GAG- ETIOLOGY AND ITS SKILLFULL MANAGEMENT- A REVIEW

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ABSTRACT: Gagging in patients can be a major encumbrance to dental procedures further compromising the quality of dental treatment. Such patients with gag susceptibility are a nightmare to dentists. Thus, one of challenging skills put to test during the dental treatment procedure is the instant gag reflex and its management. A hypersensitive gag reflex often retards the ongoing procedures and thus prolongs the treatment procedure. The various factors range from congenital to iatrogenic, seem to exaggerate such reflex. Gagging can also be a physical expression of panic, related to a feeling that some threat to breathing or swallowing is about to occur. This article highlights the etiology, scoring the gag reflex and thus its effective and skilled management to gag prone patients during clinical procedures.

KEYWORDS: Gagging, Etiology, Management, COMPISS techniques

INTRODUCTION: Gag reflex is the most likely stimulation resulting due to the foreign body into the oral cavity. This reflex is a physiological reaction which can be controlled by nerve endings situated on the soft palate, pharynx, and pharyngeal part of the tongue¹. Gag reflexes encompasses all the various dental procedures and can be seen in all age groups. It is mostly seen during recording impression of maxillary arch, mostly out of fear of being choked or due to taste, or taking of intra oral radiographs due to stimulation of floor of the mouth, periodontal scaling, during placement of suction tubes or rubber dams etc. Gagging basically is like other reflex reactions, an involuntary process and instantaneous process in response to a set of stimuli. These reactions are controlled and mediated by the reflex arc. This is a neural pathway or region that functions to activate emergency responses to stimuli by transmitting the signal to the spinal cord first instead of the brain. Due to this reflex reactions are very quick and hence termed spontaneous. This causes embarrassment to the patient and creates an unwillingness of the patient towards further procedures. The dentists' quick acquaintance about management of gag plays an important role.

CLASSIFICATION: Gagging or Gag-reflex has been classified as either (i) somatogenic (ii) psychogenic.^{2,3}

- i. **SOMATOGENIC GAGGING:** The term somatogenic describes gagging that is primarily induced by physical stimuli. The five intra-oral areas 'trigger zones' for

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examination purpose include palatoglossal and palatopharyngeal folds, base of tongue, palate, uvula, and posterior pharyngeal wall. Bartlett, described how conditions such as chronic nasal obstruction or sinusitis may increase the predisposition to gag.^{4,5}

Somatogenic gagging results from

- Insufficient retention,
- Incorrect occlusal vertical dimension,
- Malocclusion,
- Lack of tongue space,
- Thick posterior borders,
- Inadequate posterior palatal seal

i. PSYCHOGENIC GAGGING:

The term psychogenic describes gagging induced primarily by psychological stimuli. Heap and Aravind⁶ stated that, psychological contributions are represented by conditioned protective reflexes from earlier experiences or existing stresses and anxieties. Saunders and Cameron⁷, who review the literature and present diagnostic criteria, treatment recommendations, and a clinical case highlight particularly on psychogenic gagging.

It is induced by

- Anxiety
- Fear
- Apprehension

ETIOLOGY: A cause or a set of causes initiated by triggering of gagging may be inborn or acquired, local or general reflexes. They can be enumerated as-

- Congenital reflexes
 - Acquired reflexes
 - Mechanical stimuli
 - Acoustic stimuli
 - Visual stimuli
 - Physic stimuli
 - Congenital reflexes
 - Psychological Factors
 - Physiologic Factors.
 - Systemic stimuli
 - Iatrogenic Stimuli
 - Anatomic Factors
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- **CONGENITAL REFLEXES** - This problem might occur during the use of the water-cooling drill associated with defective suction, because a patient with his/her mouth open is unable to swallow the excess of water accumulating in his/her mouth.⁸ Sometimes, the mere noise of the burr may remind the patient such an incident, inducing hypersalivation with all the ensuing consequence.
 - **Acquired reflexes**- Alcoholism, certain digestive or hepato-biliary disorders and emetic medication seem to be the factors which initiate gag-reflexes.

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- **Mechanical stimuli** - The ability and familiarity of the dental professional associated with his/her expert witness are an advantage in preventing such occurrences due to Olfactory/taste stimuli, certain smells, especially that of sulphur given off by certain dental materials, or the bitter taste of the anaesthetic are enough to trigger nausea.^{9,10}
- **Acoustic stimuli**- The uproar of a rotating instrument may remind the patient of a traumatizing dental manoeuvre. In this case, cortical stimulation has a psychic origin.
- **Visual stimuli**- Sometimes the sheer sight of a pair of rubber gloves, of a cotton swab or the contact of this swab with the mouth mucous membrane may trigger gag reflex.
- **Psychic stimuli** - Fear or the memory of an unpleasant experience may have a direct influence on the patient's behaviour when a print is taken. Nausea of psychic origin is essentially linked to wearing a mobile prosthesis.
- **Anatomic Factors** - It has been suggested that extensive distribution of the neural pathway; especially the vagus nerve may play a role in gagging⁶. But this does not explain why patients gag with auditory, olfactory, or visual stimuli also.⁷
- **Psychological Factors**: Fear or the memory of an unpleasant experience may have a direct influence on the patient's behaviour when a print is taken. Harmless stimuli, such as the sight of an impression tray, the smell of the dental surgery, or the sound of a dental hand-piece, may become associated with an unpleasant gag response.
- **Physiologic factors**: Olfactory/taste stimuli Certain smells, especially that of sulphur given off by certain dental materials, or the bitter taste of the anaesthetic are enough to trigger nausea.^{8,9} The uproar of a rotating instrument may remind the patient of a traumatizing dental manoeuvre. In this case, cortical stimulation has a psychic origin.
- **Systemic Disorders**: Deviated septum, nasal polyps or sinusitis block nasal passages, where there is increase likelihood of the gag reflex. Chronic gastrointestinal disease, notably chronic gastritis, peptic ulceration, and carcinoma of the stomach, lowers the intraoral threshold for excitation and contribute. It's prevalent among the alcoholics and smokers. Medication that a person may be taking are another consideration if this produce nausea as a side effect. Pregnancy can also cause exaggerated reflex activity at the gagging centre since the adjacent vomiting centre is usually very active in early pregnancy.^{15,16,17}
- **Iatrogenic**: Incompetence of the dental professional may trigger a gag reflex in a normal patient who is not affected by gagging. These include overextended borders especially in the posterior palatal seal region and the distolingual flange of the lower arch or while recording maxillary impression with overloaded impression tray, poorly retained dentures, an increased vertical dimension of occlusion has also been suggested as precipitating gagging.²⁴
- **Gagging Scores**: Dickinson & Fiske gagging severity index (GSI)¹¹

1:	Normal gagging. Very mild, occasional and controlled by the patient
2:	Mild gagging. Control is required by the patient with reassurance from the dental team
3:	Moderate gagging. Consistent and limits treatment options. Gagging prevention measures are usually required
4:	Severe gagging. Gagging occurs with all forms of treatment including simple visual examination. Treatment is limited.
5:	Very severe gagging. Affecting patient behaviour and dental attendance and making treatment impossible without specific treatment for control of gagging.

MANAGEMENT: Management of gagging here plays a very important role both from the patients' point of view as well as for the dentist too. Since the feeling or the act of gagging embarrasses them, a knowledge regarding its management plays a significant role on the patients' psychology.

The first to do's

- The Dentist should take a detailed history in relaxed, sympathetic manner in a comfortable environment
- The Dentist should try to recognize the situation that triggers gagging.
- The Dentist should try to learn if there are any precipitating events responsible for initiating gagging.
- Limit examination to prevent stimulating a gag response then.
- Simple measures like avoid over loading of the impression tray, use of fast setting materials, ensuring sufficient aspiration, treatment in upright position, frequent cessation of treatment etc can be used.

I. BEHAVIORAL TECHNIQUES:

These techniques are the most successful long term method of management. It reduces anxiety and helps "unlearn" the behaviour that provokes gagging. **Relaxation, distraction, suggestion,** and **systematic desensitization** are all methods that can be employed, singly or in combination.^{12s}

i. Relaxation techniques: Relaxation helps to rule out the awkward thought processes. Ask the patient to tense and relax certain muscle groups, starting with the legs and working upwards, while continually providing reassurance in a calm atmosphere. It basically relaxes the patient and makes him comfortable thus adapting himself to the clinical procedures ahead.

ii. Distraction: Distraction techniques can be used to temporarily divert a patient's attention and may allow a short dental procedure. Distraction is another method used during dental treatment wherein the mind is diverted to something pleasant experience like music.¹² Music therapy has become a common practice while treating anxiety patient. Some dentists use virtual reality goggles which provide life like images and sounds. These provide necessary distraction during treatment. Distractions may be carried out in various forms- a chair mounted television provides an audio visual form of distraction which also serves to entertain the patient. Programmes according to the patients age group are channelled thus distracting them and makes dental procedure more of a normal routine than the scary procedure thought of.

iii) Breathing exercises: Gagging is a reflex response involving the oesophagus, while breathing involves the trachea. Just as it is impossible for an adult to swallow and breathe at the same time, it is impossible to breathe and gag at the same time. It was explained that a valve closes over the oesophagus while breathing, making gagging impossible. On that note, the patient was instructed to practice taking long deep breaths in, and then fast forced breaths out between visits, especially while doing his desensitization exercises. It was emphasized that there should be no pause between expiration and inspiration. Barsby, describes the control of hyperventilation and gagging by teaching patients breathing techniques.¹³

iv. Hypnosis: Hypnosis is a procedure wherein the patient's subconscious is used to command the patient conscious nature. But the procedure is of benefit to a person trained in the art and beyond practical use for those not well versed with it. However not used in much practice since it becomes little or too much to alter the subconscious mind of the patient.

iv. Systemic Desensitising Technique: This technique is also called as graduated exposure therapy. The technique consists of incremental exposure of the patient to the feared stimulus. The intensity, duration and frequency of the noxious stimulus are slowly increased, allowing the patient to deal with the situation gradually. For example, once tolerated maxillary and mandibular bases are given to the patient which are later fabricated to final dentures.

v. Cognitive Therapy: It is the process of learning to disprove fundamental faulty thinking with the goal replacing ones irrational counter factual beliefs with more accurate and beneficial ones. For example: A patient might feel that when taken an impression by a dentist will cause choking. The psychotherapist tries to rationalize this bizarre idea.

vi. Re-education technique: Singer¹⁴described a technique (marble technique) where ordinary glass marbles were used to re-educate the patient. Five rounds multi-coloured, glass marbles, approximately 1/4inch in diameter, were placed on a tray in front of the patient. The patient was told to put the marbles in his mouth, one at a time, at his leisure, until all five marbles were in his mouth. 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 harm him. Continual assurance that he would be able to wear dentures was given to the patient at each weekly visit. He was urged to keep the five marbles in his mouth continuously for one week, except when eating and sleeping. Patients with this problem can be treated with as few as two marbles.

vii. Acupuncture: Acupuncture has been demonstrated to have an effect on the gag response. This technique makes use of pins or needles pricked extra-orally that seem to create pressure decreasing the gag sensation.

II. Pharmacological Techniques

- i. **Local Anaesthesia:** Administration of local anaesthesia is debatable in treating gagging. The agents may be applied in the form of sprays, gels, lozenges, mouth rinses, or injection. Local infiltration placed alongside to the posterior palatine foramen is known to reduce gagging. Webb^{15,16}suggests that distortion of tissue contour due to injection of anaesthetic solution can be minimized by adding hyaluronidase (I-3cc) to 2 % lidocaine HCI (1cc). One-third of this solution is injected into the area of each greater palatine foramen to prevent gagging effectively. He also advocated the use of this injection technique for insertion of dentures thereby controlling post insertion gagging.
- ii. **Conscious Sedation: Nasal, oral and intravenous sedating agents are available.** Sedating agents reduce anxiety and maintain reflexes that protect the airway. Nitrous oxide is frequently used; the mechanism being an altered perception of the external stimulus which is thought to depresses the gag reflex.

- iii. **General Anaesthesia: May be used as a last resort** in a patient with severe symptoms and requiring extensive restorations. However it is a risk prone procedure and its feasibility is questionable.

III. Inventiveness of Prosthodontic Techniques for the Gag Patient

i. Impression Technique

- a. **Modification of edentulous maxillary custom tray-:** The modified maxillary custom acrylic resin tray to which second layer of autopolymerising tray acrylic has been attached to original custom tray with wax spacer removed aids in removal of excess impression material as it extrudes from the posterior border of the maxillary custom tray before it can elicit a gag reflex in the patient.^{17,18}
- b. **Impression Material to be used:** Low-fusing wax has been advocated by Borkin for gagging patients.^{19,20} The intraoral wax being thermoplastic in nature can hence be used repeatedly to obtain the final impression despite the restrain caused due to gagging episodes. The material needs to set intra orally completely; syringing ice water aids in the set and is frequently used. It should be remembered that though the cooling effect offered by the water helps to retard the gagging paroxysm; an efficient suction system needs to be used to counter the sensation caused by the volume of water.

ii. **Modification of the prosthesis:**

Plateless denture, a cast metal denture base of aluminium or chrome nickel alloy is recommended.²¹ The advantage here is the achievement of intimate contact between the denture base and the underlying tissue, which markedly increases the retention of the prosthesis^{22,23}. The metal base provides rigidity to resist breakage war page, uniform thickness of material, a beaded metal finish line on the palatal surface, and a stable substructure for recording jaw relations. The metal base extends from the palatal bead line to cover the crest of the ridge. Plateless dentures are recommended as a possible solution for gagging patients with a history of unsuccessful denture wearing ²⁴ (as a last resort) and for patients with a large inoperable maxillary torus.

Gagging - Post insertion denture problems: Gagging is seen mostly in the elder age group after post denture insertion. Commonly seen factors that aggravate gagging are:

MAXILLARY DENTURE- Immediate gagging on insertion

- Maxillary denture
- Overextension
- Too thick posterior border

MANDIBULAR DENTURE-

- Distolingual flange too thick
- Delayed gagging (2 weeks to 2 months after insertion)
- Incomplete border seal allowing saliva under denture.
- Malocclusion causing denture to loosen, allowing saliva under denture.

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Post operative denture problems sometimes can lead to gagging. However post insertion follow up corrects the denture related disharmonies. Often the reason for gagging could be because of the newness of a foreign body as a denture into the oral cavity.

- **Altering the Gag Reflex via a Palm Pressure Point** -The pressure point used was located in the middle of the palm at the angle of intersection of the thumb and third digit using the patients' hands at this intersection with a felt-tip marker. Pressure device over the marked point on a randomly selected hand (right or left) was placed.²⁵ Once, the hand pressure device was secured, and patient is instructed not to resist the pressure applied to the hand while the primary dentist manually increased the force of the actuator to two pounds.
- **Gag Reflex Reduction in a Patient with Maxillofacial Prosthesis:** Use of silicone rubber base impression material in impression taking gave favourable results in preventing the problem of gagging. This impression technique makes use of neutral zone principle^{26,27} construction of a hollow obturators.
- **COMPISS Technique:** Dabney Ewin's very useful hypno-analysis technique 'COMPISS' was used to safely investigate and uncover any potential causes of the abnormal gag reflex (Ewin and Eimer)²⁸ this is a recent technique employed and thus aids in patient management. In doing ideomotor reviews of which ones

DISCUSSION: One of the more mystifying problems encountered is gagging, which can be distressing for both patient and dental professional. But not a single antidote has been diagnosed to completely solve the problem. When biomechanical factors have been eliminated, drugs may be used to deal with the psychogenic aspects of gagging and to block stimuli which provoke the gagging reflex.²⁹

These stimuli usually have psychological origin from previous dental procedures or merely out of fear. So focus should be on minimizing the fear and apprehension of the patient by relaxing and desensitizing. Since past hypnosis, rhythmic breathing, local anesthesia, acupuncture etc various methods have been used, however newer techniques help to investigate and uncover any potential causes of the abnormal gag reflex.

Gag is thus considered as one of the obstacle in rendering patients proper dental care and treatment. Though we cannot avoid gag but we definitely can take preventive measures to make it less severe.

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