



An Exploration on the Method of Quantitative Photographing Posed Smile

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Abstract

Measure the characteristic smile index by the way of taking posed smile photographs has become one of the main method in the studies of smile esthetics. Posed smile is not only related to the action of the smile muscles, but also affected by photography method. It is important to standardize the method of taking digital posed smile photographs. So, we proposed a quantitative shooting procedure for posed smile in this paper.

Introduction

In recent years, inspired by pretty faces and beautiful smiles, more and more patients have sought Orthodontic and prosthetic treatment for improving their smile esthetics [1]. But, esthetics is a subjective notion and many articles on this theme were based on author's opinions rather than scientific evidence, this fact is a drawback for clinicians who seek a treatment protocol that involves changes in smile esthetics [2]. With the continuous progress of oral aesthetic restoration, some researchers have been devoting themselves to the study of digital imaging technology in order to search for more scientific and consistent references [3]. At present, the analysis of posted smile photos has become one of the main auxiliary diagnostic methods for aesthetic restoration of oral smile. However, in practical application, clinicians have found that even if the shooting conditions are strictly controlled, it is difficult to ensure good repeatability of smile photos of the same patient before, during and after operation. According to Christian Coachman [4], it is difficult to guarantee that the moment captured is the realistic rest position. In addition, one study has shown that it was almost impossible to repeat the posed smile exactly during one photography session, much less over a longer period of time [5]. To some extent, this affects the communication between doctors and patients, technician and doctors. Then, how to guarantee that the moment captured is the realistic rest jaw position and obtain standardized and repeatable posed smile photos? In the course of

capturing, we found that the posed smile repeatability was relatively reliable when the subject's mandible was stabilized in the rest jaw position. Consequently, in this study, the specific process of quantitatively making posed smile photographs under the condition of a subject's mandible in the rest jaw position was proposed.

Clinical Technique

1. Under the condition of sitting and keeping the head upright, the subject was asked to pronounce "M" tone slightly in order to guide her mandible to rest jaw position [6]. The vertical distance of the rest jaw position was obtained by measuring the distance between the base of nose and the pogonion with Digital vernier caliper. The measurement was performed three times by a single operator. And the three measurements were averaged and recorded. Then she was instructed to swallow, relax chin, bite both sides posterior teeth in order to guide her mandible to centric occlusion position(COP) [7]. Then vertical distance of the COP with the same method. The difference between the two averages was the interocclusal distance.
2. The Fleximeter-Strips (Bausch, Germany) elastic gap check strip with the thickness close to the Interocclusal distance of subject was placed in her anterior dental region of upper and lower jaw. Then, the subject was asked to bite gently according to the method of COP (Figure 1).

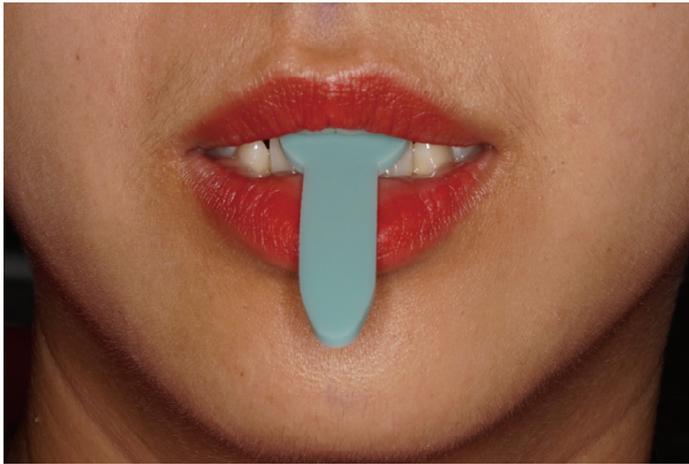


Figure 1: Photograph of the lower one-third of the face of subject with the Fleximeter-Strips in her anterior dental region of upper and lower jaw.

3. The kristall A70 (Muller, Germany) transparent occlusal record silicon rubber was inserted into the bilateral posterior occlusal space under the condition of biting elastic gap check strip in the anterior tooth region (Figure 2). Then the elastic gap check strip was removed after the transparent occlusal record silicon rubber solidified. So, the mandible of the subject was kept in the status of the rest jaw position under this condition.



Figure 2: The kristall A70 transparent occlusal record silicon rubber was inserted into the bilateral posterior occlusal space under the condition of biting Fleximeter-Strips in the anterior tooth region.

4. Marked the O.orbitales and P.porions of the subject and connected the left and right O.orbitale to the bridge of the nose (marker A). The Subject was seated comfortably in a chair and placed in natural head position. And adjusted slightly the head of subject to keep overlapping of the line of A and two

P.porions with laser horizontal line so that guaranteed the FH.plane parallel to the floor. Meanwhile, kept overlapping of facial midline with laser vertical line. Subject was asked to wear Laser protective eye wave which was fixed to the subject's head against laser damage to eyes in this process (Figure 3).



Figure 3: The picture in the camera frame taken with iPhone XS.

5. A camera (Sony a7, Japan) connected to a twin flash was mounted to a tripod which was adjusted in order to ensure a fixed distance of 50 cm between the lens and the subject. All photographs were made by one photographer. Before making the posed smile photographs, the subject was coached to smile with similar level at least three times. The lens was focused on the lower one-third of the face and made 3 posed smile photographs in a row. After the images were opened in Photoshop (Microsoft Corporation) to pick up the one which presented the nature and perfect posed smile (Figure 4).



Figure 4: Posed smile photograph of the lower one-third of the face of subject.

Discussion

In the last century, the study of the scientist Alfred Yarbus revealed that while analyzing facial photographs, people tend to focus attention mostly on the mouth and the eyes [8]. Additionally, Thompson LA [9] thought also the mouth is one of the centers of attention of the face, the smile plays an essential role in facial esthetics. Machado AW [2] thought smile is the most important element in dental esthetics. In recent years, more and more patients have sought Orthodontic and prosthetic treatment for improving their smile esthetics. Correct diagnosis is essential to determine which elements of smile need to be improved. In fact, making posed smile photographs has become one of the main auxiliary diagnostic method. David C. Havens et al., [10] defined two basic types of smiles: the social smile and the enjoyment smile. The social smile used as a greeting or photographing which is reproducible, voluntary. It is also known as a posed smile, which could be sustained as a static facial expression. The results of studies of Marc B. Ackerman and Laurie McNamara both showed that the reproduction of posed smile was very reliable [11,12]. Ackerman [5] thought also the posed smile has high repeatability and maneuverability. Therefore, the posed smile could be used as a reliable reference to measure the characteristic smile index.

On the other hand, esthetics is a subjective notion and tends to vary among different individuals and cultures [13]. In fact, smile esthetics is affected by several factors, such as the occlusion, gingival display, lip position, dentolabial harmony, or dental anomalies like congenitally missing teeth. In addition, Tüzgiray YB et al., [14] put forward not only the smile itself, but also the evaluation methods matter as well. The factors affecting the quality of smile can be analyzed accurately by using digital camera to record the smiling phase of the patients, so that the corresponding treatment measures can be formulated to satisfy the patients' pursuit of beauty in maxillofacial region [15]. But, Tarantili, et al., [16] have described a progression of the smile using digital video that consists of an initial attack period, a sustaining period, and a fade-out or decay period. If a clinical photograph is taken during the attack or the decay phase, the resulting smile will not be a reliable reference. According to Christian Coachman [4], it is difficult to guarantee that the moment captured is the realistic rest position. Usually when the dentist asks the patient to give a full smile, the patient shows less than the real maximum height of the smile. Al-Johany [17] evaluated static photographs of a posed smile and reported that 11% of the patients presented a high smile, as opposed to 21% of patients with an anterior high smile in a study with video recording [18]. Moreover, it is exceedingly difficult to standardize photographs due to differences in camera angles, distances to the patient, head positions, and discrepancies between intraoral and extraoral photographic techniques [5].

Conclusion

In the same shooting process, we took dozens of posted smile photos for the subject with the quantitative photographing method,

and they all showed good repeatability. We thought the quantitative photographing process proposed in this study can effectively obtain standardized and repeatable posed smile photos.

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