

Smile Design: A Literature Review

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Received 10January, 2016; Accepted 09February, 2016 © The author(s) 2015. Published with open access at www.questjournals.org

ABSTRACT:- *Esthetic dental treatment involves artistic and subjective components design to create the illusion of beauty. Smile is a person's greatest beauty asset. A defective smile right be considered as a physical handicap as the mouth act as a focal point where a large share of attention is directed toward mouth and teeth. Our ultimate goal is to achieve pleasing composition in the smile by creating an arrangement of various esthetic elements. Smile design is different from tooth design, with tooth design one is concerned with contour, position and color of individual teeth ,while integration of these teeth into the face and facial features is paramount in smile design*

Keywords:- *Smile design, smile proportion, elements of smile designing, denture esthetics,dynasthetics*

I. INTRODUCTION

Smile, a person's ability to express a range of emotions with the structure and movement of the teeth and lips, can often determine how well a person can function in society¹. Smile is one of the facial expressions that are essential in expressing friendliness, agreement and appreciation. This demand for a pleasant smile drives us to a field of dental esthetics and thus the role of a prosthodontist become significant. The goal for esthetic treatment should be an enhanced but natural appearance that imparts a vibrant and believable appearance to the patient. A smile design should always include the evaluation and analysis of both facial and dental composition¹.

II.PRINCIPLES OF VISUAL PERCEPTION AND SMILE DESIGN

There are various factors that govern the principles of visual perception. Following are some of them which has to be considered in the process of denture construction.

Composition:

The study of the relationship existing between objects made visible by contrasts in line, colour and texture is called composition

Symmetry is the prime requisite for composition² which means oneness. The objective of prosthodontist is to provide a dynamic unity and not a static one. The teeth can be arranged with variations within the framework of the dental composition, e.g. Hogarth's line of beauty (Fig.1). It is a line inscribed around a cone. The line is never the same along its course but neither has it left away from the surface.

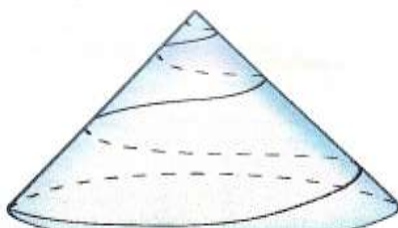


Fig. 1: Hogarth's line of beauty

Dominance is the factor required to provide symmetry, i.e. one tooth must dominate in the anterior tooth arrangement, by virtue of its size central incisors being the right choice. The central incisor must be larger than the lateral incisor to dominate the composition⁵. The canine is not used because only its mesial aspect is seen.

Proportion is a valuable tool to provide symmetry with variety, i.e. if two teeth are of the same width but different lengths, the longer teeth will appear to be narrower (Fig. 2). This can be made use to achieve dynamic unity smile. These proportions are usually based on perceived sizes viewed from the frontal. Though various proportions were proposed like the Golden proportion³, recurring aesthetic dental (RED) proportion⁴ and Chu's aesthetic gauges⁵, most authors recommend creating harmony and balance, by eye through proper adjustment and evaluation of provisional rather than by using any rigid formula

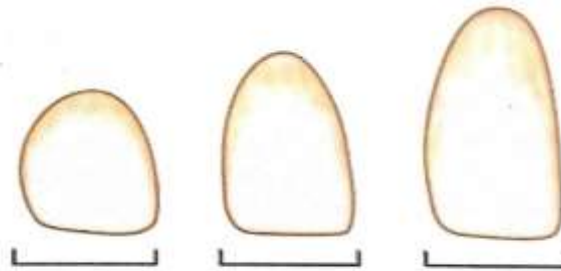


Fig. 2: Proportion

II. BALANCE

Balance is one important factor to be considered in denture aesthetics. It denotes the stability resulting from equilibration of opposing forces. In other words, it is called as equilibrium. If a structural map of lip is drawn, then the most stable point is at the intersection of the structural axes. When a question arises about the placement of the midline, either in the middle of the head or the middle of the mouth, the answer according to balance should be at the point where it remains stable, which is mostly the imaginary midline that divides the philtrum of the upper lip. However, the midline cannot be measured, but a long contemplative look will reveal the position of the midline as eye is a competent evaluation. (Fig 4)

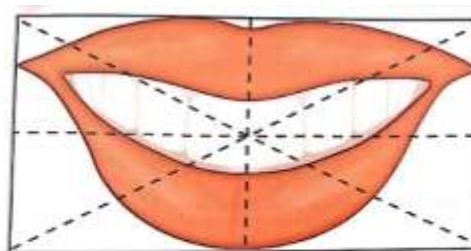


Fig. 4: Proposed structural map of looth

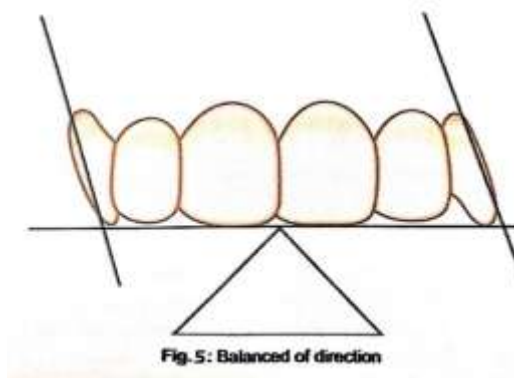


Fig. 5: Balanced of direction

Balance is not only essential in establishing midline, but is also required in establishing the direction of teeth on either side of the midline. The lack of balance in direction is mostly due to cross bite ridge relation in which the canine is not placed lingually in relation to the lower canine. (Fig5).

III.VITAL ELEMENTS OF SMILE DESIGNING

1. Tooth components

- a. Dental midline
- b. Incisal length
- c. Tooth dimensions
- d. Axial inclination
- e. Incisal embrasures
- f. Interdental contact area and Interdental contact points
- h. Sex, personality and age

2. Soft tissue components

- a. Gingival health
- b. Gingival level
- c. Smile line
- d. Interdental embrasure

1) Tooth components

a)Dental Midline:

Midline refers to the vertical contact interface between the two maxillary central incisors . As long as the midline is parallel with the long axis of the face, midline discrepancies of up to 4 mm will generally not be perceived as unesthetic.A midline diastema divides dental composition into two separate entities and disturbs the cohesiveness of the dentition .Various anatomical landmarks are used to establish the midline. They are midline of the nose, forehead, chin, philtrum and interpupillary plane. Among these anatomical guide posts, the philtrum of the lip is the most accurate.(Fig.6) Slight corrections of midline can be corrected by restorative dentistry. The ideal treatment is orthodontics⁶.

b)Incisal Length:

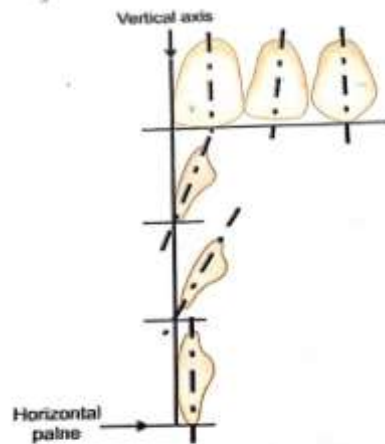
Published reports have shown that the average 30year old woman displays about 3.5 mm of maxillary incisor tooth structure when the lips are at rest. The prosthodontic literature has generally recommended setting denture teeth so that 2 mm of tooth structure is displayed at rest⁷. If patient displays less than 4 mm of the maxillary centrals at rest, the teeth need to be lengthened and this length will be achieved by adding to the incisal edge.

c) Tooth Dimensions:

If the incisal display at rest is 3 mm to 4 mm, and it is determined that the teeth are too short, then surgical crown lengthening procedures should be considered ⁶.If there is insufficient tooth display at rest, normal lip mobility, the teeth are the correct length, and there is inadequate tooth display during smiling, then this is diagnostic of vertical maxillary insufficiency. This is not a case that should be treated with esthetic tooth lengthening. This is an orthognathic problem and should be referred for proper treatment ⁸.

d) Axial inclinations:

Tooth inclinations compares the vertical alignment of maxillary teeth, visible in the smile line, to central vertical line. The evaluation of axial inclination can be done on a photograph of the anterior teeth in a frontal view. A line is sketched on each tooth from the midline of the incisal edge through the midline of the tooth at its gingival interface ⁹.(Fig.7).



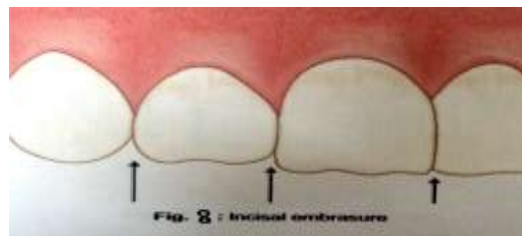
: Relationship of upper front teeth to horizontal plane and vertical axis

f) Incisal embrasures:

From central to canine, an open space is formed between the proximal surfaces of incisal edges from the contact points. These embrasure spaces terminate at the contact points with the adjacent teeth. Failure to provide adequate depth and variation to the incisal embrasure will make the teeth appear too uniform and contact areas too long which gives box like appearance of the dentition⁹.

g) Interdental contact area and Interproximal contact points

It is defined as the broad zone in which two adjacent teeth touch. It follows the 50:40:30 rules⁸ inferences to the maxillary central incisor, i.e. as we move from canine to the central incisors, there is a gradual increase in the interdental contact area.(Fig.8)



h) Sex, age and personality:

- For Female, the maxillary incisors should be round, smooth, soft, delicate and for male, should be cuboidal, hard and vigorous.
- Youthful teeth: unworn incisal edge, defined incisal embrasure, low chroma and high value
Aged teeth: shorter; so less smile display, minimal incisal embrasure, high chroma and low value.
- Personality: Aggressive, hostile angry: pointed long “fangy” cusp form, passive, soft: blunt, rounded, short cusp form¹.

2 .Soft tissue components

a) Gingival health, level and harmony:

The gingival frame the teeth and add to the symmetry of the smile. The health, colour and texture of the gingival tissues are paramount for long term success and the esthetic value of the treatment. Healthy gingiva is usually pale pink in colour, stippled, firm and should exhibit a matte surface. A normal healthy gingival sulcus should not exceed 3 mm in depth.

b) Smile Line:

Its an imaginary line drawn along the incisal edges of the maxillary anterior teeth. In an esthetic smile, the edges of the maxillary anterior teeth follow a convex or gull-wing course matching the curvature of the lower lip⁶. In a reverse smile line, the centrals appear shorter than the cuspids along the incisal plane. Lip line should not be confused with the smile line.

c) Interdental embrasures:

The darkness of the oral cavity shouldn't be visible in the interproximal triangle between the gingival and the contact area. The black triangles will be avoided if the most apical point of the restoration is 5 mm or less from the crest of the bone. Which encourage the formation of healthy pointed papilla instead of the blunted tissue form that often accomplishes a black triangle¹⁰

III. SMILE DESIGN IN PROSTHODONTICS

1. Smile Design for Full Mouth Rehabilitation

Full mouth rehabilitations deal with the science of treating a multilated dental situation which involves treatment of many or all teeth and helps them function in harmony with the surrounding muscles and temporomandibular joint. Full mouth rehabilitation is needed when the teeth are worn down , broken , missing or if you experience pain in the jaw joint , headaches , muscles tenderness or clicking of the jaw.

2. Smile Design For Complete Denture Patients:

Proper harmony and balance between a person's smile and facial design incorporates tooth sizes , shape , and position as well as the visual impact that their inter-relationship has on the patient's appearance. Mondial denture teeth is a type of teeth can be used for the replacement for implant –supported dentures, because they demonstrate life-like opalescence , high abrasion resistance , biocompatibility , color stability ,plaque resistance and strength .

IV. DISCUSSION

Esthetics has become increasingly important in the practice of modern dentistry. The demand for esthetic motivates the patient to seek dental treatment which is often dictated by cultural, ethnic and individual preferences. The factors which govern the restoration of natural appearance for edentulous patients often discussed but frequently misunderstood. This dental art does not always occur automatically or are present in the nature, but is carefully incorporated into the treatment plan which creates an attractive smile which enchances the acceptance of an individual in our society.

V. CONCLUSION

From the above discussion, it is vivid that the smile we create should be esthetically appealing and functionally sound too. We the dentist should carefully diagnose, analyse and deliver the best to our patients by considering all the above factors. In today's world, the smile is consider an important component of an individual's overall appearance and well being. Scientific analysis of beautiful smiles has shown that the principle of Golden Proportion or RED proportions and Chu's esthetic gauges can be systematically applied to evaluate and to improve denture esthetics in predictable ways. The aim of smile design must be less tooth structure reduction and greater esthetics and durability.

REFERENCES

- [1]. G. Rajtilak ,S.Deepa ,V Rajasekhar. Anterior teeth and smile design:A prospective view. *IJOPRD* 2012;2(3):117-127
- [2]. Lombardi RE. The principles of visual perception and their clinical application to denture. *Esthetics.J Prosthet Dent.* 1973;29(4):358-82
- [3]. MinooMashid et al. Evaluation of Golden Proportion in individuals with an esthetic smile. *J Esthet Restor Dent.* 16:185-193, 2004
- [4]. Ward DH. Proportional smile design using the recurring esthetic dental (RED) proportion. *Dent Clin North Am.* 2001;45:143-154
- [5]. Stephen J. Chu, DMD, MSD , CDT. A biometric approach to esthetic crown lengthening. *Pract Proced Aesthet Dent* 2007; 19(10): A-X)
- [6]. Edward A. McLaren, DDS, MDC : and Phong Tran Cao, DDS Smile Analysis and Esthetic Design: "In the Zone" Inside Dentistry July/August 2009
- [7]. Vig RG, Brundo Gc. The Kinetics of anterior tooth display. *J Prosthet Dent.* 1978;39; 502-504.
- [8]. Robbins JW. Differential diagnosis and treatment of excessive gingival display. *Pract Periodontics Aesthet Dent.* 1999;2:265-272.
- [9]. Mohan Bhuvaneshwaran. Principles of smile design. *J Conserv Dent .* 2010 Oct – Dec; 13(4): 225-232.
- [10]. Tarnow DP, Manager AW, Fletcher P. The effect of the distance from the contact point to the crest of the bone on the presence or absence of the interproximal papilla. *J Periodontal .* 1992; 63:995-6.