

3D 2-layer Elastic Models for Cleft Lip Rhinoplasty Made from 3D Camera

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We have described our realistic 3-dimensional computer-assisted 2-layer elastic models of the face and cleft lip using computed tomographic and magnetic resonance imaging stereolithographic data.¹ The surface layer is made of polyurethane, 1 mm thick, and the inner layer is silicone. Using this elastic model, we taught residents and young doctors how to perform cheiloplasty. We perform the secondary rhinoplasty by Tajima's reverse U method² before the patient enters primary school. To avoid irradiation by computed tomography, we used a 3D camera to make this elastic model.

COMPARISON OF THE COMPUTED TOMOGRAPHY AND THE 3D CAMERA DATA

We compared the stereolithographic data from the 3D camera of VECTRA H1 with the data from computed tomography and measured the distance between the bilateral nasal alar of the first author (K.U.) of this article. The position was the same supine position used when taking pictures with the 3D camera as computed tomography. The distance measured by computed tomography and by the 3D camera was 41.477 mm and 41.723 mm, respectively. The difference is 0.246 mm.

CONSTRUCTION OF THE 2-LAYER ELASTIC MODEL FROM THE DATA OF THE 3D CAMERA

The method of construction of the 2-layer elastic model has been described. The 2-layer model can be made from the stereolithographic data of the 3D camera. We have made the same elastic model for the nose of the first author (K.U.) of this article from the data of the 3D camera (Fig. 1).

CONSTRUCTION OF THE CLEFT LIP NOSE MODEL FROM THE DATA OF THE 3D CAMERA

We took 3D data of the cleft lip nose of three children using a 3D camera before operation and made a 2-layer

elastic model of the cleft lip nose (Fig. 2). We performed 2 of them with Tajima's reverse-U method for secondary rhinoplasty. However, we performed simulation surgery of the reverse U incision method for 3 models. The procedure of widely undermining subcutaneous tissue of the nose could be performed as in the actual operation, and 5-0 nylon stitches for the mattress could be performed



Fig. 1. Elastic model of the face with 2 layers. The surface layer is made of polyurethane with a thickness of 1 mm and the inner layer is silicone. The left model was made from computed tomographic stereolithographic data and the right from stereolithographic data from a 3-dimensional camera.



Fig. 2. Two-layer elastic models of the cleft lip nose. With all models simulation surgery with Tajima's reverse U method was performed. The left model is of a 5-year-old boy with right cleft lip and palate. The center model is of a 5-year-old boy with right cleft lip. The right model is of a 4-year-old girl with left cleft lip. This model is different from the other 2 models. The surface layer is made of polyurethane and the inner layer is also polyurethane. The elasticity index of polyurethane is different.

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on the undermined surface of the inner layer. When the mattress sutures were tied, the stitches were detached from the inner layer. However, the previous 2 procedures could be done well.

DISCUSSION

Zabaneh et al.³ used a 3-dimensional printer to make a plaster mold and to create a silicone model of a nose. The model was used to train residents in rhinoplasty. A computer-aided design/computer-aided manufacturing 1-layer silicone simulator has been used for teaching cheiloplasty.⁴

We could make the cleft lip nose model for the secondary rhinoplasty from the data of the 3D camera and could perform simulation surgery for rhinoplasty to some extent.

Tajima's rhinoplasty method for the cleft lip nose is excellent, but it has a problem in that the visual operative field is limited. Simulation surgery using this model may help us with suggestions for the actual operation, but we must improve the models further to make them more realistic.

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DISCLOSURE

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