On prediction in orthognathic surgery
Analysis of 2D and 3D techniques from multiple perspectives

Akademisk avhandling
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av Martin Bengtsson

Fakultetsopponent:
Docent Anders Westermark
Kirurgkliniken, Mariehamn, Finland

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SAHLGRENSKA AKADEMIN
INSTITUTIONEN FÖR ODONTOLOGI
On prediction in orthognathic surgery
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Martin Bengtsson
Avdelningen för Oral och Maxillofacial kirurgi, Odontologiska institutionen, Sahlgrenska akademin, Göteborgs universitet, Sverige.

Abstract

The aim of the present thesis was to compare two different prediction methods in orthognathic treatment of dentofacial deformities and severe malocclusions. The comparison was made between a two-dimensional (2D) and a three-dimensional (3D) computerized prediction system in 62 healthy subjects with Angle class III occlusion aged between 18-30 years and from different perspectives. Measurements were performed prior to surgery and at 12-month follow-up on cephalometry, health related quality of life (HRQoL), time consumption, economic cost and effective radiation dose. The thesis is based on four articles, which all were conducted as prospective double-blinded two-armed parallel-group randomized controlled trials with a 1:1 allocation ratio. Cephalometric accuracy showed as expected a statistically significant difference between planned and obtained positions for all measurements ($p<0.001$) and revealed a level comparable to other similar studies for both techniques. The 3D technique showed a comparable higher accuracy in the anterior maxilla ($p<0.05$). Both techniques showed poor accuracy in the anterior mandible. Independent on planning technique, 2D or 3D, analysis of HRQoL demonstrated an improvement after treatment of dentofacial deformities and malocclusions with orthognathic surgery. No statistically significant difference was found between the groups ($p>0.21$). An initial difference between the groups in HRQoL was observed. Accounting for that, a statistically significant difference was found for one parameter in the questionnaire ($p=0.028$). Comparing the cost-effectiveness for the two planning techniques showed no difference in time consumption between the techniques ($p>0.30$). The 2D technique showed an overall lower economic cost ($p<0.001$). A larger effective radiation dose related to the 3D planning technique was found ($p<0.001$). The present thesis reveals only minor differences between the studied techniques. Because the 3D technique has an advantage for the group of patients with asymmetry it would be the technique recommended for any case in the clinical setting.

Keywords: Orthognathic surgery, Dentofacial deformity, Three-dimensional, Two-dimensional, Computer-aided surgical simulation, Virtual surgical planning, Prediction, Cephalometry, Randomized controlled trial, Blinded case-controlled cohort study