

## Role of Photography in Orthognathic Surgery – A Review

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### Abstract

In the field of maxillofacial surgery, digital photographic documentation plays a crucial role in clinical practice. The main advantage of digital photography is the possibility of immediate reappraisal of the photographs for alignment, brightness, positioning, and other photographic settings, which aids in avoiding errors in addition to permitting the instant repetition of photographs if and when required. This paper gives an overview of the evolution from analog to digital in photography and highlights the significance of digital photography in orthognathic surgery.

**Keywords:** Photography, Orthognathic Surgery, Oral Surgery, Maxillofacial Surgery.

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### INTRODUCTION

A valuable clinical photograph is regarded as a key element for both recording and monitoring clinical progress in addition to being an aid in medico-legal issues. With time, the means of obtaining measurements from clinical photographs have evolved with new technology beginning from projecting photographic slides on to a screen, using sliding calipers from magnified photographic prints, or from scanned photographs and direct on-screen digitization [1-3].

Various methods were deployed by numerous authors to assess both the validity and repeatability of measurements taken from facial photographs. Farkas *et al.*, compared manual anthropometric measurements with those taken from frontal and lateral 1:1 photographic prints [4]. Nechala *et al.*, found that measurements taken using three different camera systems did not differ statistically significantly from each other, or from the anthropometric measurements, other than in three measurements: upper face height, intercanthal width and nose height [3]. However, Becker *et al.*, found very close correlations between manual and digital photographic measurements [5].

### Merits of Digital Photography

Digital photography provides the clinician an opportunity to review the picture immediately to judge technical aspects such as sharpness, illumination, color, and patient positioning. Due to the development of powerful data storage tools and software, clinical patient records can be supplemented with informative photographs, and these photographs can be integrated into digital patient files [6].

Especially in the field of orthognathic surgery, where surgery can change the appearance of a face, 3D assessment is becoming very essential. Digital photography not only allows the clinician to plan the surgical procedures, but also aids in predicting the outcome.

### Principles of Clinical Photography

Clinical photographs should be consistent with patient's clothing, the angle of camera, lighting, positioning of the patient and background [7]. Final images should be published in the same magnification and size compared with preoperative picture. It is crucial to place the camera at the same distance from the patient before and after the surgery [8, 9].

Lighting and background play a key role in achieving a high quality image.<sup>10</sup> Background for oral and maxillofacial clinical photography should be a light blue because it contrasts to skin color and regulates shadows. Black and white backgrounds should be avoided because they result in low contrast image [10]. In order to take a standard photograph, a special garb and proper patient position are recommended. Accessories such as jewels, glasses and hearing aids should be removed before photographing [11]. The camera should be placed parallel to the patient face. A stool is used for facial views for proper positioning of the patients. There should be also some guides and marks placed on the wall and printed on the floor to assist patients turn in the right directions [12].

### **Intraoral Photographs**

Lip retractors are used to improve the visibility of the dentition and surrounding tissues.<sup>13</sup> The retractors hold the lips out of focus and allow maximum illumination of the oral cavity. In order to increase precision, double-ended transparent retractor is preferred for a thorough vision of the oral cavity [10, 13]. Intraoral front silvered mirrors are ideal tools for areas that are out of sight and hard to be seen during clinical photography. Despite their expensive price, front silvered mirrors are more preferred for their great optical properties and resistance to scratching [10].

### **Extraoral Photographs**

Lateral, full face frontal, oblique and submental oblique views should be documented for extraoral picture set [10, 13]. It is recommended to use a chair with adjustable vertical setting for the alignment of patient's focus point with the camera. It is indispensable that the camera and head should be at the same level and at fixed distance before and after surgery [11]. Chairs with backrest are beneficiary for constant position of the head and spine relative to the camera. It is noteworthy that extraoral pictures should be captured in portrait view and intraoral pictures should be taken in landscape view [9]. In addition, the interpupillary plane needs to be parallel to the floor for accurate assessment.

### **Errors during Clinical Photography**

Technical errors seen in clinical photography are broadly categorized into two different categories. The first category relates to the use of equipments including lens, flash, mirrors, retractors and camera. Nonstandard position of the subject and camera is the second category leading to technical errors [13, 14]. Inconsistent pre- and postoperative photographs lead to visual misinterpretation of facial esthetic analysis [14]. Saliva and blood should be suctioned to prevent blood-stained appearance [13, 14]. The administration of anticondensation solutions like Neo-Sabanyl before intraoral photography is helpful for eliminating mist or fog on the surface [9].

### **In Orthognathic Surgery**

Several studies explored the possibility of performing qualitative analysis through photograph. They compared cephalometrics and photometrics. Significant and positive correlations between majority of cephalometric and photometric variables were proved. They concluded that photometric analysis serves as a powerful method to address craniofacial disorders, establish treatment planning, evaluate surgical results and orthodontic outcome, and also study the facial growth [15, 16]. Photometric is a feasible and a practical alternative when radiography is considered too invasive or logistically impractical. Photometric measurements can be performed repeatedly, and data stored permanently. This makes longitudinal studies also possible [16].

Use of photograph as a diagnostic aid was also established by many workers when they studied the impact of buccal corridor, lip line, or smile arc on facial attractiveness. With the help of photographs, they reiterated the need to address these vital esthetic signs. Assessment of profile using visual treatment objective (VTO) with photograph was universally accepted and formed a standard protocol in myofunctional therapy. Likewise, use of lip lines to study and objectively assess the profile became routine [17].

A recent study conceptualized soft-tissue-based diagnosis and treatment planning. To encompass both function and esthetics, the authors developed a model called classification of appearance and esthetic analysis, which included three components namely macro-, mini-, and micro-aesthetic divisions. Functional goals were evaluated in the context of expanded dentofacial analysis. This formed a framework for the systemic evaluation of esthetic needs of each patient. The emphasis was on proportionality rather than linear or angular norms [15].

The newest innovation in photography, incorporating the third dimension, offers detailed studies of the facial surface and soft tissue morphology. The advantages of digital photography include improved capabilities for diagnostics, planning of surgery and treatment, follow-up, and interdisciplinary communication between physicians and other specialists.

### **CONCLUSION**

It is important for the oral and maxillofacial surgeon to be aware of principles of photography and all the possible mistakes in extra- and intraoral clinical photography, to enhance the chances of obtaining high quality images. Especially in the field of orthognathic surgery, where surgery can change the appearance of a face, 3D assessment is becoming very essential. Digital photography not only allows the clinician to plan the surgical procedures, but also aids in predicting the outcome.

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