

Comparison of 2 and 3-dimensional Imaging for the Diagnosis of the Alveolar Nerve Position for the Osteotomy of Third Molar



J. Neugebauer¹, R. Shirani¹, R. A. Mischkowski¹, L. Ritter², E. Keeve², J.E. Zöller¹

¹ Department for Cranio-maxillo-facial and Plastic Surgery, University to Cologne, Cologne, Germany

² Surgical Systems Laboratory, CAESAR -Center of Advanced European Studies and Research, Bonn, Germany



Introduction

The treatment plan for the osteotomy of impacted third molars is determined by the position of the root tips and the mandibular nerve. Conventional radiological diagnosis is performed by a panoramic radiograph. In difficult indication with a direct correlation of root and nerve a second plain is

necessary. The clinical benefit for the diagnosis of impacted third molars with the Cone Beam (CB) imaging in comparison to the conventional technique is not reported yet. The aim of this study was to evaluate the quality of the diagnosis for impacted third molars with both techniques.



Conventional radiographs for two plains (panoramic & skull)

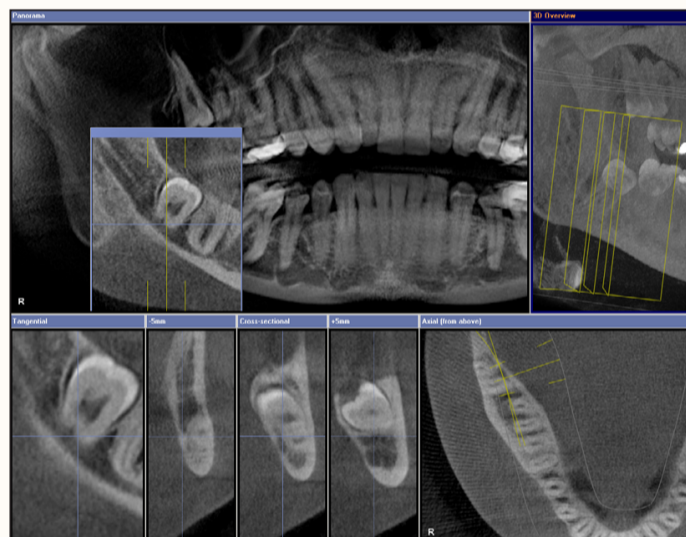
Material and Methods

Six clinically experienced observers retrospectively evaluated 30 CB scans and 30 panoramic and skull pa radiographs. In each group 48 third molars were evaluated. The imaging quality was scaled between 1 to 5 (very good, good, satisfactory, dissatisfied and not acceptable). The correlation of the mandibular nerve in relation to the root tip

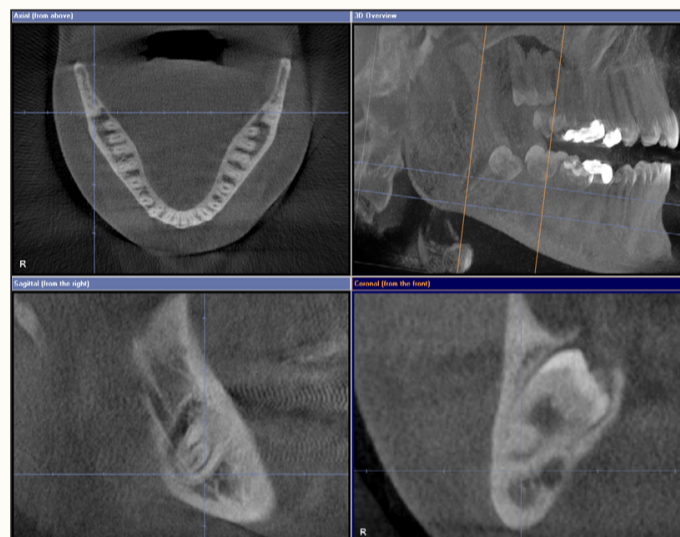
was determined vertically. A new CB scanner (Sirona, Bensheim, Germany) was used, producing a three-dimensional volume of 15 x 15 x 15 cm in size. Scanning time was 15 sec while patients were fixed with a bite block firmly attached to the scanner. Scanning parameters were 90 kV and 28 mAs constantly for all patients.



Galileos Device for dental ConeBeam scans



Panoramic window with transversal and 3d-view



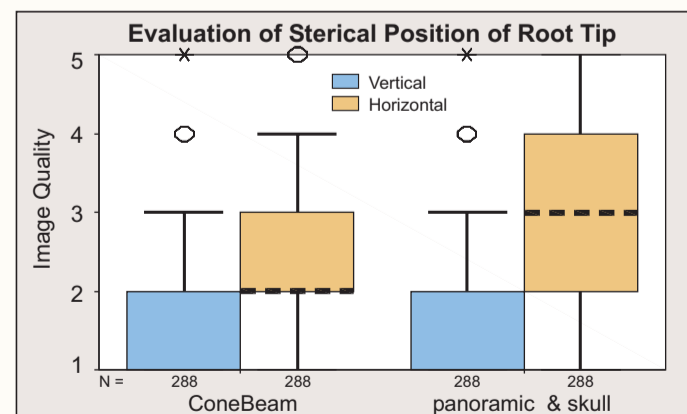
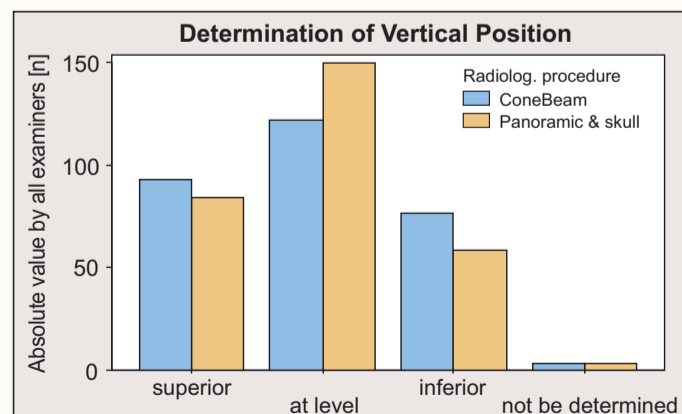
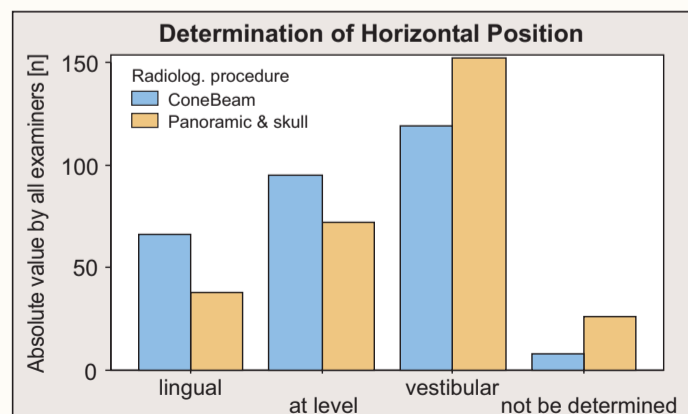
Conventional 3d-view with cross sections

Results

The image quality for the CB scans in the vertical dimension were determined in average with 1.9 (± 0.87), for the horizontal dimension in average with 2.16 (± 0.958). The image quality for the combination of panoramic and skull PA were determined

for the vertical dimension in average with 1.8 (± 0.88), and for the horizontal dimension in average with 2.86 (± 1.12). In this study no correlations could be found for the vertical data. A highly significant correlation could be found for the horizontal data with

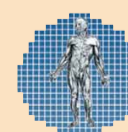
an advantage for the CB scans ($p=0.01$). The evaluation for the vertical position of the root tip of the third molars to the mandibular nerve showed no significant difference for sub-groups.



Conclusion

Findings of this study indicate that the used cone beam technology has a significant improvement for the preoperative diagnosis for impacted third molars. Especially in the

indication for difficult anatomic situation with the risk to harm the patient by a routine procedure the investigated technology show a reduction of risk parameters.



CARS 2006
Computer Assisted Radiology and Surgery
20th International Congress and Exhibition
June 28 - July 1, 2006 Osaka, Japan

Dr. Joerg Neugebauer
University to Cologne
Dept. for Cranio-maxillo-facial and Plastic Surgery
Head: Univ.-Prof. Dr. Dr. Joachim E. Zoeller
Kerpener Str. 32, D-50931 Köln, Germany
joerg.neugebauer@medizin.uni-koeln.de