

Intuitive Facial Imaging Method for Evaluation of Postoperative Swelling: A Combination of 3-Dimensional Computed Tomography and Laser Surface Scanning in Orthognathic Surgery

Satoshi Yamamoto, DDS,* Hitoshi Miyachi, DDS, PhD,† Hitoshi Fujii, DDS,‡
Shigeki Ochiai, DDS, PhD,§ Satoshi Watanabe, DDS, PhD,||
and Kazuo Shimozato, DDS, PhD¶

Purpose: Postoperative facial swelling after orthognathic surgery may be prolonged and of concern in some patients. In recent years, there have been several reports of analysis of postoperative facial swelling by volume data; however, such evaluations cannot exclude the possibility of error in the measured point because there are no clear anatomic landmarks on the cheek. Three-dimensional laser scanning is a noninvasive tool that can be used to measure surface changes in soft tissue over time. The aim of this study was to quantify postoperative swelling in orthognathic surgery by fusing surface scanned images with skin images reconstructed from 3-dimensional computed tomography data and identifying a set of reference points on the bone.

Materials and Methods: The study comprised 30 patients undergoing bilateral sagittal split osteotomy. Facial scans were obtained with the Artec Eva Scan imaging system (Data Design, Japan) at 9 time points from before surgery to 6 months postoperatively. Postoperative scan images were compared with the baseline facial scan obtained 6 months postoperatively.

Results: On average, 66% of the initial postoperative edema subsided in 1 month. After 3 months, only 5% of the swelling remained. There were statistically significant correlations between subcutaneous tissue thickness and swelling ($P < .0001$).

Conclusions: We were able to monitor facial swelling after orthognathic surgery with very high precision using the described method. Subcutaneous tissue thickness may be an important determinant of facial swelling.

© 2016 Published by Elsevier Inc on behalf of the American Association of Oral and Maxillofacial Surgeons

J Oral Maxillofac Surg ■:1.e1-1.e10, 2016

Many postoperative sequelae such as pain, swelling, and occasional trismus may occur in the very early stages and can cause functional impairment after

orthognathic surgery. In particular, prolonged facial swelling may trouble the patient from a psychological point of view.¹ Accurate quantification of the extent

Received from Department of Maxillofacial Surgery, School of Dentistry, Aichi Gakuin University, Aichi, Japan.

*Postgraduate Student.

†Associate Professor.

‡Postgraduate Student.

§Associate Professor.

||Lecturer.

¶Department Head.

Address correspondence and reprint requests to Dr Miyachi: Aichi-Gakuin Dental Hospital, 2-11, Suemori-dori, Chikusa, Nagoya, Aichi 464-8651, Japan; e-mail: hitomiya@dpc.agu.ac.jp

Received July 13 2016

Accepted August 22 2016

© 2016 Published by Elsevier Inc on behalf of the American Association of Oral and Maxillofacial Surgeons

0278-2391/16/30773-X

<http://dx.doi.org/10.1016/j.joms.2016.08.039>

and duration of postoperative swelling may help the orthognathic surgeon, who is aiming to support patients eager to reach the final esthetic result, by predicting the duration of swelling.

Several methods for the measurement of postoperative facial swelling have been reported, but most of these are mechanically invasive methods or optical methods, with problems of low resolution in 3-dimensional (3D) space.^{2,3} The use of the thickness of soft tissue measured at the chin area using a lateral cephalogram to evaluate swelling has often been reported.⁴ More precise measurement can be performed with computed tomography (CT) at a higher cost and exposure to radiation, which may not be appropriate for repeated evaluation of swelling. However, recent advances in 3D imaging technology have provided the maxillofacial

surgeon with powerful tools for rapid, accurate, and noninvasive capture of the surface structure and texture of soft tissue. Because such scanning is not invasive as long as the visible range of light wavelength is used, we can obtain scan images as frequently as needed, and this method is suitable for continuous observation of soft tissue swelling. In recent years, there have been several reports of analysis of postoperative facial swelling by volume data obtained from calculated deviation between shells generated from selected corresponding surface areas on superimposed images.⁵⁻⁸ However, such evaluation of volume cannot exclude the possibility of error in the measured point because there are no clear anatomic landmarks on the cheek, where most postoperative swelling occurs after sagittal split ramus osteotomy.

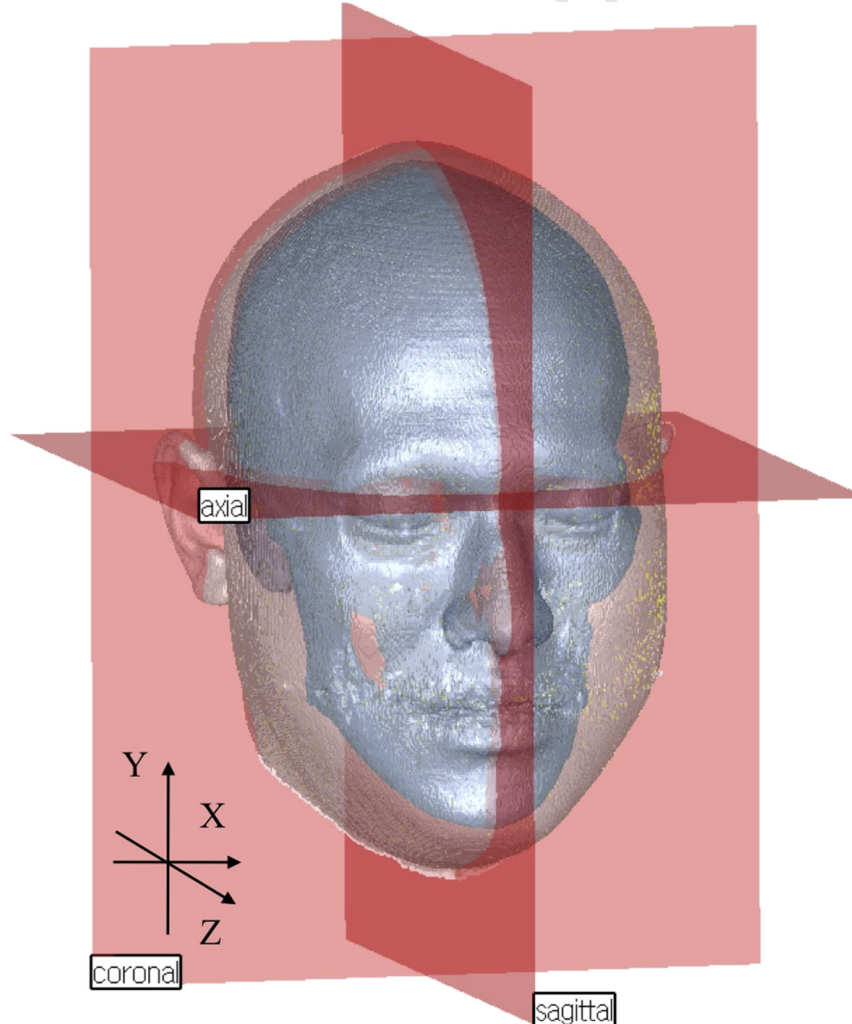


FIGURE 1. Three-dimensional (3D) computed tomography (CT) image of translucent skin and bone. Because they are reconstructed from the same CT scan, both bone and skin 3D CT images are produced in the same 3D space. Setting of 3D reference plane to merge surface scan. The Y-Z plane passes through the nasion, sella, and basion. The X-Z plane crosses perpendicular to the Y-Z plane and passes through the nasion and sella. The X-Y plane is perpendicular to both planes passing through the sella.

Yamamoto et al. *Evaluation of Postoperative Swelling. J Oral Maxillofac Surg* 2016.

Download English Version:

<https://daneshyari.com/en/article/5641844>

Download Persian Version:

<https://daneshyari.com/article/5641844>

[Daneshyari.com](https://daneshyari.com)