Estimation of the Cone-Beam Computed Tomography in Diagnostics of the Molar Root System Anatomy of the Mandible and Maxilla

V. S. Blinov[1, 2], M. V. Kartashov[1], S. E. Zholudev[1], O. S. Zornikova[2]

[1] Ural State Medical University, Ministry of Healthcare of the Russia, Yekaterinburg
[2] Dental Clinic «Garant», Yekaterinburg

Abstract

The study aim was to estimate possibilities of the cone-beam computed tomography in diagnostics of the molar root system anatomy of the mandible and maxilla. The study design: we evaluated the clinical endodontic examination data, intraoral radiovisiograms and cone-beam tomograms of 240 first and second molars of the mandible and maxilla of 145 patients who were receiving endodontic treatment in the dental clinic. Interobserver agreement the experts was assessed be means of Cohen's kappa. Diagnostic significance of the results was assessed using Student's t-test. Results: The second root canal in the mesial root of the first upper molar was detected in 91,7 % of cases. Frequency of the 2 structure type for the root was 30 %, the type 4 — 46,6 %. 36,7 % of the second upper molars had the 2 structure type as per Vertucci for the mesial root, 46,7 % — the 4 structure type. An additional third root was identified in 5 % of the first lower molars. We found the 4 configuration type as per Vertucci for the mesial root in 43,9 % of the second lower molars, the 2 type — in 28 %. Interobserver agreement the radiologists in estimating the number of roots was perfect ($k = 0,81 — 0,93$; $p < 0,001$), and it was substantial in defining the number of root canals and the type of structure ($k = 0,61— 0,77$; $p < 0,05$).

Key words: Cone-Beam Computed Tomography, Permanent Molars, the First, the Second Molar of the Maxilla, the First, the Second Molar of the Mandible.

References

1. *Arzhantsev A. P., Akhmedova Z. R., Perfilev S. A.* Radiographic representation of root teeth canals using different methods of evaluation. REJR. 2012. No. 2. P. 20–26 (in Russian).
2. *Grigorev S. S.* Estimation of quality of root canal filling with gutta-percha by optical microscopy and CBCT. Dental Tribune. 2014. No. 3. P. 8–9 (in Russian).
3. *Melnichenko Yu. M., Kabak S. L., Savrasova N. A.* Root and canal morphology of the first and second mandibular molars. Izvestiya Natsionalnoy akademii nauk Belorussii. 2014. No. 2. P. 28–32 (in Russian).
4. *Tegako O. V., Ivanov M. S.* Anatomical features of the root system of human teeth. Glavnyy vrach Yuga Rossii. 2012. No. 6. P. 28–32 (in Russian).
5. *Shleyko V. A., Zholudev S. E.* CT as the main tool for planning and forecasting of complex dental treatment. Problemy stomatologii. 2013. No. 2. P. 33–57 (in Russian).
6. *Demirbuga S., Sekerci A. E., Cayabatmaz M.* Use of cone-beam computed tomography to evaluate root and canal morphology of mandibular first and second molars in Turkish individuals. Med. Oral Patol. Oral. Cir. Bucal. 2013. No. 18 (4). P. e737–e744.

7. *Hassan B.A., Payam J., Juyanda B.* Influence of scan setting selections on root canal visibility with cone beam CT. Dentomaxillofacial Radiology. 2012. No. 41. P. 645–648.
8. *Zhang Xin, Xiong Shijiang, Ma Yue.* A cone-beam computed tomographic study on mandibular first molars in a chinese subpopulation // PLOS ONE. 2015. № 4. P. 1–9.

Authors

Blinov Vladislav Sergeevich, Assistant of Department of Radiology, Faculty Training and Retraining, Ural State Medical University, Ministry of Healthcare of Russia, Radiologist of Dental Clinics «Garant».
Address: 3, ul. Repina, Yekaterinburg, 620014, Russia.
Phone number: +7 (343) 214-86-01. E-mail: VladSBlinov@mail.ru

Kartashov Maksim Viktorovich, Ph. D. Med., Head of Department of Radiology, Faculty Training and Retraining, Ural State Medical University, Ministry of Healthcare of Russia.
Address: 3, ul. Repina, Yekaterinburg, 620014, Russia.
Phone number: +7 (343) 214-86-01. E-mail: mvkartashov@gmail.com

Zholudev Sergei Egorovich, M. D. Med., Professor, Head of Department of Prosthetic Dentistry, Ural State Medical University, Ministry of Healthcare of Russia.
Address: 3, ul. Repina, Yekaterinburg, 620014, Russia.
Phone number: +7 (343) 214-86-01. E-mail: ortoped_stom@mail.ru

Zornikova Olga Sergeevna, Radiologist of Dental Clinics «Garant».
Address: 65, ul. Uralskaya, Yekaterinburg, 620041, Russia.
Phone number: +7 (343) 369-33-11. E-mail: triniti134@yandex.ru