Different methods for management of gaging reflex during prosthetic treatment

Tsvetelina Kanlieva, Kalina Georgieva, Metodi Abadjiev

Department of Dental Material Science and Prosthetic Dental Medicine, Faculty of Dental Medicine, Medical University of Varna

Abstract

Introduction

The reflex of gaging and vomiting is an unpleasant feeling. Its purpose is to protect the upper respiratory tract and to remove foreign particles from posterior part of the oropharynx and upper gastrointestinal tract. Gag reflex could also be provoked by psychogenic stimuli modulated by higher brain centers. A common problem in clinical dental practice are patients with hypersensitivity in the oral cavity. Dental care could be a challenge for the dentists. Detailed anamnesis, clinical examination and gaging reflex management contribute to the appropriate approach in oral rehabilitation.

Aim

The aim of this study is to present different techniques for gaging and vomiting reflex management during prosthetic treatment

Materials and Methods

Detailed research in electronic databases Google scholar, Scopus, Pubmed and Research gate was conducted from September 2022 until December 2022. The keywords were: gag reflex, management, dentistry, removable partial denture. The literature was in English.

Results

A total of 542 articles were found during the literature review. In this study 39 original scientific papers meeting the criteria were included. Data and evidence for the importance of gaging reflex management were found in the reviewed articles.

Conclusion

The gag reflex decreases the effectiveness of the prosthetic treatment. A number of methods for its management are described in the literature and in the practice. The application of some of them is limited by local or general contraindications. Others could be used after an additional training. Regardless of the methods that are chosen, the dentist must take into account the characteristics of each patient and apply an individual approach.

Keywords: gag reflex, management, dentistry, removable partial denture

Address for correspondence:
Medical University of Varna, Varna, Bulgaria
Email: Tsvetelina.Kanlieva@mu-varna.bg

Introduction

The gag reflex represented by discomfort and sensation of nausea is a protective reflex that prevents the entry of foreign particles into the pharynx, larynx or trachea. (1)(2) Involving additional symptoms such as sweating, feeling weak, change in breathing, increased heart rate and hypersalivation. (3) Usually it occurs during an dental examination or various dental procedures when the soft palate, tongue and cheeks are touched (4) - the areas where the receptors of the protective reflex are located. (5) Beside to tactile stimulation, gag reflex (GR) could also be provoked by non-tactile, psychogenic stimuli. (6) The sensory stimuli is visual perception, sound, smell or thought of dental treatment. (7) The gag reflex has a mutual etiology and it is difficult to differentiate the causes - a result of psycho-emotional or tactile stimulation. (8)

In the oral cavity, the soft palate, pharynx and tonsils are well-supplied innervated. Their receptors are connected to those in the labyrinth which are irritated by tactile stimulation (1). The somatic afferent nerve fibers come from the labyrinth (branch of n.vestibulocochlearis), rr auricularis of n.vagus, oral cavity (branches of n. trigeminus-V2 and V3), tongue (n. glossopharyngealis), digestive tract (n.vagus - X) and the eye system (n.opticus), anastomose with each other and then continue to the centers responsible for the vomiting. (1) The vomiting center is located in the medulla oblongata

and is closely connected with the respiratory, vestibular, vasomotor and salivary center. (9) Psychogenic nausea and vomit are modulated by higher centers in the brain and cause nausea or vomiting without the need for direct contact of the receptors. (10) (11).

Effective treatment of the gag reflex is the result of a detailed medical history and examination, accurate determination of the hypersensitive areas responsible for its occurrence. (12) Determination of the etiology of the excessive GR is essential for the correct treatment planning. (13) The single or multiple etiology of the problem is an important factor in choosing one or a combination of several methods to manage the reflex.

Material and methods

Detailed research in electronic databases Google scholar, Scopus, Pubmed and Research gate was conducted from September 2022 until December 2022. The keywords were: gag reflex, management, dentistry, removable partial denture. The literature was in English. The total number of publications was 542 articles. After introducing additional criteria - publications after the year 2000, 59 articles were selected. After introducing more additional criteria - keywords "etiology" and "pathogenesis", 39 publications were selected.

Key words: gag reflex, treatment, dentistry, removable partial denture, etiology, pathogenesis

Results

Classifications of gag reflex severity.

A number of researchers have developed classifications to assess the severity of GR. The most commonly used indices were proposed by Fiske and Dickinson: "Gag severity index" (GSI) (14) - tab. 1 and "Gag prevention index" (GPI) - tab. 2 (9) Other scales and indices have been proposed in the studied literature, but the above-mentioned ones are more clearly and reliably applicable in clinical practice (15).

Table 1. *Dickinson and Fiske Index / Gagging Severity Index (GSI)*

Gag severity index by Dickinson and Fiske (GSI)	Definition and characterization of gag reflex strength ratings
I	Very mild gag reflex, occasional gag reflex, but controlled by the patient.
II	Mild, control requires reassurance from the dental team.
III	Moderate degree. The possibilities of dental treatment are limited.
IV	Severe degree. Treatment not impossible.
V	Very severe gag reflex, affecting the patient's behavior and the treatment is impossible.

Table 2. *Index of Dickinson and Fiske / Gagging Problem index (GPI)*

Classification of Gagging Problem index (GPI)	Characteristics of degrees
G1	Normal gag reflex but not desensitized. Patients possible tolerate measurement of periodontal pockets throughout the oral cavity with a probe.
G2	Mild gag reflex. Patients cannot tolerate measurement of periodontal pockets with a probe of all teeth in their oral cavity.
G3	Moderately gag reflex. Patients cannot tolerate the dental mirror during back teeth examination.
G4	Severe gag reflex. Patients cannot tolerate the dental mirror during front teeth examination.
G5	Very severe gag reflex. Patients cannot tolerate the dental mirror in their oral cavity at all.

Methods for management of gaging reflex

Ashish R divides the methods for management of the gag reflex into several main groups: psychological intervention, prosthetic management, pharmacological measures, surgical corrections, acupuncture and acupressure. The group of psychological intervention includes: table salt technique, relaxation, desensitizing technique and distraction technique. Local and general anesthesia, sedation, antiemetic drugs are included in the group of pharmacological measures (16). Joshi et al classified reflex management methods into five main groups similar to the aforementioned author, adding breathing exercises and behavioral therapy to the psychological intervention (7). (tab. 3)

Ali et al suggest the following strategies for managed GR:

– Techniques performed by the dentist. They consist of distraction strategies, prosthetic manage-

Table 3. Variety of methods for management of gaging reflex

		Ashish R	Joshi et al
1.	Psychological intervention	1. Table salt technique 2. Relaxation 3. Distraction technique 4. Desensitizing technique	1. Distraction technique 2. Desensitizing technique 3. Relaxation 4. Hypnosis 5. Behavioral therapy 6. Breathing exersice
2.	Prosthetic management	1. Training /bases/ plaques	1. Training baseplate 2. Singer Marble Technique 3. Asessment the vertical distance 4. Digital impressions
3.	Surgical corrections	Leslie recommends surgery to tear or tighten the soft palate found in a nervous patient.	Leslie recommends surgery to tear or tighten the soft palate found in a nervous patient.
4.	Pharmacological measures	1. Local anesthesia 2. General Anastasia 3. Sedation 4. Antiemic drugs	1. Local anesthesia 2. Nerve block 3. Sedation 4. Topical anesthesia
5.	Acupuncture and acupressure		

ment, pharmacological measures, surgical corrections, acupuncture, acupressure and sedation.

– Techniques performed by the patient. This group includes: systematic desensitization, Singer's marble technique, psychological intervention and behavioral approaches. (14) (Tab. 4)

Table 4. Anti-gag reflex techniques performed by the dentist and the patient

Techniques performed by the dentist	Techniques performed by the patient
1. Distraction technique 2. Prosthetic management 3. Pharmacological measures 4. Surgical corrections 5. Acupuncture and acupressure 6. Sedation	1. Desensitizing technique 2. Singer Marble Technique

Techniques of psychological intervention and distraction.

n the literature there are many recommendations for patient distraction (13) such as intriguing conversation, elevating one of the legs, or placing table salt on the tip of the tongue. (17) This non-standard method with table salt added for 5 seconds on the tip of the tongue eliminates the reflex of gagging. Salt affects two-thirds of the taste buds on the tongue which are innervated by the branches of the chorda tympani. (18) These distraction techniques (DT) could have a result in patients with mild gag reflex and in short manipulations like taking an impression. They have not been reported to be significantly effective when used separately in patients with a strong gag reflex. (16)

Landa suggests as a method of distraction the patient to be engage in a conversation on a topic of interest to him/her; to count quickly to 50 or 100 mentally (19) or to read aloud. (20) At the moment when the patient has difficulty in carrying out the conversation, intraoral procedures can be performed. (21)

Krol describes a DT in which the patient is instructed to raise one's leg and hold it in the air. As the patient's muscles become increasingly fatigued, more conscious effort is required to keep the leg elevated. (20)

Kovats reports a technique in which the patient breathes noisily through the nose and at the same time rhythmically taps the floor with the right foot. (16) Breathing exercises create conditions for distracting attention and at the same time lead to relaxation. (22) When concentration on breathing is insufficient Faigenblum discusses another approach: "There is evidence that vomiting is impossible during apnea". The patient is instructed to control gagging by prolonging exhalation at the expense of inhalation. This leads to a condition of apnea and elimination of the reflex. Furthermore, according to Faigenblum a well-relaxed patient on an empty stomach is less likely to activate the gag reflex.(22) The essence of DT is to distract the patient long enough from the thought of gagging and at the

same time concentrate on a specific task or reflection that fully engage his/her mind. (23) In this way, the patient's anxiety is reduced and the success of the dental procedure is increased significantly. (24)

Systematic desensitization.

Unlike short-term distraction techniques, desensitization techniques aim to lower the GR threshold over a longer period of time. (25) The marble technique described by Singer reportes successful adaptation in patients who have an extremely strong gag reflex. Patient motivation is a key to success. The technique consists of the following: the patient holds in his/her mouth three or five marble balls, of a certain size, for a period of one week, excluding the time when he/she eats and sleeps. (26) Gradually, in the next visits, the balls are replaced with baseplates, occlusal rims and finally finished prostheses. Dentures are made with a small acrylic bead attached to the lingual surface, which is polished. This is another "device" to distract attention as the focus falls on the position of the tongue. (16)(27) Thus, the patient psychologically prepares himself/herself for adaptation to prostheses. (28)(29)

Another method suggests using a graduated toothbrush. The patient should carefully clean the hard palate with the brush as far back as possible without inducing gagging. A mark is made on the handle of the brush so that progress in overcoming the gag reflex can be tracked. (30)

Prosthetic management

Feintuch describes an additional desensitizing technique which helps patients learn to wear dentures step by step. (31) A thin acrylic baseplate without teeth is fabricated and it is worn by the patient at home. At the beginning it is used for a short period of time - about 5 minutes per day. After that the time and frequency of wearing the baseplate are increased gradually. If necessary, the distal part of the baseplate is reduced. The purpose is to make the patient get used to wearing the baseplate during most of the day time. Next step is to add front teeth and after adaptation of the patient, distal teeth are added. Good retention and stability are obligatory. A combination of distraction techniques along with this approach have been reported. Relaxation techniques could also be combined with the initial wearing of the baseplate. (16)

Stolzenberg and a number of other authors emphasize the importance of the dentist-patient relationship, as well as the positive influence that encouraging and supporting the patient could have in overcoming the gag reflex. (17)

Callison modifies an acrylic upper custom tray which is used for a precise final impression with elastomeric impression material. The excess of material is removed from the distal border of the custom tray before triggering gag reflex. (32)

The selection of the correct size and shape of the impression tray is very important. (32) The position of the patient's head is tilted forward and downward during impression taking. (16) A number of studies have reported reduction of gaging reflex using flavored alginates, primary impression with high viscosity elastomer, final impression with putty silicone material and wash technique with light body silicone, training baseplates and acrylic discs. (34)

Krol reveals that inadequate and decreased interocclusal distance could lead to gag reflex. Restoring the correct centric relations causes the GR to disappear. (4, 36)

Bay reports a prosthetic treatment of a patient with a hypersensitive hard palate using a combination of an overdenture and a modified baseplate. The baseplate is reduced distally. Relainer is used in the area of the remaining teeth. The author observes excellent retention, reduced volume of the denture and successful management of gag reflex. (27)

Jordan reports that smooth and well-polished denture surface is unbearable for some patients and activates the gag reflex. Once the smooth surface is no longer polished, the feeling of gag disappears completely. (36)

Factors interfering with the degree of gaging are enough free space for the tongue, the position of the artificial teeth, tight fit and adequate thickness of the A-line area of the maxillary complete denture, as well as correct occlusion, shape and length of the denture flanges. (32, 37, 38)

Another technique for GR management is first described in the literature by The Department of Dental Medicine at the Academy Gülhane Military Medical Teaching Hospital, Turkey, meeting the standards of Revised Helsinki Declaration 1975. It demonstrated that using earplugs during impression taking procedures reduced gag reflex. Its success was explained by the fact that the earplug stimulated the skin of the external auditory canal. It is innervated by branches of the vagus nerve, which may receive fibers from the facial and glossopharyngeal nerves (Arnold's branches), part of the efferent pathway of the gag reflex (39).

Results

The gag reflex decreases the effectiveness of the prosthetic treatment and makes it not comfortable for both the patient and the dentist. A number of conventional and alternative methods for gag reflex management are described in the literature and in the practice. The application of some of them is limited by local or general contraindications. Others could be used after an additional training. Regardless of the methods that are chosen, the dentist must take into account the characteristics of each patient and apply an individual approach.

References

1. Ardelean L., Bortun C., Motoc M. GAG REFLEX IN DENTAL PRACTICE - ETIOLOGICAL ASPECTS, TMJ 2003, Vol. 53, No. 3-4
2. Аврамова Т. Основи на анатомията на човека. София : Мед. изд. Арсо, 2015.
3. Sakamoto, T., Fukuda, K., Saita, N., Koukita, Y., Yamashita, S., Koizumi, J., & Ichinohe, T. (2015). Autonomic nervous activity of patients with gagging problems during dental mirror insertion. Special Care in Dentistry, 36(2), 80–84. doi:10.1111/scd.12148
4. Krol, A. J. (1963). A new approach to the gagging problem. The Journal of Prosthetic Dentistry, 13(4), 611–616. doi:10.1016/0022-3913(63)90131-8).
5. Йорданов Й., Узунов К., Факих Х. Наръчник по анатомия и антропология за стоматолози. София: АртГраф; 2012 , 272стр.
6. Saunders RM, Cameron J. Psychogenic gagging: identification and treatment recommendations. Compendium Contin Educ Dent 1997;18(5):430-40
7. Bassi, G. S., Humphris, G. M., & Longman, L. P. (2004). The etiology and management of gagging: A review of the literature. The Journal of Prosthetic Dentistry, 91(5), 459–467
8. Collett HA, Briggs DL. Some psychological aspects of denture stimulated gagging. J Prosthet Dent 1953;3:665-71
9. Dickinson CM, Fiske J. A review of gagging problems in dentistry: I. Aetiology and classification. Dent Update. 2005 Jan-Feb;32(1):26-8, 31-2. Review
10. Кръстев Д., Джамбазова Е., Лазаров Н., Дончев В. Основи на анатомията и физиологията: За студенти с образователно-квалификационна степен "Професионален бакалавър". 2. попр. и доп. изд. София: Симелпрес, 2017
11. Polverino et al.: Anatomy and neuro-pathophysiology of the cough reflex arc. Multidisciplinary Respiratory Medicine 2012 7:5)
12. Murchie, B. D. (2018). Gagging – bringing up an old problem part 1: aetiology and diagnosis. Dental Update, 45(7), 609–616. doi:10.12968/denu.2018.45.7.609
13. Dickinson, C. M., & Fiske, J. (2005). A Review of Gagging Problems in Dentistry: 2. Clinical Assessment and Management. Dental Update, 32(2), 74–80. doi:10.12968/denu.2005.32.2.74
14. Goyal, G., Ganga, M., & Dental, S. (2014). Gag Reflex: Causes and Management
15. Zafersoy Akarslan, Zühre. (2016). GAG REFLEX IN DENTISTRY: WHAT CAN WE DO?. Atatürk Üniversitesi Diş Hekimliği Fakültesi Dergisi. 503-503. 10.17567/ataunidfd.290426
16. Kumar, Sandeep & Yadav, Renu & Yadav, Vikender & Sidhu, M.s & Prabhakar, Mona & Dabas, Ashish. (2017). Alternative Therapies and Prosthodontics: A Combined Approach. Indian Journal of Health Sciences and Care. 4. 41. 10.5958/2394-2800.2017.00009.8
17. Stefos, S., Zoidis, P., & Nimmo, A. (2018). Managing Gag Reflex during Removable Partial Denture Treatment: A Review and a Clinical Report. Journal of Prosthodontics. doi:10.1111/jopr.12957
18. GAGGING AND ITS MANAGEMENT IN PROSTHODONTIC PATIENTS - A REVIEW OF LITERATURE.. (n.d.) >The Free Library. (2014). Retrieved Oct 15 2022 from https://www.thefreelibrary.com/GAGGING+AND+ITS+MANAGEMENT+IN+PROSTHODONTIC+PATIENTS+-+A+REVIEW+OF...-a0588997429
19. LANDA JS. Practical full denture prosthesis. Dent Items Interest. 1946 Feb;68:155 passim. PMID: 21011790
20. Croser, D. Complementary treatments and dental indemnity. BDJ In Pract 33, 30–31 (2020). https://doi.org/10.1038/s41404-020-0525-2
21. Saita, N., Fukuda, K., Koukita, Y., Ichinohe, T., & Yamashita, S. (2012). Relationship between gagging severity and its management in dentistry. Journal of Oral Rehabilitation, 40(2), 106–111. doi:10.1111/joor.12014
22. Faigenblum, M. J. Retching. It's causes and management in prosthestic practice. Br DEnt J 125:485, 1970
23. Friedman MH, Weintraub M: Temporary elimination of gag reflex for dental procedures. J Prosthet Dent 1995;73:319
24. Ahmad N.et al, Etiology and Management of Gag Reflex in the Prosthodontic Clinic: A Review, International Journal of Oral Health Dentistry, Jan-March, 2015;1(1):25-28
25. Savage, R. D., & MacGregor, A. R. (1970). Behavior therapy in prosthodontics. The Journal of Prosthetic Dentistry, 24(2), 126–132. doi:10.1016/0022-3913(70)90134-4
26. Lee Singer, I. (1973). The marble technique: A method for treating the "hopeless gagger" for complete dentures. The Journal of Prosthetic Dentistry, 29(2), 146–150. doi:10.1016/0022-3913(73)90106-6
27. Conny DJ, Tedesco LA. The gagging problem in prosthodontic treatment. Part II: Patient management. J Prosthet Dent. 1983 Jun;49(6):757-61. doi: 10.1016/0022-3913(83)90343-8. PMID: 6348257
28. Ramsay DS, Weinstein P, Milgrom P, Getz MS. Problematic gagging: Principles of treatment. J Am Dent Assoc 1987;114:178-83) (Farmer JB, Connelly ME. Palateless dentures: Help for the gagging patient. J Prosthet Dent 1984;52:691-4)
29. Farmer JB, Connelly ME. Palateless dentures: Help for the gagging patient. J Prosthet Dent 1984;52:691-4
30. Jain, Ashish. (2018). Gagging: A problem to prosthetic dentistry - Review. Drug Invention Today. 10. 48-54
31. Cox, L., & Brindley, J. (2017). Exploring alternative methods of gag reflex control Part 1: Acupressure. BDJ Team, 4(4). doi:10.1038/bdjteam.2017.59
32. Callison GM. A modified edentulous maxillary custom tray to help prevent gagging. J Prosthet Dent 1989;62:48-50
33. Xianyun R. Making an impression of a maxillary edentulous patient with gag reflex by pressing caves. J Prosthet Dent 1997;78:533
34. Thomas A, Raju BS, Varma M, Peedikayil FC, Gopal D. Gagster: A New Technique for Maxillary Impression without Gagging. J Ind Orthod Soc 2014;48(1): 69-71.
35. Wilks CG, Marks IM. Reducing hypersensitive gagging. Br Dent J 1983;155:263-5.
36. Bedia, Sumit & Ghadage, Mahesh & Joshi, Mridula. (2022). Gag reflex: An overview. NeuroQuantology. 20. 793-804. 10.14704/nq.2022.20.6.NQ33100)
37. Randall, CL, Shulman, GP, Crout, RJ, & McNeil, DW (2014). Occlusion and its associations with fear of dental care, fear of pain, and beliefs about treatment. Journal of the American Dental Association, 145(5), 452–458. doi:10.14219/jada.2013.50
38. Beri A, Pisulkar S G, Bansod A V, et al. (September 20, 2022) Alternative Prosthodontic Therapies: A Multifaceted Approach. Cureus 14(9): e29363. doi:10.7759/cureus.29363
39. Cakmak, Y. O., Ozdogmus, Ö., Günay, Y., Gürbüzer, B., Tezulaç, E., Kaspar, E. C., & Hacioglu, H. (2014). An Earplug Technique to Reduce the Gag Reflex during Dental Procedures. Forschende Komplementärmedizin / Research in Complementary Medicine, 21(2), 94–98. doi:10.1159/000362140

Reviewer of the article:
Dr. Miroslav Stoykov
Medical University of Varna, Bulgaria