that insertion of a needle in an acupuncture point will create a small inflammatory process with release of neurotransmitters such as bradykinin, histamine, etc and subsequently stimulates A-d-fibres located in the skin and muscle. The A-d- fibres terminate in the second layer of the back horn and inhibits the incoming painful sensations by release of enkephaline. This segmental model is the most simple mode of action and accounts probably for the pain relieving effect of acupuncture in most cases.^{1,7}

J.Fiske and C.Dickinson conducted a study on ear acupuncture in ten people and concluded that ear acupuncture is safe, quick, inexpensive and relatively non invasive technique in controlling the gag reflex during dental treatment.¹⁰

TENS: Morrish used a portable TENS device to stimulate the PC.6 point instead of acupressure or acupuncture to reduce the gag reflex.²⁰

Hypnosis: Hypnosis may help to relax patient and temporarily ameliorate the gag reflex to allow dental treatment to be performed. Noble used hypnotherapy to desensitize a patient for treatment and eventually to gain control of phobia and gagging, which suggests it acts as a treatment for the phobia itself, rather than just an aid to successful dental care.²¹

4. Miscellaneous Techniques

Using the rubber dam, non perforated impression trays which prevents the extrusion of impression material, sectional impression trays and table salt applied to the tip of the tongue are few examples of miscellaneous techniques in controlling the gag reflex.

Conclusion

Overt gagging can be distressing for both the patient and clinician. A wide variety of management strategies have been described and these should be tailored to suit the needs of individual patients. The gagging problems require an empathetic approach using individualized, flexible treatment solutions by a knowledgeable dental team.

References

1. P.Rosted, M.Bundgaard, J.Fiske and A.M.L. Pederson. The Use of acupuncture in controlling the gag reflex in patients requiring an upper alginate impression: an audit. *British Dental journal* 2006; 201: 721-25. <http://dx.doi.org/10.1038/sj.bdj.4814305> PMID:17159959
2. G.S. Bassi, G.M, Humphris, L.P Longman. The etiology and management of gagging; A review of literature. *J Prosthet Dent* 2004; 91: 459-67. <http://dx.doi.org/10.1016/j.prosdent.2004.02.018> PMID:15153854
3. C.M.Dickinson and J.Fiske. A review of gagging problems in dentistry: 1.Aetiology and classification. *Dent Update* 2005; 32: 26-32. PMID:15739661
4. C.M.Dickinson and J.Fiske. A review of gagging problems in dentistry: 2.clinical assessment and management. *Dent Update* 2005; 32: 74-80. PMID:15819150
5. Neumann J.K and McCarty G.A. Behavioral approaches to reduce hypersensitive gag response. *J Prosthet Dent* 2001; 85: 305. <http://dx.doi.org/10.1067/mpr.2001.114273> PMID:11264940
6. Packer. M.E. Joarder Camilla, Lall B.A. The use of relative analgesia in the prosthetic treatment of the 'gagging' patient. *Dent Update* 2005; 32: 544-50. PMID:16317888
7. P.Rosted. Introduction to acupuncture in dentistry. *British Dental Journal* 2000;189: 136-40 <http://dx.doi.org/10.1038/sj.bdj.4800704> PMID:11021030 <http://dx.doi.org/10.1038/sj.bdj.4800704a> PMID:11021030
8. AmornpongVachiramon and Wang W.C. Acupressure technique to control gag reflex during maxillary impression procedures. *J Prosthet Dent.*2002; 88: 236. <http://dx.doi.org/10.1067/mpr.2002.127952> PMID:12397258
9. RenXianyun. Making an impression of a maxillary edentulous patient with gag reflex by pressing caves. *J Prosthet Dent* 1997; 78: 533. [http://dx.doi.org/10.1016/S0022-3913\(97\)70075-1](http://dx.doi.org/10.1016/S0022-3913(97)70075-1)
10. J.Fiske and C. Dickinson. The role of acupuncture in controlling the gagging reflex using a review of ten cases. *British Dental Journal* 2001; 190: 611-13. <http://dx.doi.org/10.1038/sj.bdj.4801053> PMID:11441900
11. Ramsay D.S. Weinstein P, Milgrom P, Getz T. Problematic gagging: Principles of treatment. *J Am Dent Assoc* 1987; 114: 178-83. PMID:2880883
12. Landa JS. *Dynamics of Psychosomatic Dentistry.* New York; dental Items of interest, 1953
13. Lee-Singer I. The marble technique: A method for treating the 'Hopeless gagger' for complete denture. *J Prosthet Dent* 1973; 29: 146-55. PMID:4509354
14. Saunders R.M, Cameron J. Psychogenic gagging: Identification and treatment recommendations. *CompendContineduc Dent* 1997; 18: 430-40. PMID:9533356
15. Wilks CG, Marks IM. Reducing hypersensitive gagging. *British Dental Journal.*1983; 155: 263-65. <http://dx.doi.org/10.1038/sj.bdj.4805203> PMID:6580017
16. Watt DM, MacGregor AR. The diagnosis and treatment of problems of edentulous patients in designing complete dentures, 2nd edi, Bristol; Wright.1986, Pg no. 154-57.
17. Hattab FN, Al-Omari MAO, Al-Duwayri ZN. Management of a patient's gag reflex in making an irreversible hydrocolloid impression. *J Prosthet Dent.*1999; 81: 369. [http://dx.doi.org/10.1016/S0022-3913\(99\)70282-9](http://dx.doi.org/10.1016/S0022-3913(99)70282-9)
18. Robb ND, Crothers AJR. Sedation in dentistry. Part 2: Management of the gagging patient. *Dent Update* 1996; 23: 182-86. PMID:8948179
19. Tomioka S, Uchida D, Eguchi S, Nakaja N. Elimination of hypersensitive gagging reaction in dentistry by Propofol at subhypnotic doses. *Oral Diseases* 1998; 4: 279-280. <http://dx.doi.org/10.1111/j.1601-0825.1998.tb00292.x>
20. Morrish RB. Suppression and prevention of the gag reflex with a TENS device during dental procedures. *General Dentistry* 1997; 45(5): 498-501. PMID:9515420
21. Noble S. The management of blood phobia and a hypersensitive gag reflex by hypnotherapy: A case report. *Dent Update* 2002; 29: 70-74. PMID:11928343