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Clinical and Radiographic Characteristics of Endoperiodontitis in Patients with Chronic Generalized Periodontitis

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Summary. The article presents modern data on the priority clinical and radiographic signs of endoperiodontitis in patients with chronic generalized periodontitis.
The aim of the research was to determine the complex of clinical and radiographic methods for diagnosing the patients with chronic generalized periodontitis in combination with localized complex endoperiodontitis.
Objects and methods. The research included the clinical and radiographic examination of 100 almost healthy patients aged 35–44 years. The study group consisted of 50 patients with chronic generalized periodontitis of moderate severity in combination with localized complex endoperiodontitis (100 teeth). The control group was represented by 50 patients without periodontal pathology. The diagnosis of endoperiodontitis was made according to the classification of Professor L.N. Dedova (2012).
Results and discussion. Clinical studies revealed chronic localized endoperiodontitis which led to 13.6 times decrease of pulp vitality and increase in the probing depth of the periodontal pocket by 4.84 ± 1.34 mm. CBCT was characterized by greater than IOR and OPG sensitivity (98%), 96% specificity, with a total accuracy of 97% and 24.5 times higher prognostic significance.
Conclusion. The main methods of diagnosing localized complex endoperiodontitis are the electric pulp test and probing the periodontal pockets that have 4.2 times higher prognostic significance compared to gingival index, bleeding on probing, suppuration from periodontal pockets, migration of teeth, positive percussion, tooth mobility, furcation involvement and formation of acute periodontal abscesses. The additional method of diagnosing the localized complex endoperiodontitis is cone-beam computed tomography that has the diagnostic efficacy 96–98% compared to intraoral radiography (42–44%) and orthopantomography (52–66%).

Keywords: *endoperiodontitis, endodontic-periodontal lesions, periodontal disease, diagnosis*

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INTRODUCTION

The study of the combined interrelated lesions of the endodontium and periodontium accompanied by inflammatory and destructive changes remains priority among other pathological processes in periodontal tissues. The epidemiological survey conducted in the Republic of Belarus has identified a significant prevalence (94,8%) of periodontal diseases among the population aged 35–44 years. Endoperiodontitis, as an endodontic-periodontal lesion, has been diagnosed in 21.3% of patients [1].

The scientists have suggested a number of classifications of endodontic-periodontal lesions. However, their data are contradictory to some extent. Thereby, there is a need in a specific interpretation of this pathological process [5–7, 9].

Professor L.N. Dedova has suggested such a term and a new nosological form, as endoperiodontitis in 2012 (tab. 1). The new classification takes into consideration the shortcomings of the well-known classifications which enables to define endoperiodontitis as a combined interconnected lesion of the endodontium and periodontium accompanied by inflammatory and destructive changes [2].

However, the issues of comprehensive clinical and radiographic characteristics of complex endoperiodontitis have not been sufficiently studied yet. The accuracy of the diagnostic criteria with their modern interpretation is the key moment in diagnosing endoperiodontitis.

Intraoral radiography of the tooth (IOR), orthopantomography (OPG) and cone-beam

Table 1. Classification of periodontal diseases (Prof. L. N. Dedova, 2002-2012)

1. Gingivitis (K 05)				
1.1 Clinical course	**1.2 Form**	**1.3 Stage**	**1.4 Prevalence**	**1.5 Severity (Degree)**
1.1.1 acute (K05.0) 1.1.2 chronic (K05.1) 1.1.3 recurrent 1.1.4 progressive 1.1.5 reversible	1.2.1 simple marginal (K05.10) 1.2.2 ulcerative (K05.12) 1.2.3 hyperplastic (K05.11) 1.2.4 symptomatic (K05.13, K05.08, K05.18, K069.1, B00.2)	1.3.1 initial 1.3.2 early 1.3.3 developed	1.4.1 localized 1.4.2 generalized	1.5.1 mild 1.5.2 moderate 1.5.3 severe

2. Periodontitis (K 05)			
2.1 Clinical course	**2.2 Form**	**2.3 Prevalence**	**2.4 Severity (Degree)**
2.1.1 acute (K05.2) 2.1.2 chronic (K05.3) 2.1.3 exacerbation of the chronic course, including abscess (K05.20, K05.21) 2.1.4 rapidly progressive (K05.4) 2.1.5 remission	2.2.1 simplex 2.2.2 complex 2.2.3 symptomatic (K05.38, K05.39, K05.5)	2.3.1 localized 2.3.2 generalized	2.4.1 mild 2.4.2 moderate 2.4.3 severe

3. Endoperiodontitis			
3.1 Clinical course	**3.2 Form**	**3.3 Prevalence**	**3.4 Severity (Degree)**
3.1.1 acute 3.1.2 chronic 3.1.3 exacerbation of the chronic course, including abscess 3.1.4 remission	3.2.1 simplex 3.2.2 complex 3.2.3 symptomatic	3.3.1 localized	3.4.1 mild 3.4.2 moderate 3.4.3 severe

4. Gingival recession (K 06.0)		
4.1 Form	**4.2 Prevalence**	**4.3 Severity (Degree)**
4.1.1 anatomical (K 06.2) 4.1.2 physiologic 4.1.3 symptomatic (K 05)	4.2.1 localized 4.2.2 generalized	4.3.1 mild 4.3.2 moderate 4.3.3 severe

5. Periodontal atrophy (K 05.5)		
5.1 Form	**5.2 Prevalence**	**5.3 Severity (Degree)**
5.1.1 physiologic 5.1.2 symptomatic (Q67.4, K07, K06.1)	5.2.1 generalized	5.3.1 mild 5.3.2 moderate 5.3.3 severe

6. Gingival hypertrophy	
6.1 Form	**6.2 Prevalence**
6.1.1 fibromatosis 6.1.2 other gingival hypertrophy	6.2.1 localized 6.2.2 generalized

computed tomography (CBCT) are used for diagnosing endoperiodontitis among the additional methods of examination. According to C. Estrela et al. (2008), the informativity of OPG is the following: the sensitivity is 0.28; the specificity is 1.00; the diagnostic accuracy is 0.54. This method of examination gives the possibility to obtain only a single planar summation image with the distortion of the object in size and configuration depending on the direction of X-ray beams. Meanwhile OPG is a static planar two-dimensional image, which doesn't give the possibility to study the object of examination in various planes. X-ray detection of the radiolucent area is possible only in case of bone demineralization for at least 30–50%, which limits the ability to identify the pathological process at an early stage of development. It decreases the informativity of OPG in patients with endoperiodontitis significantly [3, 4, 10].

Nowadays CBCT has obtained a broad integration into dentistry. The received three-dimensional model is studied with regard to the choice of the angle, side, plane and depth of image without distortion when obtaining a slice of the examination area. Cone-beam computed tomography shows the anatomical features of root canals, accessory root canals, topography of bone tissue resorption, involvement of tooth root furcation in the pathological process and other signs of endodontic-periodontal lesions. This radiographic method can thus be applied in patients with endodontic-periodontal lesions [8, 12–25].

● THE AIM OF THE PRESENT RESEARCH

The aim of the present research is to determine the complex of clinical and radiographic methods for diagnosing the patients with chronic generalized periodontitis in combination with localized complex endoperiodontitis.

● OBJECTS AND METHODS

The research included the clinical and radiographic examination of 100 almost healthy patients aged 35–44 years. The study group consisted of 50 patients with chronic generalized periodontitis of moderate severity in combination with localized complex endoperiodontitis (100 teeth). The control group was represented by 50 patients without periodontal pathology. The diagnosis of endoperiodontitis was made according to the classification of Professor L.N. Dedova (2012). The examined patients had chronic generalized periodontitis accompanied by a long lasting inflammation of periodontal tissues with the destruction of periodontal ligament and alveolar bone of moderate and severe degree.

Evaluation of clinical data included the analysis of questioning, clinical examination and study of the objective tests, which included determination of the gingival index GI (Loe N., Silness J.,1963); bleeding on probing the gingival sulcus; gingival sulcus depth and furcation area destruction; suppuration from periodontal pockets; migration of teeth; percussion of teeth; tooth mobility, electric pulp test; intraoral radiography, orthopantomography and cone-beam computed tomography.

The statistical data analysis was carried out in accordance with modern requirements for conducting the biomedical research. The program Statistica 10.0 was used. The informativity of orthopantomograms and cone-beam computed tomograms was evaluated by determining the sensitivity, specificity, overall accuracy and prognostic value.

● RESULTS AND DISCUSSION

Clinical studies revealed chronic localized endoperiodontitis which led to 13.6 times decrease of pulp vitality (the control group had 5.14 ± 1.66 μA) and increase in the probing depth of the periodontal pocket by 4.84 ± 1.34 mm (the control group had 2.39 ± 0.26 mm) (fig. 1).

The results of the research also showed the secondary clinical signs of localized complex endoperiodontitis in patients with periodontal diseases such as inflammation and gum bleeding, suppuration from periodontal pockets, migration of teeth, pain to percussion, tooth mobility, furcation involvement and formation of periodontal abscesses. Gum bleeding was recorded in the area of 49% of teeth with localized complex endoperiodontitis. The mean GI index was 1.78 ± 0.59. The comparison of the findings of the electric pulp test (EPT) and the depth measurement of the periodontal pocket with gum bleeding on probing showed 100% sensitivity, 51% specificity and 2.1 times higher prognostic significance ($F = 0.6$; $p = 0.001$).

Positive percussion was detected in the area of 17% of teeth. The comparison of the findings of the EPT and the depth measurement of the periodontal pocket with the positive percussion showed 100% sensitivity, 83% specificity and 5.9 times higher prognostic significance ($F = 0.8$; $p = 0.001$).

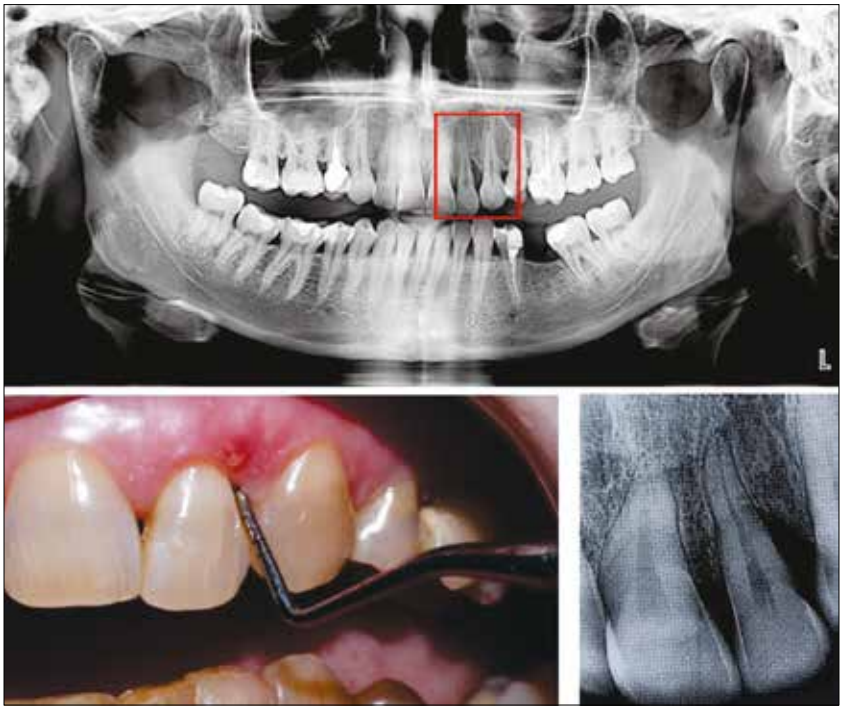

Fig. 1. Exacerbation of chronic localized complex endoperiodontitis of moderate severity of tooth # 2.2

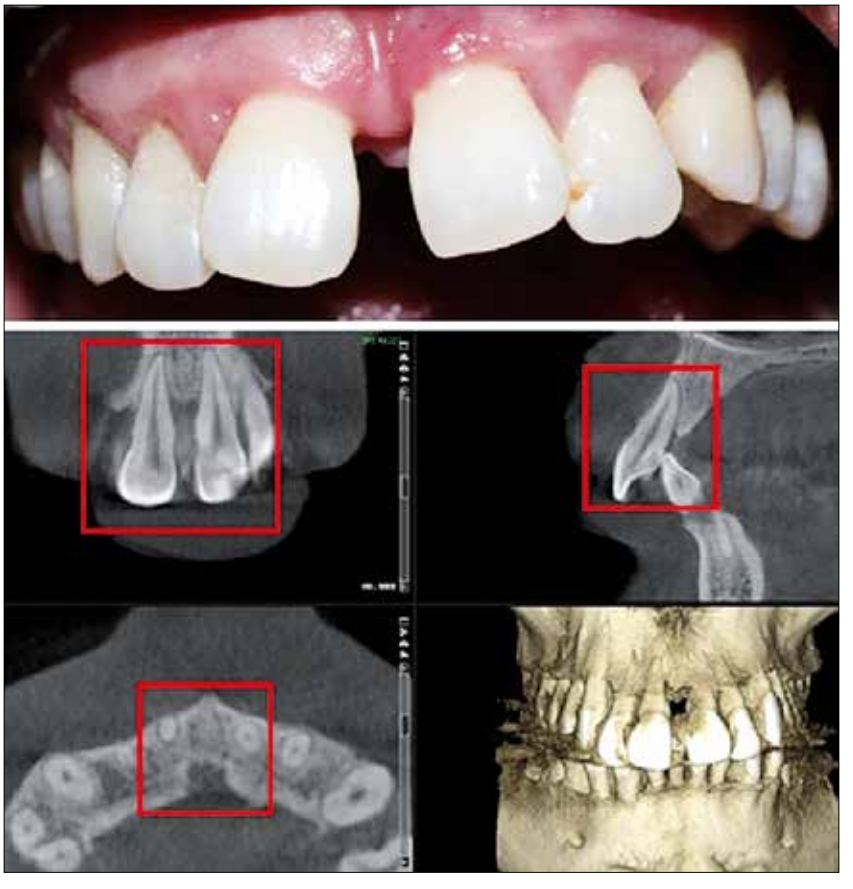

Fig. 2. Chronic localized complex endoperiodontitis of moderate severity of tooth # 1.1

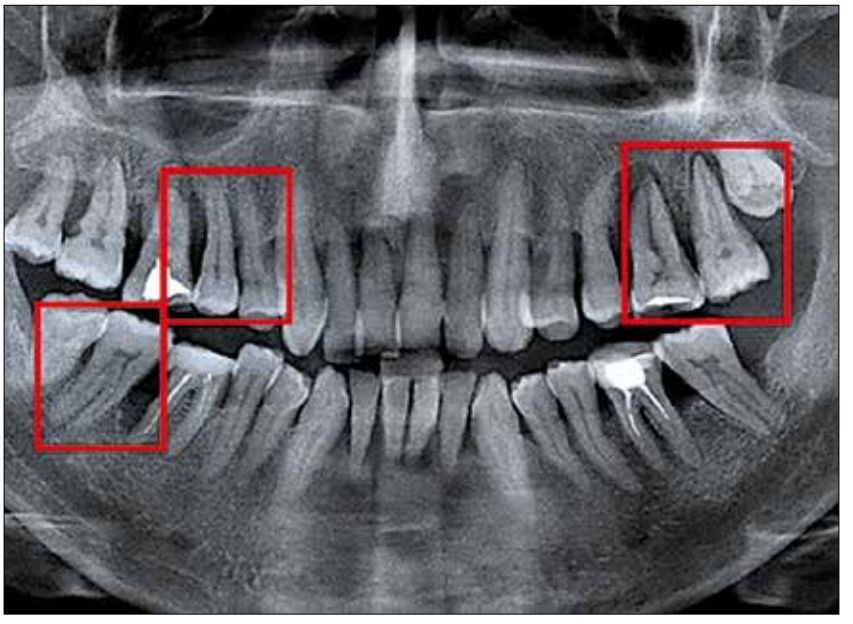

Fig. 3. Chronic localized complex endoperiodontitis of severe degree of teeth # 1.5, 2.7, 4.7

Migration of teeth was determined in the area of 38% of teeth. (fig. 2). The comparison of the findings of the EPT and the depth measurement of the periodontal pocket with migration of teeth showed 100% sensitivity, 62% specificity and 2.6 times higher prognostic significance (F = 0.7; p = 0.001).

Pathological mobility (degree I and degree II) was found in the area of 48% of teeth. The comparison of the findings of the EPT and the depth measurement of the periodontal pocket with pathological tooth mobility revealed 100% sensitivity, 52% specificity and 2.1 times higher prognostic significance (F = 0.6; p = 0.001).

Furcation involvement of the tooth root in the pathological process was observed in the area of 22% of teeth. The comparison of

Fig. 4. Chronic localized complex endoperiodontitis of severe degree of tooth # 3.1

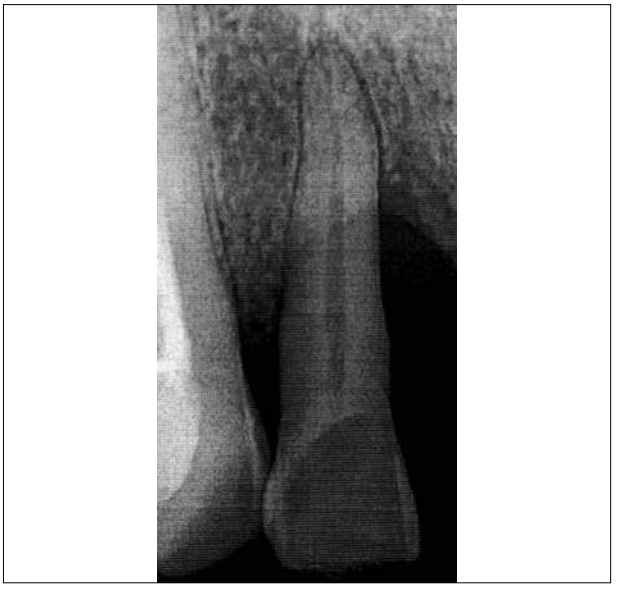

Fig. 5. Chronic localized complex endoperiodontitis of moderate-severe degree of tooth # 2.2

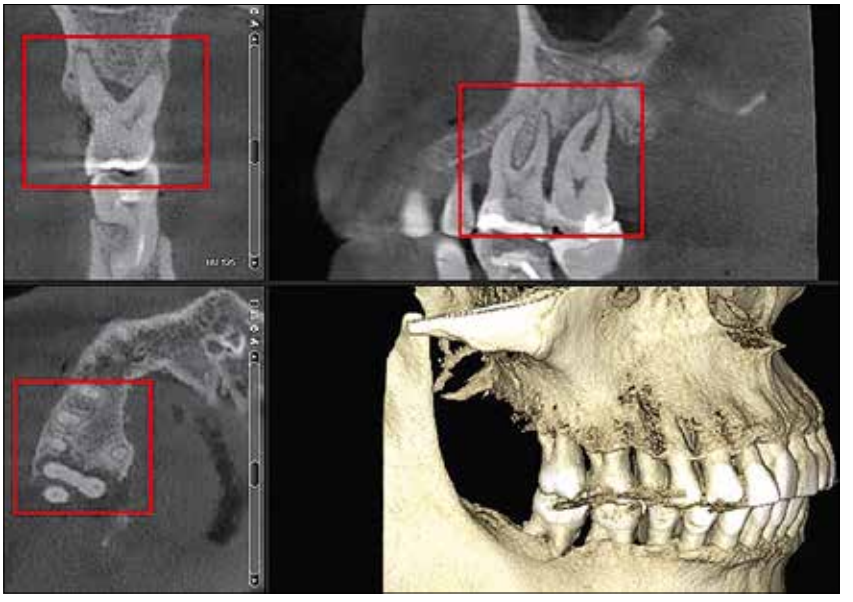

Fig. 6. Chronic localized complex endoperiodontitis of severe degree of teeth # 1.6 and 1.7

the findings of the EPT and the depth measurement of the periodontal pocket with the furcation involvement of teeth confirmed 100% sensitivity, 78% specificity and 4.6 times higher prognostic significance (F = 0.8; p = 0.001).

Suppuration from periodontal pockets was identified in the area of 43% of teeth. The comparison of the findings of the EPT and the depth measurement of the periodontal pocket with the presence of suppuration from the periodontal pocket demonstrated 100% sensitivity, 57% specificity and 2.3 times higher prognostic significance (F = 0.6; p = 0.001).

Acute periodontal abscesses were revealed in 16% of teeth. The comparison of the findings of the EPT and the depth measurement of the periodontal pocket with the presence of periodontal abscess showed 100% sensitivity, 84% specificity and 6.3 times higher prognostic significance (F = 0.9; p = 0.001).

Destructive processes in periodontal tissues were identified in 100% patients with localized complex endoperiodontitis. The main radiographic sign was irregular resorption of the intraalveolar septa and the alveolar bone in the area of pathways. Meanwhile, the secondary radiographic signs of bone destruction were osteoporosis of the interdental septa and widening of the periodontal ligament space (fig. 3; fig. 4; fig. 5).

Osteoporosis of the interdental septa was determined in the area of 34% of teeth. The comparison of the alveolar bone destruction in the area of pathways with osteoporosis of the interdental septa elucidated 100% sensitivity, 66% specificity and 2.9 times higher prognostic significance (F = 0.7; p = 0.01).

The widening of the periodontal ligament space was marked in the area of 41% of teeth. The comparison of the alveolar bone destruction in the area of pathways with osteoporosis of the interdental septa showed 100% sensitivity, 59% specificity and 2.4 times higher prognostic significance (F = 0.6; p = 0.01).

IOR was characterized by 44% sensitivity, 42% specificity, 43% overall accuracy and 0.76 times higher prognostic significance (F = 0.1; p = 0.01). The sensitivity of OPG was 66%, specificity was 52%, overall accuracy was 59%, and it had 1.4 times higher prognostic significance (F = 0.2; p = 0.01). In its turn, the CBCT was characterized by greater sensitivity (98%), 96% specificity, with a total accuracy of 97% and 24.5 times higher prognostic significance (F = 0.9; p = 0.01).

Applying the complex of clinical and radiographic diagnostic methods showed the necessity of using CBCT for determining the level of destructive processes in case of endoperiodontitis. Nevertheless, CBCT has determined the presence of lateral canals in the area of root and furcation in 12% of patients (F = 0.2; p = 0.01) compared to controls (12% and 2%, respectively) along with the basic radiographic signs of endoperiodontitis.

CBCT has revealed the formation of infrabony pockets in case of localized complex endoperiodontitis. IOR and OPG did not visualize the amount of bone resorption due to planar images. Thus 12% of patients (F = 0.2; p = 0.01) had three-wall periodontal pockets, 42% of patients (F = 0.6; p = 0.01) had two-wall periodontal pockets, 36% (F = 0.5; p = 0.01) of patients had one-wall periodontal pockets and 30% of patients (F = 0.4; p = 0.01) had spiral periodontal pockets (fig. 6).

CONCLUSION

The following conclusions were made on the basis of the conducted research:

1. The main methods of diagnosing localized complex endoperiodontitis are the electric pulp test and probing the periodontal pockets that have 4.2 times higher prognostic significance compared to gingival index, bleeding on probing, suppuration from periodontal pockets, migration of teeth, positive percussion, tooth mobility, furcation involvement and formation of acute periodontal abscesses.
2. The additional method of diagnosing the localized complex endoperiodontitis is cone-beam computed tomography that has the diagnostic efficacy of 96–98% compared to intraoral radiography (42–44%) and orthopantomography (52–66%).

REFERENCES

1. Dedova L.N., Denisova Ju.L., Kandrukevich O.V., Solomevich A.S., Rosenik N.I. Rasprostranennost' boleznej periodonta, kariesa kornja zuba, chuvstvitel'nosti dentina i zubocheljustnyh deformacij v Respublike Belarus' po rezul'tatam obsledovanija naselenija v vozrastnyh gruppah 35–44, 45–54 i 55–64 goda [The prevalence of periodontal diseases, root caries, dentine sensitivity and dentoalveolar deformities in the Republic of Belarus based on the the results of examining the population aged 35–44, 45–54 and 55–64 years]. Stomatolog. Minsk. – Stomatologist, Minsk. 2016, no 1 (20), pp. 9–15.
2. Dedova L.N., Denisova Ju.L., Denisov L.A. Jendoperiodontit – novoe v klassifikacii boleznej periodonta [Endoperiodontitis – new in the classification of periodontal diseases]. Stomatolog. Minsk. – Stomatologist, Minsk. 2012, no 3 (6), pp. 16–21.
3. Abbott P.V., Salgado J.C. Strategies for the endodontic management of concurrent endodontic and periodontal diseases. Australian Dental Journal, 2009, no. 54, pp. 70–85. doi: 10.1111/j.1834–7819.2009.01145.x.
4. Aksel H., Serper A. A case series associated with different kinds of endo-perio lesions. Journal of Clinical and Experimental Dentistry, 2014, vol. 6, no. 1, pp. 91–95. doi: 10.4317/jced.51219.
5. Chen S.Y., Wang H.L., Glickman G.N. The influence of endodontic treatment upon periodontal wound healing. Journal of Clinical Periodontology, 1997, no. 24, pp. 449–456. doi: 10.1111/j.1600-051X.1997.tb00211.x.
6. Dannewitz B., Krieger J.K., Husing J., Eickholz P. Loss of molars in periodontally treated patients: a retrospective analysis five years or more after active periodontal treatment. Journal of Clinical Periodontology, 2006, vol. 33, no. 1, pp. 53–61. doi: 10.1111/j.1600-051X.2005.00858.x.
7. Davies A., Mannocci F., Mitchell P., Andiappan M., Patel S. The detection of periapical pathoses in root filled teeth using single and parallax periapical radiographs versus cone beam computed tomography – a clinical study. International Endodontic Journal, 2015, vol. 48, no. 6, pp. 582–592. doi: 10.1111/iej.12352.
8. Davies A., Patel S., Foschi F., Andiappan M., Mitchell P.J., Mannocci F. The detection of periapical pathoses using digital periapical radiography and cone beam computed tomography in endodontically retreated teeth part 2: a 1 year post-treatment follow-up. International Endodontic Journal, 2016, vol. 49, no 7, pp. 623–635. doi: 10.1111/iej.12500.
9. De Beule F., Alsaadi G., Peric M., Brecx M. Periodontal treatment and maintenance of molars affected with severe periodontitis (DPSI=4): An up to 27-year retrospective study in a private practice. Quintessence International, 2017, vol. 48, no5, pp. 391–405. doi: 10.3290/j.qi.a38059.
10. Estrela C., Bueno M.R., Leles C.R., Azevedo B.C., De Azevedo J.R. Accuracy of cone beam computed tomography and panoramic and periapical radiography for detection of apical periodontitis. Journal of Endodontics, 2008, vol. 34, no 2, pp. 237–279. doi: 10.1016/j.joen.2007.11.023.
11. Estrela C., Bueno M.R., Azevedo B.C., De Azevedo J.R., Pecora J. A new periapical index based on cone beam computed tomography. Journal of Endodontics, 2008, vol. 34, no 11, pp. 1325-1331. doi: 10.1016/j.joen.2008.08.013.
12. Fujii R., Muramatsu T., Yamaguchi Y., Asai T, Aida N, Suehara M, Morinaga K, Furusawa M. An endodontic-periodontal lesion with primary periodontal disease: a case report on its bacterial profile. The Bulletin of Tokyo Dental College, 2014, vol. 55, no 1, pp. 33–37. doi: 10.2209/tdcpublication.55.33.
13. Haghanifar S., Moudi E., Mesgarani A., Bijani A., Abbaszadeh N. A comparative study of cone-beam computed tomography and digital periapical radiography in detecting mandibular molars root perforations. Imaging Science in Dentistry, 2014, vol. 44, no 2, pp. 115–119. doi: 10.5624/isd.2014.44.2.115.
14. Lim J.H., Lee J.H., Shin S.J. Diagnosis and treatment of teeth with primary endodontic lesions mimicking periodontal disease: three cases with long-term follow ups. Restorative Dentistry and Endodontics, 2014, vol. 39, no.1, pp. 56–62. doi: 10.5395 / rde.2014.39.1.56.
15. Patel S., Dawood A., Ford T.P., Whaites E. The potential applications of cone beam computed tomography in the management of endodontic problems. International Endodontic Journal, 2007, vol. 40, no.10, pp. 818-830. doi: 10.1111/j.1365–2591.2007.01299.x.
16. Patel S., Wilson R., Dawood A., Foschi F., Mannocci F. The detection of periapical pathosis using periapical radiography and cone beam computed tomography part 2: a 1-year post-treatment follow-up. International Endodontic Journal, 2012, vol. 45, no. 8, pp. 711–723. doi: 10.1111/j.1365-2591.2012.02076.x.

17. Patel S., Brady E., Wilson R., Brown J., Mannocci F. The detection of vertical root fractures in root filled teeth with periapical radiographs and CBCT scans. International Endodontic Journal, 2013, vol. 46, no.12, pp. 1140-1152. doi: 10.1111/iej.12109.
18. Peeran S.W., Thiruneervannan M., Abdalla K.A. Endo-Perio Lesions. International Journal of Scientific and Technology Research, 2013, vol. 2, no.5, pp. 268–274.
19. Rajput A., Talwar S., Chaudhary S., Khetarpal A. Successful management of pulpo-periodontal lesion in maxillary lateral incisor with palatogingival groove using CBCT Scan. Indian Journal of Dental Research, 2012, vol. 23, no. 3, pp. 415–418. doi: 10.4103/0970-9290.102243.
20. Sharma, S. Srivastava D., Sood V., Khetarpal A. Endodontic and periodontal management of a severely affected maxillary lateral incisor having combined mucosal fenestration and palatogingival groove. Journal of Indian Society of Periodontology, 2015, vol. 19, no. 3, pp. 348–351. doi: 10.4103/0972-124X.152413.
21. Shenoy N., Shenoy A. Endo-perio lesions: diagnosis and clinical considerations. Indian Journal of Dental Research, 2010, vol. 21, no. 4, pp. 579–585. doi: 10.4103/0970-9290.74238.
22. Singh P. Endo-perio dilemma: a brief review. Journal of Dental Research, 2011, vol. 8, no.1, pp. 39–47.
23. Schmidt J.C., Walter C., Amato M., Weiger R. Treatment of periodontal-endodontic lesions – a systematic review. Journal of Clinical Periodontology, 2014, vol. 41, no. 8, pp. 779-790. doi: 10.1111/jcpe.12265.
24. Venskutonis T., Plotino G., Juodzbalys G., Mickevičienė L. The importance of cone-beam computed tomography in the management of endodontic problems: a review of the literature. Journal of Endodontics, 2014, vol. 40, no. 12, pp. 1895–1901. doi: 10.1016/j.joen.2014.05.009.
25. Verma P.K., Srivastava R., Gupta K.K., Srivastava A. Combined endodontic-periodontal lesion: a clinical dilemma. Journal of Interdisciplinary Dentistry, 2009, vol. 13, no. 2, pp. 97–100. doi: 10.4103/2229-5194.85034.

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