

Palatogram revisited

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Abstract

It is the responsibility of the dentist to fabricate a denture that is fully functional and perfectly esthetic. One prime oral function that has always been overlooked in this regard is speech. It has been thought that speech will follow mere replacement of teeth and that it is the patient's duty to fine tune this function with practice. Phonetics, esthetics, function and comfort form the foundation of a successful prosthodontic treatment. Accurate approximation of palatal contours of a maxillary complete denture to a patient's tongue can improve speech intelligibility, if other factors such as tooth position, occlusal plane and occlusal vertical dimension are satisfactory. Customizing palatal contours of a maxillary complete denture can be accomplished by using tissue-conditioning material, which provides sufficient working time for a patient to pronounce a series of sibilant sounds while recording dynamic impression of the tongue. This article describes a technique of obtaining palatogram and customizing palatal contours of a maxillary complete denture with autopolymerizing acrylic resin to improve the intelligibility of speech.

Keywords: Complete denture, palate, palatogram, phonetics, sounds, speech

Introduction

"Speech is the use of systematized vocalization to express verbal symbols or words." (Sheridan: 1964). Speech is a very sophisticated autonomous and unconscious activity. Speech in matured man is a learned habitual neuromuscular pattern which makes use of anatomical structures designed primarily for respiration and deglutition. Because oro-dental morphological features also may influence an individual speech, the dentist should therefore recognize the possible role of prosthetic treatment on speech activity.^[1,2]

Aim

This article describes a technique of obtaining palatogram and customizing palatal contours of a maxillary complete denture with autopolymerizing acrylic resin to improve the intelligibility of speech.

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What is Palatogram?

A palatogram is a graphic representation of the area of the palate contacted by tongue during a specified activity, usually speech-GPT 8.

J. Oakley Coles, in 1871, was the first to use palatograms.^[3]

Indications of palatogram

- Used with implant - supported maxillary dentures. Deviation from ideal palatal contours is often encountered with maxillary implant-supported dentures. This can be caused by implant anplation problems, diminished restor-ative space and bulky attachment mechanisms
- The evaluation of maxillary denture placement in the sensory - or muscularly impaired patient. An analysis of the space of donder in patients suffering from a loss of motor function can be simplified by the use of a palatogram
- Evaluation of speech patterns and food bolus management in the orally disabled or geriatric patient may include palatal contour assessment.

A Technique of Obtaining Palatogram to Shape the Palatal Surface of Denture

In this technique the only additional equipment necessary for palatogram is non-scented talc, in inexpensive soft bristle brush for dusting the talc on the palate and a glass marking pencil to outline the contact area.^[1] Palatograms can be easily and quickly made on the trial or processed denture if the following steps are recalled.

Various other recording medium can be used are:

- Gothic arch tracing ink
- Pressure indicating media

- Powders-gypsum products, talc, alginate
- Occlude aerosol
- Impression waxes.

Step 1: Verification of recorded dimensions

- Verify the correct vertical dimension in your patient
- Verify the arrangement of teeth
- Verify the occlusal plane of a trial or processed denture.

Step 2: Application of recording medium

- Dry the palatal surface of maxillary denture thoroughly before dusting non-scented talc (do not use regular or surgical talc) and shake off the excess powder.

Step 3: Insertion of coated maxillary denture

- Train the patient to pronounce the sound and open the mouth without again contacting the palate
- Avoid touching dusted palate with the fingers during insertion, but ensure that the denture is well seated before the sound is pronounced.

Step 4: Pronunciation of palatolingual consonant sounds and recording the palatogram

- Instruct the patient to articulate various palatolingual consonants sounds for example s, sh, ch, n, k etc
- Use vowel "O" with the consonant to be studied, even though the combination is not a word; i.e. to study k, use ko; to study ch; use cho. This is according to Allen's protocol where o is the only vowel tongue does not make any contact with palate. This is combined with other consonants to avoid multiple recordings of tongue to palate^[2]
- The patient should be asked to repeat the desired sound only two consecutive times. Then the denture should be carefully removed
- Be sure the patient makes definite palatal contact in pronouncing the sound, but avoids palatal contact after opening the mouth
- Avoid contacting the palate with the fingers when removing the denture.

Step 5: Evaluation of recordings

- Outline the contact area with a wax carver where wax is present, (in wax trial denture) and with a glass-marking pencil (in processed denture)
- Note: Each individual will produce a similar palatogram for a given sound; however there will be certain unique characteristics for that particular person because variations in shape and size of tongue and palatal vault arch form.

Case Report of an UnderContoured Palate of a Maxillary Complete Denture

A 45-year-old man patient reported to our hospital (Saveetha Dental College and Hospital, Saveetha University, Chennai,

India) with a chief complaint that he could not speak fluently. The patient had no relevant medical history. On intraoral examination maxillary denture revealed undercontoured palate. The following steps were followed for recording a palatogram as mentioned above.

Palatogram recordings using English as well as Tamil consonants:^[4-7]

- "S" sound palatogram using word "SO" [Figure 1]
- "Sh" sound palatogram using word "SHOW"/Nashtam [Figure 2]
- "Ch" sound palatogram using word "CHOKE"/Pachai [Figure 3]
- "N" sound palatogram using word "NO"/Mannan [Figure 4]
- "G and K" sound palatogram using word "GIVE KING"/Jeevan/kaakka [Figure 5].

After recording the palatogram using the above mentioned various palatolingual consonants, the form of palatal surface was contoured using acrylic burs in order to create the desired shape of contact areas.

Case Report of an OverContoured Palate of a Maxillary Complete Denture

A 53-year-old man patient reported to our hospital (Saveetha Dental College and Hospital, Saveetha University, Chennai, India) with a chief complaint that he could not speak fluently. The patient had no relevant medical history. On intraoral examination maxillary denture revealed overcontoured palate. The following steps were followed for proper contouring of an overcontoured palate.

Stepwise solution of an overcontoured maxillary denture:^[8]

- Draw an outline of the surface that requires correction with a pencil
- Prepare a thick mixture of tissue-conditioning material (coe-comfort; gc America, inc, alsip, ill) by adding 25% more of the powder than recommended by the manufacturer and spread an adequate amount of the mixture only on the outlined surface
- Insert the maxillary denture with the tissue conditioner in place and have the patient completely read each of the 10 stimulus sentences [Tables 1,2 and 3], without repeating the same sentence twice and continue doing so for about 5 min at a rate faster than a normal speaking rate
- Evaluate the patient's speech for clarity
- Remove the denture from the mouth, once initial polymerization occurs. If the prosthesis is a waxed trial denture, stop at this step for processing
- Fill the intaglio surface of the denture and the base of a denture processing flask with a mixture of laboratory plaster and pumice to make it easier to retrieve the denture
- Lightly lubricate the set mixture of laboratory plaster and pumice with petrolatum, put the upper half of the flask in place, leaving the area of tissue conditioner uncovered



Figure 1: "S" sound palatogram using word "So"

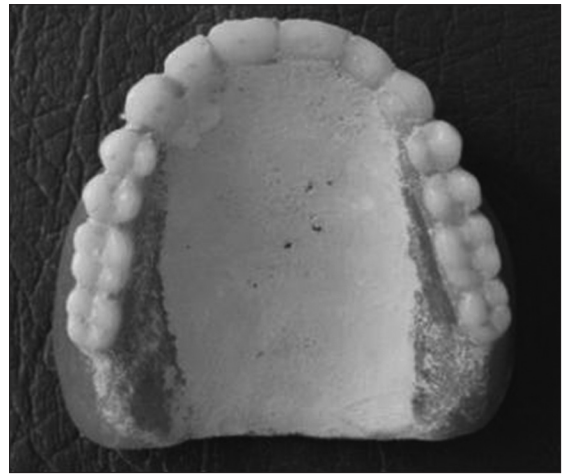


Figure 2: "Sh" sound palatogram using "Show"/Nashtam



Figure 3: "N" sound palatogram using No/Mannan



Figure 4: "Ch" sound palatogram using Choke/Pachai

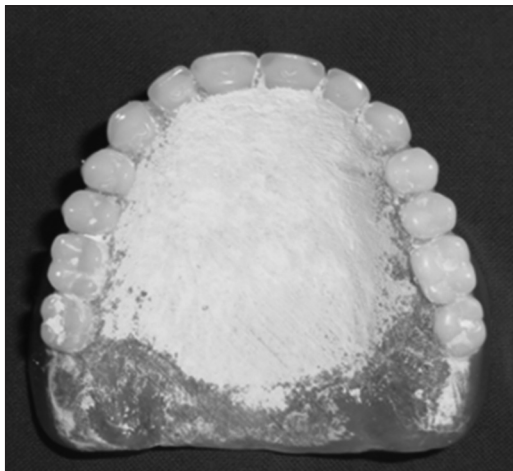


Figure 5: "G and K" sound palatogram using Give King/Jeevan/kaakka

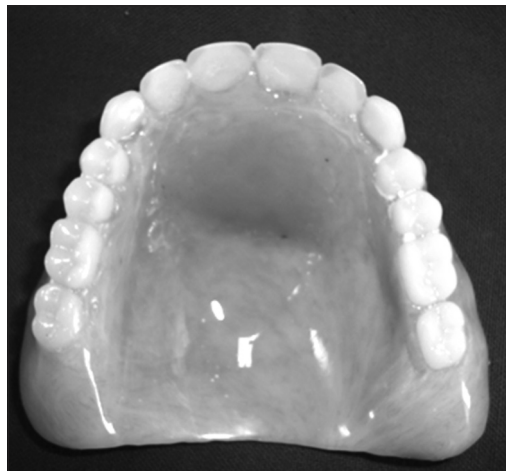


Figure 6: Palatally countoured finished and polished denture

- Fill the upper half of the flask with the appropriate amount of plaster and completely close the lid
- After the plaster has set, open the lid. Remove the tissue conditioner from the denture

- Mix autopolymerizing repair resin according to the manufacturer's instructions and place the appropriate amount of the mixture on the denture to replace the tissue conditioner. Use autopolymerizing acrylic resin because it is relatively easy to work with, inexpensive,

Table 1: Specific speech sounds

Speech sounds	Words	Words framed to form a sentence
S and sh	Six, sixty, ships, sailed, mississippi, sure, sign, sun, shine	Sixty-six ships sailed the mississippi. Sure sign of sunshine
T, d, n and l	Locator, located, tornado, near, Toledo	The locator located the tornado near toledo
Ch and j	Joe, joyce, joined, george, charles, church	Joe and joyce joined george and charles at the church
K	Committee, convened, political, convention, Connecticut	The committee convened at the political convention in connecticut
F and v	Vivacious, vivian, lived, five, fifty-five, fifth, avenue	Vivacious vivian lived at five fifty-five fifth avenue

Table 2: Manner of production - Hindi consonants

Place	Manner of production			
	Plosives	Fricatives	Affricative	Nasal
Bilabial	प ब भ			म
Labiodental		फ व		
Lingual dental	त थ द ध			न
Lingual alveolar	ट ठ ड ढ	स ल		ण
Palatal		श ष र	च छ ज झ क्ष	
Velar	क ख ग घ	य		

Table 3: Manner of production-English consonants

Place	Manner of production				
	Plosive	Fricative	Affricative	Semi vowel	Nasal
Bilabial	P (pole) b (bowl)			W (watt)	M (sum)
Labial dental		F (fat) v (vat)			
Lingual dental		T (thigh) h (thy)			
Lingual alveolar	T (toll) d (dole)	S (seal) z (zeal)		L (lot)	N (sun)
Palatal		Z (azure)	Ch (choke) j (joke)		
Velar	K (koal) g (goat)				Ng (sing)

less time consuming and dimensionally stable. Note that both the adhesive strength and color stability of an autopolymerizing acrylic resin are adequate for use in a low stress and non-visible area such as the palate of a maxillary complete denture

- Coat the plaster with a separating medium and completely close the plaster and the lid. Place the assembled flask in the pneumatic or a hand bench press and slowly squeeze out the excess resin
- Once the repair resin has polymerized, retrieve the denture from the flask
- Carefully finish with laboratory carbide burs and polish the corrected palatal contour with a wet buffing wheel and pumice [Figure 6]
- Evaluate the intelligibility of /s/ and /sh/ sounds with the denture.

Conclusion

Speech difficulties as sequelae of oral rehabilitation with complete dentures are generally a transient problem. When encountered the difficulties may not be easily solved. Therefore efforts should be made to avoid them by pretreatment records or assessment of speech and provision of information to patients about likely initial deviation from normal speech, immediately following oral rehabilitation. Hence a prosthodontist play a pivotal role in understanding the basic mechanisms involved in the various speech pathology and provide prudent treatment for the same to enhance an individual's personality. More research needs to be carried out in this field to make our rehabilitative treatment complete, with ideal esthetics and optimum function

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