

Hyperactive Gag Reflex Associated With Maxillary Posterior Palatal Mucosa

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Abstract Body is protected from external and internal dangers through a wide variation of defense mechanisms, some of which are involuntary. Among one of the most common reflex of oral cavity is the gag or pharyngeal reflex that is initiated in response to stimulus in the posterior parts of the oral cavity either in the maxillary or mandibular arch. Posterior palatal region is usually less sensitive to such stimuli, but underlying local and systemic conditions may bring exaggerated gag reflex. We present two cases of gag reflex that were associated with underlying systemic conditions in which one was due to nutritional deficiency and the other due to stress. Both cases presented wide clinical changes in the palatal mucosa including hypersensitive mucosa. One patient being completely edentulous was successfully treated with complete denture prosthesis while other patient received a single implant supported crown. Management of gagging during impression making was achieved by local anesthetic application, and distraction of patient. Both patients expressed their satisfaction with management of gagging and respective clinical treatments.

Keywords: *pharyngeal fauces, pharynx, posterior palatal seal area, nausea, retching, gag reflex*

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1. Introduction

Human body has multiple protective mechanisms for defending that can be categorized either under voluntary or involuntary control. The cranial structures carry most sensitive organs which are therefore protected by a wide array of defense mechanisms, that are mainly based on reflexes [1]. Gagging (smother, nauseous, struggle for breath) is an involuntary reflex, which attempts to eject unwanted, irritating or toxic materials from the upper gastrointestinal tract [2]. The sequence of events during a gag reflex includes, puckering of the lips in an attempt to close the jaws, elevating and furrowing of the tongue, with rotation of from back to front with the hyoid bone at the center, elevation of the soft palate and the hyoid bone and finally fixation of the hyoid bone before closing nasopharynx that constricts anterior and posterior faucial pillars leading to rotation of tonsils in anterior medial direction [3,4]. Continuous stimulus causes elevation, contraction, retraction of the larynx and the closure of the glottis which results in uncoordinated respiratory muscle spasms and/or vomiting. Gagging may be either psychogenic which is due to fear, apprehension or anxiety of the unknown, or of the procedure or of choking and somatogenic which is due to the actual stimulation of the gag reflex [5]. Like many other oral conditions being

shaped by genetic constitution, the gag reflex is also predominantly influenced by the genetic constitution especially in terms of the ability to resist [6]. It may vary from mild retching to severe retching and vomiting in association with nausea which is mostly accompanied by any form of gagging [7]. An apprehensive person or patient is bound to gag more especially if the patient is supposed to wear a dental prosthesis [8]. The etiology of gagging may be identified according to their source like systemic, psychological, physiological or at times iatrogenic [3]. Systemic factors like a deviated nasal septum, nasal polyps, bony exostoses and tori, alcoholism, chronic gastritis, peptic ulcer, pharyngitis and medications have also been considered to cause gagging either directly or indirectly [9,10,11]. The physiological factors may be identified on the basis of their source as either extra oral or intra oral stimuli. The extra oral stimuli can be either visual, auditory or olfactory. The intra oral stimuli primarily deals with the tactile stimulation of hypersensitive areas, such as the soft palate back of throat, and the distal part of the tongue [4]. Abnormally active gag reflex has been attributed to be either due to active or a passive cause and psychological factors play a significant role in such gaggers [12]. Gagging is considered to be a serious management issue in the field of Prosthodontics [13], mainly while impression making of the maxillary or the mandibular arch [14]. Like for other local conditions like trismus or restricted mouth

opening, one needs to innovate or manage a patient gagging to accomplish the treatment procedures [15]. Patients may usually gag to gain attention, have fear of the procedure, avoid dental treatment like impression making, or have a fear of swallowing the material. In dentistry, gagging may be classified under iatrogenic factors and may be further subdivided into those due to procedure, due to prosthesis or those related to dentists [16,17].

This article in the form of case series presents three different conditions of the maxillary arch where the authors found abnormally sensitive gag reflex due to the underlying condition. The article discusses the reason for such sensitive gag reflexes.

Case Report 1: A completely edentulous female patient aged 71 years, had reported with chief complaint of inability to masticate due to absence of natural teeth. The patient was completely edentulous and had reported the loss of teeth due to natural causes like periodontitis and caries. The patient has been edentulous since 3 years and had no history of wearing a prosthesis in the past. Medical, social, drug and dental history did not reveal any significant findings that would impact or influence the current planned treatment. Extra oral examination showed normal clinical findings for temporomandibular joint, mandibular movement and other esthetic features related to lip, nose and eyes. Intra oral examination showed a well formed maxillary and mandibular residual alveolar ridge with the maxillary ridge showing localised inflammatory changes in the maxillary posterior region near the posterior palatal seal area (Figure 1). The inflammatory changes were clinically more evident in the center of the hard palate with presence of mild nodular growth towards the left side. The area was sensitive to touch and was associated with severe gagging when touched with finger or instrument. Other less severe diffuse inflammatory patches were also present but less sensitive to touch. The patient was referred to the department of oral diagnosis and radiology where after thorough investigations she was diagnosed with nutrient deficiency of which vitamin deficiency stood prominent. The treatment plans/ options that were presented to the patient for successful rehabilitation of edentulism included implant supported fixed or removable partial denture, conventional complete denture with balanced occlusion.



Figure 1. Posterior palatal mucosa showing inflammatory regions widely dispersed along the origin of the soft palate

The patient because of economic and long treatment time restraints did not opt for any of the implant prosthodontic options. A written informed consent was taken from the patient following which a conventional,

complete denture prosthesis was fabricated for her. For the patient the complete denture treatment was carried using routine clinical and laboratory procedures. During preliminary and definitive impression procedures, the patient's gag reflex was controlled by topical application of local anesthetic over the area since the gagging was associated with hypersensitive palatal mucosa. The patient felt a burning sensation initially but later was more comfortable since the gag reflex had subsided with application of anesthesia. Other secondary measures to control gag reflex during border molding and jaw relations were distraction techniques. The patient denture delivery was postponed till the patient had completed the course of multivitamin supplement intake (2 months daily once) and the soft tissue changes had completely resolved. The final impression was made after the changes in the oral mucosa were evident. All clinical procedures were undertaken following strict infection control and pandemic control guidelines for prosthodontic care [18,19]. The patient was educated and motivated regarding gag reflex and association of gagging with complete denture prosthesis. The patient was highly satisfied with the outcome of the entire treatment.

Case Report 2: An elderly male patient aged 56 years reported to the department of Prosthodontics for replacement of a maxillary right lateral incisor which was extracted due to trauma after a car accident. The patient had no history of medical comorbidity except that he had met with a motorcycle accident two months back and had undergone multiple medical and dental treatments in the aftermath of that accident. Social, drug and other dental related histories were insignificant for existing treatment options.



Figure 2. Posterior hard and soft palate junction showing irregular multiple pale areas on the oral mucosa

The extra oral examination revealed prominent malar bones with missing incisor taking the center stage of his face upon smiling. Intra oral examination revealed a poorly maintained natural permanent dentition with plaque and stains present in both maxillary and mandibular arches. The maxillary arch in the posterior region of its attachment with soft palate presented multiple small pale pink lesions that were sensitive to touch (Figure 2). These lesions were isolated but dispersed and multiple with size varying from few millimeters to a centimeter in one of the dimensions. The areas were not delineated with any clinical inflammatory or non inflammatory changes and were quite sensitive upon touch in the central region. The patient was referred to the department of oral diagnosis and radiology where the mucosal condition was attributed to stress related mucositis that would subside on its own and needed no intervention. The prosthodontic treatment

was planned to carry with the current condition since the prosthesis was planned in the anterior region and would not be supported by the soft tissue of that region. Treatment planned and options that were presented to the patient included a single implant supported anterior crown, a three unit fixed partial denture (all ceramic) or an interim/definitive cast partial denture. The patient opted for an implant supported single crown restoration which was successfully performed over a period of 6 months. During the clinical procedures, the sensitive palatal mucosa was desensitized by application of topical local anesthetic gel (ELA-Max, 4% tetracaine gel) during preliminary impression procedures. While the patient's condition remained till stage 1 surgery, there was no sign of the condition at stage 2 surgery of implant rehabilitation. The patient was highly satisfied with the management of sensitive palate during the course of clinical procedures.

2. Discussion

Two cases of hyperactive gag reflexes not modified by psychological factors have been presented as case reports in this article. These two conditions have not been reported in any literature till date and although being physiological in nature they are clinically relevant since management is simple and easily accomplished chairside without delaying patient treatment. In both cases the gag reflex was initiated using water spray in the region and/or stimulation of the area by either end of mouth mirror or a suction tip. Both cases the reflex was not related to prosthesis since in the first case the patient was not wearing any prosthesis and in the second case the prosthesis was an anterior fixed partial denture. This rules out the iatrogenic causes of gag reflex. Both of the cases different levels of sensitivity of the palatal mucosa which has been reported to vary depending upon local and systemic factors [20,21]. The vault of the palate plays a significant role in the retention and stability of tissue supported complete or partial dentures [22], and varies from one patient to another and has been associated with age, gender and racial variations [23]. Oral tactile sensitivity or oral stereognosis (ability to determine shape and texture) [24], allows one to manipulate food or to isolate and remove undesired food particles which may cause the person a fear of either gagging or choking. The oral stereognosis also allows one to perceive his own oral cavity and is also responsible for many behaviours of tongue when food particle gets stuck between the teeth or when the surface of the tooth is altered [25]. The same process plays a significant role in the production of gag reflex that are related to poor execution of intra oral procedures or rough/careless handling of tissues while working on a patient. The same perception is also responsible for producing gagging on wearing a complete or removable partial denture prosthesis which has a step at the posterior palatal seal area or has rough polished surface. This also forms the basis of why the correct thickness of the denture and its flanges, accurate and appropriate extensions, adequate posterior palatal seal are important to prevent developing such reflexes once worn by the patients. Patients with highly sensitive gag reflex

may take more time to adapt to new dentures or in some extreme cases they may also refuse to wear the dentures for a long period of time [26,27]. Behavioral therapy has been shown to be successful in such patients [28] using the principles of reciprocal inhibition and operant conditioning either in isolation or combination with classical conditioning. This can be also achieved in selective patients by desensitization like placing marbles in the mouth over a period of time, which reduce the tendency to gag [29]. Implementation of a proper patient health education is mandatory in such patients so that two objectives are achieved which include removal of fear and enhancing denture adaptation [30]. Patient must be thoroughly educated since that is the only way of removing fear and apprehensions that are associated once gagging sets in a particular patient [31].

Vitamins of different classes are associated with maintaining the health of body mucosa including oral mucosa [32]. The deficiency of specific vitamins produces physical changes in the oral mucosa while altering its functional capability. Most vitamins are body regulators who function together or in unison to maintain the health by mainly aiding digestive efficacy which enhances utilization of minerals and oxidation of carbohydrates. Their contribution in nerve function in terms of stability and resistance to bacterial infection is also well known [33]. Both cases presented in the article, one associated with vitamin deficiency and the other related to stress are factors that have long been attributed to contribute to immunity in both lower and higher animals [34].

3. Conclusion

While encountering a patient with a hyperactive gag reflex, one must always examine and palpate the surface of the soft palate and observe for any changes in the oral mucosa. Underlying systemic conditions like vitamin deficiency and stress can alter mucosal tolerance, which in turn will be clinically experienced as an abnormally high gag reflex. Delaying the treatment till underlying condition is resolved may be the best option while selective cases where delay is not the option, topical application of a gel allows clinicians to perform his cl

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