REVIEW ARTICLE
The Gag Reflex - Etiology And Management
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Abstract
Every dentist and most dental students and paradental personnel have had experience with the patient whose gag reflex is abnormally active. This article reviews the literature on the gagging problem. The first section considers the normal gag reflex and factors that may be associated with the etiology of gagging, including anatomical and iatrogenic factors, systemic disorders, and psychological conditions. A review of the management of patients with an exaggerated gag reflex follows and includes strategies to assist clinicians.

Key Words: Gag reflex, Retching.

Introduction
Many dental practitioners are faced with patients presenting gag reflex, a phenomenon that appears quite commonly during prosthesis or dental treatment. Consequently, the clinical procedure becomes extremely difficult and to perform quality work is out of question. Gag reflex can be described as the protective mechanism against the entry of the fluids or any substance in the upper respiratory tract. However, it can also be an acquired reflex, conditioned by various stimuli: visual, olfactory acoustic, psychic, chemical or toxic transmitted via the blood flow or the cerebrospinal liquid.

Gagging has been generally classified as either somatogenic or psychogenic. Means and Flenniken observed somatogenic gagging results from insufficient retention, incorrect occlusal vertical dimension, malocclusion, lack of tongue space, thick posterior borders, and inadequate posterior palatal seal. They also stated that Psychogenic gagging is induced by anxiety, fear, and apprehension. Behavioral management therapy or psychotherapy should be considered strongly in the management of the psychogenic gagging patient.

The Gag Reflex
Gag reflex is a subjective sensation originating at the cortical level. This is actually a normal defense mechanism that prevents foreign bodies from entering the trachea, pharynx, or larynx. Unwanted, irritating, or toxic material is ejected from the upper respiratory tract by the contraction of the oropharyngeal muscles. In retching, peristalsis becomes spasmodic, uncoordinated. Air is forced over the closed glottis producing a characteristic retching sound. Schote related the gag reflex to the vomiting reflex and he also stated that describe that the vomiting center lies in the dorsal portion of the lateral reticular formation of medulla oblongata and to some extent, includes tractus solitaries.

Gagging may be accompanied by excessive salivation, lacrimation, sweating, fainting, or, in a minority of patients, a panic attack. When stimulation occurs intraorally, afferent fibers 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, salivary, and cardiac centers and these structures may be stimulated during gagging.

Landa described a husband and wife who both suffered from severe gagging. The sound of the wife retching was sufficient to cause the husband to gag.

Etiology of gag reflex
A stimulation that is manifested by triggering may be inborn or acquired, local or general reflexes.

Inborn reflexes - This problem may also 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.\textsuperscript{11} Sometimes, the mere noise of the burr may remind the patient such an incident, inducing hypersalivation with all the ensuing consequences.\textsuperscript{10}

\textbf{Acquired reflexes} - Alcoholism, certain digestive or hepatobiliary disorders and emetic medication.

\textbf{Mechanical stimuli} - The dexterity and experience of the practitioner associated with his/her authority are an advantage in preventing such occurrences. 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.\textsuperscript{12,13}

\textbf{Acoustic stimuli} - The noise of a rotating instrument may remind the patient of a traumatizing dental maneuver. In this case, cortical stimulation has a psychic origin. Visual stimuli sometimes the mere 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.

\textbf{Psychic stimuli} - Fear or the memory of an unpleasant experience may have a direct influence on the patient's behavior when a print is taken. Nausea of psychic origin is essentially linked to wearing a mobile prosthesis.

\textbf{Management of gag reflex}

\textbf{Distraction techniques}\textsuperscript{7}: Conversation can be useful, or the patient may be instructed to concentrate on breathing, for example, inhaling through the nose and exhaling through the mouth. Distracting the patient's mind by having him raise his foot. Until this tiring exercise requires more conscious effort and a concomitani conversation Can no longer be easily carried on.\textsuperscript{14}

\textbf{Relaxation}\textsuperscript{7}: 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 situations where retching is induced simply by looking at the denture, then the patient is merely requested to look at or hold the denture and to stop before symptoms of retching develop. The process is repeated, with a small increase in time spent undertaking this task, until eventually the patient can wear the denture.

\textbf{Pharmacological Techniques Local Anesthesia} - The 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 used for patients who gag when the posterior palate is touched. \textbf{Conscious sedation} - Nitrous oxide alters the perception of external stimuli and it is suggested that this altered perception depresses the gag reflex.

\textbf{Prosthodontic Techniques Impression Technique}

A technique described in which a material will be used that will give the dentist full control of the setting time and which can be easily corrected.

Borkin\textsuperscript{1,8} recommends low-fusing wax as an impression material for gagging patients. This material can be seated repeatedly between gagging episodes until a satisfactory impression is obtained. The low-fusing wax must be hardened in the mouth. This is done by squirting ice water from a bulb syringe along the borders of the completed impression and over as much of the impression surface as possible. Copious amounts of ice water should be used because the impression must be thoroughly chilled before it is removed. The ice water will retard the paroxisms of gagging by its cooling effect so this chilling can be done with a minimum of difficulty. This low-fusing wax will not set hard at mouth temperature, but it will remain soft and pliable until it is chilled by the dentist. Taking advantage of this characteristic, the tray can be reseated an unlimited number of times until the desired results are obtained.

Webb\textsuperscript{6,15} suggests that distortion of tissue contour due to injection of anesthetic solution can be minimized by adding hyaluronidase (I-3cc) to 2% lidocaine HCl (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.

\textbf{Modification of edentulous maxillary custom tray to prevent gagging}\textsuperscript{16}: 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.
Plate less dentures: A cast metal denture base of aluminum or chrome nickel alloy is recommended. The primary advantage is the achievement of intimate contact between the denture base and the underlying tissue, which markedly increases the retention of the prosthesis. The metal base also provides rigidity to resist breakage warpage, 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.

Palate less dentures are recommended as a possible solution for gagging patients with a history of unsuccessful denture wearing as a last resort and for patients with a large inoperable maxillary torus.

The marble technique: Five rounds of multicolored, glass marbles, approximately 1/4 inch 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.

Gagging - Post insertion denture problems:

1. Immediate gagging on insertion
   Maxillary denture
   a. Overextension
   b. Too thick posterior border
   Mandibular denture
   a. Distolinguat flange too thick

2. Delayed gagging (2 weeks to 2 months after insertion)
   a. Incomplete border seal allowing saliva under denture.
   b. Malocclusion causing denture to loosen, allowing saliva under denture.

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 marking the subjects’ 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. Once the hand pressure device was secured, subjects were instructed not to resist the pressure applied to the hand while the primary investigator manually increased the force of the actuator to two pounds.

Systematic desensitization: The technique consists of incremental exposure of the patient to the feared stimulus. 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. The patient, under conditions of relaxation and reassurance is exposed to a mildly aversive stimulus and learns to cope with this.

Training bases: A thin acrylic denture base, without teeth is fabricated and the patient is asked to wear it at home, gradually increasing the length of time the training base is worn. A suitable regime may be 5 minutes once each day, then twice each day and soon. After 1 week the patient is asked to increase this to 10 minutes 3 times each day, then 15 minutes, 30 minutes, and 1 hour. Eventually the patient is able to tolerate the training base for most of the day. (Fig. 1 & 2)

Errorless learning: The patient is instructed to set aside time to position the denture closer each day and eventually into the mouth in “successive approximations.” That is, the denture is placed perhaps millimeters at a time closer to the final position. In situations where retching is induced simply by looking at the denture, then the patient is merely requested to look at or hold the denture and to stop before symptoms of retching develop. The process is repeated,
with a small increase in time spent undertaking this task, until eventually the patient can wear the denture. The objective is to unlearn the conditioned response. It is a laborious task on the part of the patient and the progress made should be strongly encouraged by the dentist. Gag Reflex Reduction in a Patient with Maxillofacial Prosthesis:

Use of silicone rubber base impression material in impression taking and gave a very good results in preventing the problem mentioned earlier, this impression technique combined with the use of neutral zone principle,28,29 construction of a hollow obturator, gave the patient a comfortable obturator.

Discussion

Most patients who gag can be successfully treated if the cause can be determined. Generally, gagging has either a psychogenic or somatogenic origin.28 Wright30,31 studied personality questionnaire to examine the personalities of dental patient who retched while attempting to wear denture. There was no evidence to suggest that retching patients were more neurotics this control group. He also analyzed the medical history, several habits and experience of patients who gagged and found a higher incidence of gastric condition.

A clinical investigation was carried out on 74 dental patients who were suffering from a severe gagging reflex. The most common stimulating factor was the maxillary denture.32 Survey suggests that although strong psychogenic factors are clearly associated with the condition, somatogenic factors could not be discounted. Several patients could wear a fully extended base only during mealtimes or while chewing candy, and most successful bases had a reduced posterior palatal extension. It appears that the attitude of the clinician toward the patient and his or her problem is an important part of the treatment.

Conclusion

Most patients whose gagging is of a psychologic nature overcome their problem before denture procedures are completed and are comfortable with a well-constructed prosthesis. It appears that the attitude of the clinician toward the patient and his or her problem is an important part of the treatment. Constant reassurance to the patient and counseling him that he is not suffering from any physical disease and efforts to reduce the patient’s embarrassment caused by the reflex, undoubtedly reduces anxiety and tension. Many patients can be treated quite successfully by building confidence in themselves and their ability to overcome the problem. The hyperactive gag reflex produces lots of clinical difficulties for the patient as well as dentist. All the methods which are discussed should be used to manage patients. The rhythmic breathing is found to be most effective method of controlling the reflex.

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References

11. Conny DJ, Tedesco LA. The gagging problem in prosthodontic treatment. Part 2:

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