

Etiology and Management of Gag Reflex in the Prosthodontic Clinic: A Review

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Abstract:

Aims: The aim of this paper is to review normal gag reflex, neurophysiology and factors that may be associated with aetiology of gagging and the role of different methods to manage gagging in Prosthodontic clinic.

Scope of the study: All the methods for the management of gagging discussed here are non invasive, safe and economical so adaptation of these techniques will enhance the compliance of the patients in the Prosthodontic clinic and also motivate to them for future dental treatment.

Collection of data: The data was collected by all 3 authors independently from articles published in national and international journals. MEDLINE, Pub Med databases were searched with the help of key words. A manual search was also performed to spot previous work on severe gagging and its management.

Clinical implication: The management of gagging is very challenging in the Prosthodontic clinic. In some people this response is exaggerated to the extent that the acceptance of even normal dental treatment is just impossible.

Conclusion: All the methods which are discussed here should be used cautiously. Each patient will need to assess independently as the approach needs to be adapted to that particular patient's requirement.

Keywords: Gagging reflex, marble technique, Neurophysiology of gagging, and Prosthodontic management.

Introduction:

In daily practices, Prosthodontists routinely encounter many patients who have extreme oral sensitivity by which they are not capable to bear any foreign body in the oral cavity and resulting gagging. The gagging phenomenon is responsible for many awkward situations for the patient as well as for the doctor on the account of rapid, aggressive hysterical vomiting. The normal gag reflex is a defensive mechanism for the survival that is controlled mainly by parasympathetic division of the autonomic nervous system. The gag reflex is an innate reflex intended to guard the upper respiratory tract and the digestive tract against from foreign body that might block them. However, it can be an acquired, adapted by various stimuli like visual, olfactory, acoustic,

psychic, chemical or toxic transmitted through the blood flow or the cerebrospinal fluid.¹⁻³

Etiology:

Majority of dental patients show history of a precipitating gag in dental clinics. The vomiting center for the gag reflexes present in the medulla oblongata and to some extent includes tractus solitarius.⁴ The physiologic mechanisms of gagging and swallowing are linked together by afferent nerve pathways, brain centers and efferent nerve pathways transmit the respective stimulation.⁵ Many evidences shows that the incidence of gastric condition is common in those patients who have medical history, several habits and experience of previous gagging.⁶

Etiology of Gagging:⁷⁻⁹

Table-I

Local factors	Medical conditions	Social Causes	Psychological factors	Iatrogenic Factors	Prosthetic Factors
Nasal obstruction	Chronic gastritis	Heavy smoking due to hypersensitivity	Eating disorders	Water and Suction Tubes	Poor retention
Deviated septum	Paterson's dysplasia	Chronic catarrh.	Fear	Instrumentation	Surface finish of dentures
Postnasal drip.	Carcinoma of stomach & Pancreas	Coughing.	Stress	Local anaesthesia	Over extended and under extended dentures
Sinusitis.	Partial Gastectomy	Chronic Alcoholism.	Neuroticism	Radiography	Inadequate PPS
Nasal polyps & Congestion of the oral, nasal and pharyngeal mucosa	Peptic Ulceration & Uncontrolled Diabetes		Learned responses	Restricted tongue space	Disharmonious Occlusion

Anatomical factors:

Atypical anatomy and oro-pharyngeal sensitivity influences patient to gag. A comparatively long soft palate and a larger angle between the hard and soft palates are associated with the gagging problem. (class iii) An atonic and relaxed soft palate bring out gagging by allowing the uvula to make contact with the tongue and the soft palate to touch the posterior pharyngeal wall. Gagging also has been seen in hypersensitivity of the soft palate, uvula, fauces, posterior pharyngeal wall and the tongue.⁷

Neurophysiology of Gag Reflex:

In most patients, nausea is initiated by a reflex physiological mechanism involving receptors situated in different parts of the body. Afferent paths convey the stimuli to the nervous centers of vomiting and afterwards to the efferent paths. The sensory stimuli capable to initiate the gag reflex are identified by three types of receptors located at the Orofacial, digestive and at blood flow level receptors respectively.⁸⁻¹⁰

Orofacial receptors, In the mouth, the posterior pharynx and of the tonsillar pillars are rich in nociceptors, these receptors which convey the taste buds, can similarly trigger the gag reflex. They generate a real reflex field, which may spread forward, depending on the individual. These receptors are connected with the labyrinth receptors that may trigger gagging if position is changed. Similarly gagging may also be triggered by visual, olfactory and auditory sensory receptors.

Digestive receptors, These receptors along with olfactory receptors are known as "chemoreceptors". The afferents approaching from the digestive tract communicate mainly through vagus nerve, arrive at solitary nucleus, towards which the afferences from Weisberg's intermediate (VII bis) nerve and afferents from the glossopharyngeal nerve also converge, on the whole responsible for the gag reflex.

Blood flow receptors, As such there are no receptors at blood flow level; the blood flow and lymph bring the chemical mediators likely for the humoral changes in the chemoreceptor area located in the postrema area, in the wall of the fourth ventricle, loaded with dopaminergic receptors. Pathological humoral alterations, like uremia or drug toxicity may take action on the bulbar centre of vomiting. Similarly, the hormonal alteration inherent to pregnancy acts through the blood flow and may induce nausea.¹⁰⁻¹¹

Gagging Severity Index (GSI)

1. **Very mild:** Patients himself controlled the gagging.
2. **Mild:** Gagging can be controlled by patient/dentist by apply simple measures.
3. **Moderate:** some treatment options are not accepted by the patients.
4. **Severe:** some treatments are impossible.
5. **Very severe:** Any procedure impossible and effects patient behaviour.

Gagging prevention index (GPI)

Treatment management method employed:

1. Obtunded gag reflex; treatment successful
 2. Partially controlled gag reflex; all treatment possible
 3. Partially controlled gag reflex but frequent gagging; simple treatment possible
 4. Inadequately controlled gag reflex; simple treatment unable to be completed
 5. Gag reflex severe; no treatment possible.
- (Source: Dickinson, 2000)¹²⁻¹³

Management of Gagging¹³⁻¹⁷

Several treatment modalities and approaches have been giving in table-2 are appeared very effective in the management of gagging patients in Prosthodontic clinic.

Table -II

Psychosomatic management	Therapeutic management	Prosthodontic management
Relaxation	sedative antihistamine	Appleby and Days finger massage technique
Distraction and desensitization	parasympathetic	Singer's marble technique
Psychological and behavioral techniques	topical anesthetics	Reduction of palatal coverage of maxillary dentures
Sedation and hypnosis	Analgesics	Modification of edentulous maxillary custom tray
Psychotherapy for chronic or hysterical gagging	Anti cholinergic drugs	Conditioning prosthesis
Leg lift technique	Acupuncture	Controlled breathing method
Hypnosis relaxation plus controlled breathing		

Appleby & Bay's finger massage of the soft palate **and** Singer's marble technique', are the two methods by which the gag reflexes can be pooped up by gradual exposure to dental prosthesis or procedures.

The Singer's marble technique

The Singer's marble technique consists of seven steps which are as follows:

- **The first visit:** Any oral examination is avoided in the first dental visit. 5 rounds, multicolored, glass marbles, approximately 1.5 cm in diameter were shown to the patient in the tray. The patient was asked to put the marbles in his mouth, one by one, at his freedom, this procedure continued for a week. Since the fear of swallowing a foreign object can induce the gag reflex, the patient was assured that if he swallowed a marble, it could not hurt him.
- **The second visit:** The patient was promise that he would be able to wear denture, which further boost his own motivation.
- **The third visit:** The hard palate, the soft palate, the cheeks, the lips, and the tongue were swabbed with topical anesthesia before the primary impression making in modeling compound. The base plates were not highly polished, but a little dull finish because polished base plates give a slimy or slippery feeling that can induces gagging.
- **Fourth visit:** lower denture's base plate was inserted, and the patient was asked to continue to keep three marbles in his mouth. A "training bead" (cold cure acrylic resin) was placed on the lingual aspect of the lower base plate to keep the proper tongue position. The patient should be encouraged that he is making excellent progress.
- **Fifth visit:** Now upper base plate was also inserted. Maxillary base plate may be little difficult for the patient to tolerate than the lower one, but he must be encourage to keep both of them in his mouth except when eating. The exercise of marbles was discontinued.
- **The sixth visit:** The patient will now able to tolerate the presence of both base plates. Occlusal rims were used to establish esthetic considerations and to validate the occlusion. The patient should carry on wearing the upper and lower base plates till the dentures are being fabricated.
- **The seventh visit:** The processed lower denture was inserted and used in conjunction with the upper base plate. A training bead was placed on the lower denture to guide tongue in proper position. The patient was educated to keep the tip of the tongue always touching the bead, which would keep away the lower denture from lifting. Next the upper denture is inserted.

The 'marble technique' is helpful in assuming so-called "hopeless" gaggers. The transform from the mental rejection to physical acceptance of the dentures can be improved by the use of the marble technique.¹⁵

Reduction of palatal coverage of maxillary denture

The size of maxillary denture can be decrease to a U-shaped border situated approximately 10 mm from the dental arch. This reduction of the size of the denture influences their sense of taste positively, and gagging will be reduced surprisingly.¹⁶⁻¹⁷

Conditioning Prosthesis

A conditioning denture is an excellent device to control gagging. Patient is gradually adapts to the reduced taste sensations. This conditioning prosthesis is similar to an orthodontic appliance (Hawley's) consists of alveolar palatal prosthesis fabricated in acrylic resin. This appliance must wear for the one week continuously and followed by interval of one week for the absolute adaptation.¹⁶⁻¹⁸

Controlled breathing method

This method is similar to that advocated by Murphy for the National Child Birth Trust for the women during labor time. All patients were instructed in controlled rhythmic breathing and asked to perform it for 10-15 days before prosthetic treatment begin. The breathing was slow, deep and even, and the beat is maintained by focusing the mind on a particular object or tune with an even pace. The attention was mainly important so that if the patient practiced a vomiting episode the breathing would become deeper and slower.

Impressions for construction of base plate were taken in the usual two stages: primary and secondary impressions. During impression taking, patient's rhythmic breathing should be reinforced. At all times the operator made the subjects concentrate on his or her breathing and if retching or vomiting occurred, the operator should maintain a relaxed manner so that the subjects did not get agitated. When the base plate was inserted, the breathing technique was explained again and the patient told empathetically that a routine should be adopted whereby a particular time each day was suggested for denture adaptation. The length of time the base plate was worn each day should be slowly increased.¹⁶

Discussion:

The Prosthodontists usually encounter many patients in the clinics who are enormously sensitive to oral cavity which cannot tolerate any foreign body. Gag reflexes may be induced by any dental procedures during and after treatment and sometimes

have multiple causes. It is hardly any precise demarcation between the general and local etiology of gag reflex and psychological factor.⁶⁻⁸ It is assumed that gagging reaction is an extended anxiety reaction which is induced by psychosomatic state. It is possible that the chronic gaggers may have more extensive distribution of vagus nerve with such an abnormally physical stimulation of mucosa may induce gagging. At the end it can be said that skill and patience of the operator is the key to control vomiting and provide satisfactory results.

Conclusion:

The hyperactive gag reflex produces lots of clinical difficulties for the patient as well as dentist. Any treatment will fail for the gagging if proper diagnosis and treatment plan not made. Detail information will enable the clinician to estimate the severity of the problem and thus make proper decisions on an ideal method to treat gaggers. All the methods which are discussed should be used cautiously. Each patient will need to assess independently as the approach needs to be adapted to that particular patient's requirement.

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