EVALUATION OF LOW-DOSE MULTISLICE COMPUTED TOMOGRAPHY, ON IMAGE QUALITY, IN A GROUP OF ORTHOGNATHIC PATIENTS

A Borg1, E Klintström1, K Hellén-Halme2
1, Department of radiology, Linköping university hospital, Linköping, Sweden 2, Department of radiology, Faculty of odontology, Malmö university, Malmö, Sweden

Introduction: Treatment planning in orthognathic surgery traditionally involve panoramic and cephalometric imaging techniques and more recently also multislice computed tomography (MSCT) and cone-beam computed tomography (CBCT). The two latter are used in computer software programs to perform 3D surgery planning (1). The patients are often of a young age and the field of view (FOV) involve radiosensitive organs (2).

As part of a multicenter project pre-operative CT-low dose examinations were performed, and it is of interest to investigate the diagnostic potential of this low-dose method.

Objective: To evaluate low-dose MSCT in a group of orthognathic patients on:
1. Ability to depict anatomical structures
2. Overall image quality
3. Image quality of the temporomandibular joint (TMJ).

Materials and methods: 45 patients, planned to undergo orthognathic surgery, were examined with low-dose protocols at 80 kV and 45 mAs, in two different CT-units. 19 patients in CT1: Siemens Definition AS+ and 26 patients in CT2: Siemens Somatom Force).

Three observers, two specialists and one specialist trainee in oral and maxillofacial radiology evaluated the images on the ability to depict anatomical structures and image quality. A four option ordinal scale with values: 1, not visible/poor image quality, 2, questionable, 3, visible/good image quality or 4, definitely visible/excellent image quality, was used.

Descriptive statistics, T-tests and Cohen’s un-weighted Kappa were calculated. T-test was considered statistically significant when \( p \leq 0.05 \). Kappa values were interpreted according to Landis and Koch’s scale for observer agreement.

Results:
The mean values of the ability to depict anatomical structures and image quality are shown in Figure 1. There was a statistically significant difference between the overall image quality and the TMJ image quality. A statistically significant difference was also found between CT1 and CT2, see Figure 2. Inter-observer agreement was fair to moderate.

Conclusion:
• The ability to depict anatomical structures and the overall image quality was found to be acceptable for both CT-units, while the image quality for the TMJ was lower for both CT-units and in particular for CT1.
• It is essential to adapt protocols to each CT-unit and diagnostic task. Studies on image quality is largely dependent on the machine and protocol that is used.
• The protocol for CT2 was found to give good image quality for orthognathic surgery planning, except for the TMJ, where the image quality was questionable.

References: