Case Report

DOI: 10.7860/JCDR/2017/23614.9222

Shade Guide for the Fabrication of Acrylic Denture Based on Mucosal Colour

Dentistry Section

GODWIN CLOVIS DA COSTA[1], MEENA AJAY ARAS[2], PAUL CHALAKKAL[3]

ABSTRACT

This article highlights the use of a simple and convenient shade guide system which not only helps in choosing the shade tab that matches with the colour of the mucosa, but, also helps in the fabrication of the precise shade of acrylic resin for making the denture. The shade guide is fabricated by mixing specified quantities of various colours of acrylic polymer in order to obtain various shade tabs. The method for fabrication of the shade guide and the clinical procedure has been discussed.

Keywords: Colour, Denture colour, Denture shade, Shade tab, Oral mucosa

CASE REPORT

A 71-year-old male patient came to the Department of Prosthodontics, Crown and Bridge with edentulous upper and lower arches. Since the patient wanted a removable prosthetic replacement, it was decided to fabricate upper and lower complete dentures for the edentulous ridges. The conventional steps for the fabrication of complete dentures that included primary impression making, fabrication of upper and lower casts, fabrication of special trays, secondary impression making, fabrication of working models, fabrication of occlusal rims, jaw relation, teeth adaptation and dewaxing were undertaken. Selection of the shade of acrylic prior to acrylization was done using a shade guide that was fabricated and used according to the method mentioned below.

Shade Guide Fabrication and Usage

Fourteen rectangular wax patterns [Table/Fig-1] measuring 6x3x3 cm, were invested and dewaxed to create space for the fabrication of each shade tab that constituted the shade guide.

The three different shades (pink, veined and clear) of heat cured acrylic resin (DPI India) were mixed in specific quantities in order to obtain 10 different shades, each represented by a three digit shade code [Table/Fig-2].

Each acrylic resin mixture was packed into the space (obtained after dewaxing) and acrylized using the long curing cycle, finished and polished, in order to obtain a shade tab. All the 10 shade tabs that were fabricated, were held together using a screw and nut to form the shade guide [Table/Fig-3].

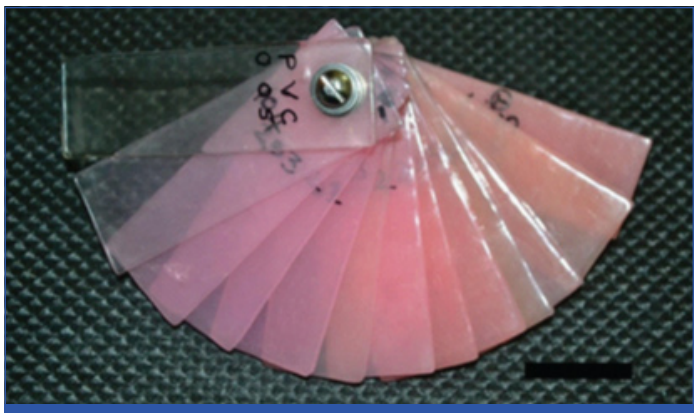
Under controlled standard full spectrum illumination, the shade guide was matched with the inner mucosa of the lip to identify the tab that closely matched with the colour of the mucosa [Table/Fig-4].

Based on the three digit shade code that corresponded with the selected tab, the denture was fabricated. After denture fabrication,

Pink (P)	Veined (V)	Clear (C)	Shade Code (PVC)
0	0	5	005
1	0	4	104
2	0	3	203
4	0	1	401
1	1	3	113
2	1	2	212
1	2	2	122
0	2	3	023
0	3	2	032
0	4	1	041

[Table/Fig-2]: Acrylic colour combinations of the shade codes.
*Each digit represents the number of scoops of acrylic polymer

[Table/Fig-1]: Rectangular wax pattern measuring 6x3x3 cm.



[Table/Fig-3]: Shade guide with shade tabs of various shades.

[Table/Fig-4]: Shade guide being matched with the inner mucosa of lip.
[Table/Fig-5]: Shade tab being matched with the denture.

its colour was matched with the selected shade tab to confirm the shade match [Table/Fig-5].

DISCUSSION

The natural changes in colour from the attached to the unattached gingiva are due to two factors: keratinization and vascularization. The degree of keratinization differs from one individual to another, and is dependent on mechanical loading and the rate of elimination of dead cell layers, while, the degree of vascularization is dependent on local mechanical loading and host response [1]. Many of the periodontal as well as gingival infections leading to hyperemia may also result in change of colour of the mucosa [2]. Oral melanin pigmentation which is considered to be of multifactorial aetiology is also one of the reason for change in colour of mucosa [3]. Melanin which is a brown pigment produced by melanocytes (dendritic cells of neuro-ectodermal origin) present in the basal and spinous layers of the epithelium, is considered to be the most common natural pigment leading to the endogenous pigmentation of gingiva [4]. Variations in oral mucosal colour, pose a difficulty while matching the shade of acrylic resin for the fabrication of denture bases. Although, various mucosal shade guides are available commercially, none of these correspond to any shade of heat cure acrylic resin. In order to simplify this problem, a new shade guide has been developed. It helps us to match the mucosal colour with the shade guide, and also helps us to fabricate the corresponding acrylic resin shade by mixing various acrylic polymer shades in specified proportions. The emphasis on dental aesthetics in recent years has encouraged the development of more accurate intraoral shade matching procedures. A single shade of pink for denture base resin cannot be a solution to match with a wide variety of shades of gingiva and other soft tissues [5]. Under controlled standard full spectrum illumination, colour matching must be done with the inner surface of the lip if a complete denture is to be fabricated [6,7]. While colour matching, the patient must be seated in an upright position and any lipstick must be removed. A neutral coloured drape must be placed on the patient in order to cover the colour of the clothing [8].

Munsell colour tabs had been used to assess the colour of attached gingiva, papillae and alveolar mucosa [9,10]. It is the oldest mucosal colour assessment system [5]. Newer shade guides are commercially available for matching with oral soft tissues, such as Lucitone 199 shade guide system (Dentsply, Trubyte, York, Pennsylvania), Ivocap Plus gingiva indicator set (Ivoclar Vivadent, Schaan, Liechtenstein) and the IPS Gingiva shade guide system (Ivoclar, Vivadent) [5]. These shade guide systems are available for colour matching with the gingiva, thus, are ineffective for the fabrication of complete dentures, in which case, colour matching needs to be carried out with the inner mucosa of the lip [7]. Denture base acrylic polymer is usually available in four different colours: clear, light pink, dark pink, veined. The shade guides available commercially, do not correspond directly to any of the above mentioned acrylic shades. In fact, dental labs need to mix and match the various colours of acrylic polymer to obtain a shade that matches with the selected shade tab provided by the dentist. This method is technique sensitive and the resultant shade of acrylic resin need not be a precise match. The shade guide that has been developed by us provides an easy and convenient method to ascertain the colour of the mucosa, and to obtain the appropriate shade by mixing specified parts of acrylic polymer of different shades [Table/Fig-2]. This method allows the clinician and the patient to choose the denture shade before its fabrication. Food colourants cause little staining if the denture has been fabricated using heat cure acrylic resins, since, they have greater colour stability as compared to self-cure acrylic resins [11].

CONCLUSION

Moreover, cleaning the denture after consumption of food will ensure the absence of any staining. A limitation in this study is that the shade guide was fabricated only from the DPI (India) brand. However, similar shade guide systems may also be fabricated using other brands of denture resins. Further studies on the fabrication of shade guides are recommended that incorporate the addition of intrinsic/extrinsic pigments, so that a larger spectrum of shades may be obtained for superior precision in shade matching.

REFERENCES

[1] Kleinheinz J, Büchter A, Fillies T, Joos U. Vascular basis of mucosal color. Head Face Med. 2005;1(4):1-7.
[2] Bergstrom J. Vascular reaction in plaque-induced gingivitis: A quantitative approach. J Periodontal Res. 1992;27:604-08.
[3] Deepak P, Sunil S, Mishra R, Sheshadri. Treatment of gingival pigmentation: A case series. Indian J Dent Res. 2005;16:171-76.
[4] Cicek Y, Ertas U. The normal and pathological pigmentation of oral mucous membrane: A review. J Contemp Dent Pract. 2003;4:76-86.
[5] Paravina RD, Powers, JM. Esthetic color training in dentistry. St. Louis: Elsevier; 2004. pp. 150-51.
[6] Bergen SF, McCasland J. Dental operatory lighting and tooth color discrimination. J Am Dent Assoc. 1977;94:130-34.
[7] Esposito SJ. Aesthetics for denture patients. J Prosthet Dent.1980;44:608-15.
[8] Sorensen JA, Torres TJ. Improved color matching of metal ceramic restorations. Part II: Procedures for visual communication. J Prosthet Dent. 1987;58:669-77.
[9] Powers JM, Capp JA, Koran A. Color of gingival tissues of blacks and whites. J Dent Res. 1977;56:112-16.
[10] Heydecke G, Schnitzer S, Turp JC. The color of human gingiva and mucosa: Visual measurement and description of distribution. Clin Oral Investig. 2005;9:257–65.
[11] Bohra PK, Ganesh PR, Reddy MM, Ebenezar AV, Sivakumar G. Colour stability of heat and cold cure acrylic resins. J Clin Diagn Res. 2015;9:ZC12-15.

PARTICULARS OF CONTRIBUTORS:
1. Lecturer, Department of Prosthodontics, Crown and Bridge, Goa Dental College and Hospital, Bambolim, Goa, India.
2. Professor and Head, Department of Prosthodontics, Crown and Bridge, Goa Dental College and Hospital, Bambolim, Goa, India.
3. Assistant Professor, Department of Pedodontics and Preventive Dentistry, Goa Dental College and Hospital, Bambolim, Goa, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Paul Chalakkal,
Assistant Professor, Department of Paedodontics and Preventive Dentistry, Goa Dental College and Hospital,
Bambolim-403202, Goa, India.
E-mail: atomheartpaul@yahoo.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Aug 18, 2016**
Date of Peer Review: **Sep 26, 2016**
Date of Acceptance: **Oct 10, 2016**
Date of Publishing: **Feb 01, 2017**