International Arab Journal of Dentistry

Volume 9 | Issue 2 Article 5

1-21-2020

Three years follow-up of a large cyst: A case report

Chadi TORBAY

Valérie BATROUNI

THREE YEARS FOLLOW-UP OF A LARGE CYST: A CASE REPORT

Chadi Torbay* | Valérie Batrouni**

Abstract

The main goal of root canal therapy is to eliminate the pathogenic effects of bacteria from the root canal system and that through chemo-mechanical debridement followed by inert root filling to prevent microorganisms from infecting or reinfecting root canals and the periradicular tissues [1].
Defining clinical healing of apical periodontitis after endodontic treatment is very difficult especially finding a relevant radiologic examination method for accurate observation. Therefore, various radiologic techniques were used among which we site the periapical x-rays, the orthopantomogram, the cone beam computed tomography, and that depending on the size and the localization of the pathological entity.
The aim of the present paper was to show the treatment outcome and the healing of large periapical radiolucency controlled with CBCT.

Keywords: Cone beam computed tomography - apical periodontitis - conventional endodontics.

TROIS ANS DE SUIVI D'UN CAS DE KYSTE LARGE : À PROPOS D'UN CAS

Résumé

Le principal objectif du traitement canalaire est d'éliminer les bactéries pathogènes du système radiculaire. Cela est accompli par le débridement chimio-mécanique suivi d'une obturation hermétique et inerte des racines pour empêcher les micro-organismes d'infecter ou de réinfecter les canaux radiculaires et les tissus périradiculaires [1].
Il est très difficile de définir la guérison clinique de la parodontite apicale après un traitement endodontique, en particulier de trouver une méthode d'examen radiologique pertinente pour une évaluation précise. Par conséquent, différentes techniques radiologiques ont été utilisées, parmi lesquelles on trouve la radiographie périapicale, la panoramique, la tomodensitométrie à faisceau conique, le choix de la technique étant en fonction de la taille et de la localisation de l'entité pathologique.
Le but de cet article était de montrer le résultat du traitement et la cicatrisation dans le temps d'une lésion radioclaire périapicale importante, le contrôle étant radiologique.

Mots-clés: Tomodensitométrie à faisceau conique - parodontite apicale - endodontie conventionnelle.

* Dpt of Endodontics,
Faculty of Dentistry, Lebanese University, Beirut, Lebanon
Chaditorbay@hotmail.com

** Dpt of Endodontics,
Faculty of Dentistry, Lebanese University, Beirut, Lebanon

Introduction

Within the concept of standard endodontics, the decision-making process to perform orthograde (non-surgical) treatment alone without apical surgery in cases of persistent apical periodontitis should bear in mind a long-term survival or success rates of root-filled teeth. This pre-evaluation includes multiple factors, individual case evaluation, and thorough treatment planning.

In addition, patients frequently tend to choose the least expensive treatment option. However, specific benefit-risk analysis or patient preference may favor apical surgery as the treatment of choice.

Case presentation

In December 2012, a 36-year-old Caucasian male reported to our dental clinic with his chief complaint: the discoloration in the upper central and lateral left incisors. He requested an esthetic and a full rehabilitation treatment. A fast overview of the buccal cavity showed the absence of three molar teeth, and some small carries. The patient was asked to do a panoramic x-ray for a complete treatment plan. The preoperative panoramic radiograph revealed a huge apical radiolucency laying on the upper left maxilla, extending from the central incisal to the mesial canine in the frontal plan and towards the nasal fossa in the sagittal plan (Fig.1). Palpation for an accurate inspection of the buccal and lingual mucosa surrounding the teeth region revealed no tenderness but an open fistula on the buccal side without swelling. The patient revealed a history of no spontaneous pain, a possible accidental trauma, and mainly a chronic sensation of discomfort in the vestibule pointing the incisal region. Clinically, no carious lesion was detected in both teeth. However, the tooth was tender to vertical percussion. Periodontal probing around the tooth and mobility were within physiological limits. The patient's medical history was normal.

Thermal testing (application of heated gutta-percha and dry ice on the cervical buccal side of each tooth with comparison to the sensation registered on the contralateral teeth) and electric pulp testing showed pulpal vitality only on tooth number 11 and the left maxillary canine.

After clinical and radiographic examinations, a possible diagnosis of asymptomatic apical periodontitis was suggested, and the evaluation of possible surgical endodontic treatment if recommended is assigned. The preoperative radiographic evaluation of the involved teeth did not indicate any variation or abnormalities in the root canal anatomy in both teeth.

Before the treatment plan, a cone beam computed tomography (CBCT) was done to evaluate the extension of the lesion, in order to assess whether the treatment is going to be assigned with surgical intervention or not (Fig .2). After studying all x-rays and with the patient consent, a decision to apply a conventional treatment with follow-up periods and to postpone the surgery was taken; knowing that in 2014, James et al. [2] dictated that surgical intervention should not be a substitute for failure to properly manage the root canal system non-surgically. It is still imperative to "consider" the choice of non-surgical root canal treatment or the revision of previous less-than-ideal treatment before undergoing surgical intervention. This is especially true with the massive and irrational movement to replace every root canal-treated tooth with or without symptoms with an intraosseous implant [2].

Treatment protocol

Local anesthesia was induced using 1.8 mL 2% lidocaine with 1:200,000 epinephrine. Conventional endodontic access opening was applied to central and lateral incisors and a rubber dam was placed for isolation to prevent salivary leakage. After access cavity preparation, working length determination was aided by an electronic apex locator (EAL) and confirmed by taking a radiograph with the diagnostic file. The canals were enlarged in a crown-down technique using an association of rotary and manual instruments. Canals were irrigated with sodium hypochlorite (5,25%) throughout instrumentation using standard endodontic needle irrigation. Endodontic needles were used 3mm short from the working length and manual agitation was applied while irrigating. Canals were instrumented apically to sizes 50 closer to the radiographic apex certainly because we are confronting infected canals with periapical lesions. A master apical file radiograph was taken at the working length, and canals were then filled using the thermomechanical compaction technique of Gutta-percha. Restoration was followed by a definitive coronal restoration material of composite resin. Treatments were completed within 1 month from the date it was initiated. Before the definitive obturation, the cleaning protocol was carried out over multiple visits and calcium hydroxide was used as an intracanal medication between appointments.

Follow-up and Discussion

In this case report, the goal was to eliminate apical periodontitis (AP) [3], an inflammatory disorder of periradicular tissues caused by microorganism agents of endodontic origin [4]. The teeth were single-rooted with less complexed canal system, decreasing the presence of debris accumulation at the intercanal spaces and favoring the disinfection. Canals were instrumented apically to sizes 50 closer to the radiographic apex [5, 6].

No presence of overextended gutta-percha that may stimulate foreign body reaction in the apical tissues, and subsequently delay the healing time by almost 14 months [7].

With the only purpose to control the lesion, a follow-up control was undertaken every six months in average, with the aid of a panoramic x-ray. It can be valuable if properly done and evaluated (Fig.3). Improper positioning of the patient's jaw within the focal trough can be an error source. When the jaws are positioned within this area, the radiograph will be clear. When the jaws are positioned outside this area, the images on the radiograph will appear blurred or indistinct. If the patient's anterior teeth are not positioned in the groove on the bite-block and are either too far forward or back to the focal trough, the anterior teeth will appear blurred.

On the other hand, panoramic x-ray shows greater coverage and 4 times less radiation than 4 periapical radiographs.

Compared to CBCT, panoramic gives less radiation and the cost is less expensive. If we make a balance between Cost + radiation and radiographic diagnosis panoramic is highly enough to see the evolution of the lesion each six months.

Surgical intervention is always questioned if no healing or recovery is to be seen.

Finally, after 3 years, a CBCT was taken to confirm the 3D volume of the bone healing if it is in concordance with the panoramic (Fig.4). The healing time of this large apical periodontitis was around 19 months with a similarity of healing time described in the literature [8-10], indicating that one year is the minimal time required for most cases before concluding a healing outcome and/ or surgical intervention.

Non-surgical success of apical periodontitis

The purpose of root canal treatment is to prevent the intracanal biofilm that can advance or the bacteria products that can egress to the periapex [11] leading to various categories of lesions that are given the overarching name of apical periodontitis [12]. That can be achieved by a microbe-free canal during multiple steps treatment: instrumentation, irrigation with sodium hypochlorite (NaOCl) solution, rinsing with EDTA and a microbicide dressing applied in multiple visit treatments [13].

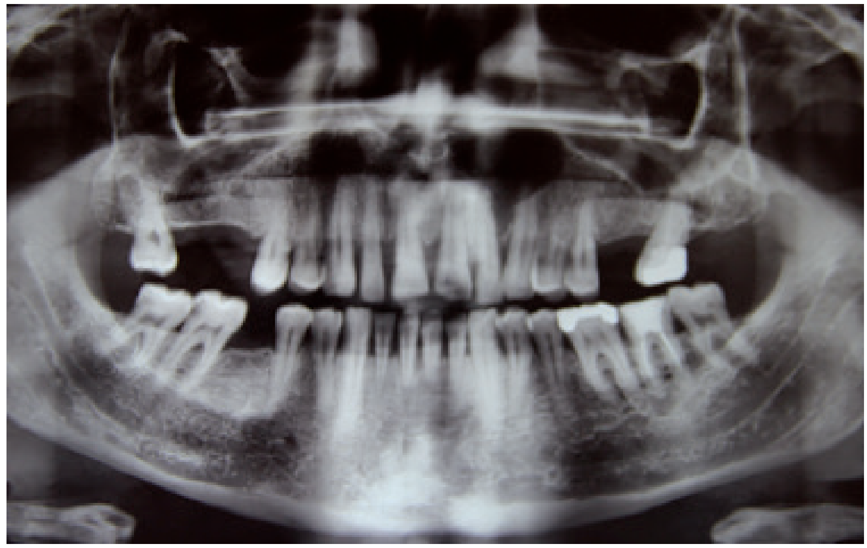

Fig. 1: A panoramic radiograph showing a large apical radiolucency laying on the upper left maxilla from the central incisal to mesial canine in the frontal plan and towards the nasal fossa in the sagittal plan.

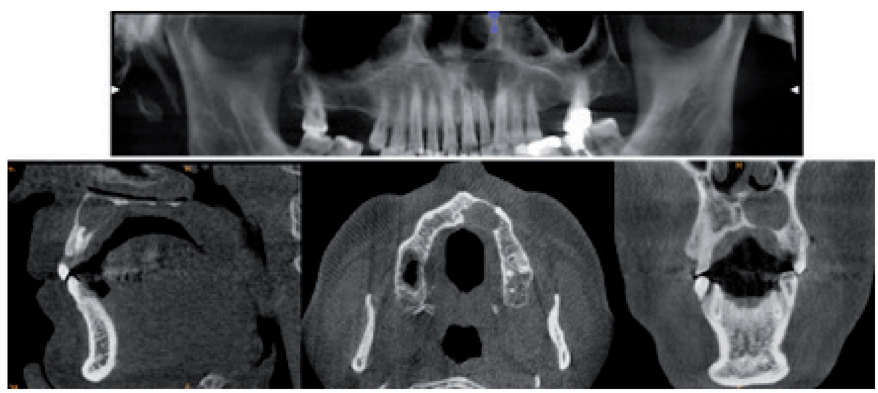

Fig. 2: Axial, frontal and sagittal cuts showing well corticated, low density area extending from the alveolar process to the nasal floor with perforation of the palatal process.

When the treatment is performed with a significant reduction of the burden of root canal infection to a subcritical level [14] it will be associated with high healing rates: osseous regeneration, gradual reduction and resolution of the radiolucency on subsequent follow-up radiographs. Even though two or multiple visit protocol resulted in microbial reduction compared to one-visit protocol, substantial amounts of microbes remained in isthmuses and other inaccessible areas of the canal system [10, 12].

Moreover healing may be achieved despite of bacterial presence [13, 16, 20]. Therefore, surviving microorganisms present at the time of root filling are a potential risk that may result with time an unfavorable apical healing response [12].

Various terms have been used to define the absence or presence of symptoms, the complete or the partial resolution of the preoperatively existing periapical radiolucency that will categorize the outcomes of root canal treatment: Success and failure, healing and healed, effective and ineffective [14, 18]. Surgical or nonsurgical approaches are time-dependent and the outcome of the treatment is controlled through monitoring for longer periods and is related to a patient

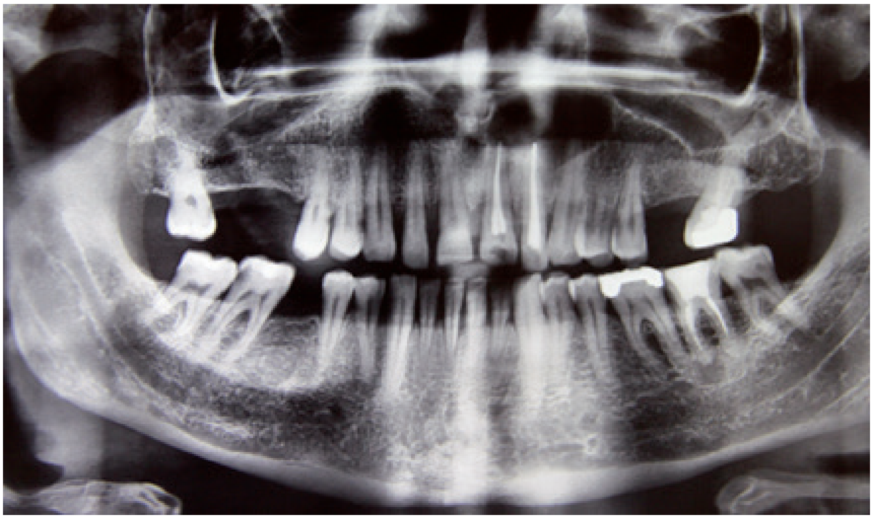

Fig.3: A panoramic radiograph 6 month later showing the regression of the lesion.

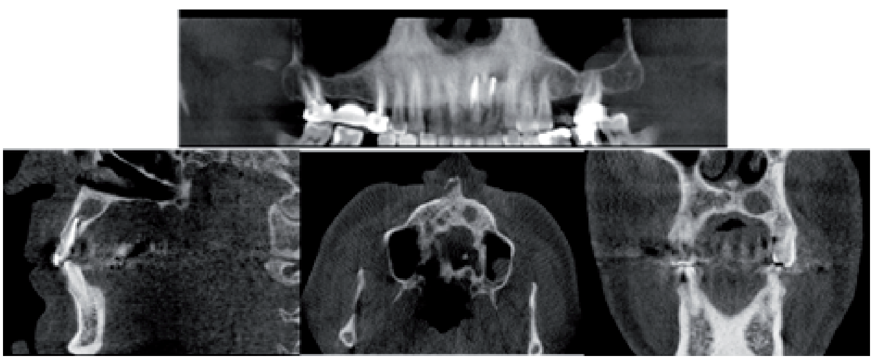

Fig. 4: 3 years later, a CBCT showing the bone healing in the three planes.

recall follow-up with a thorough clinical and radiographic examination [8, 19, 23, 24].

The outcome of root canal treatment improved from 86% at 10–17 years to 95% at 20–27 years post-treatment in both initial [25] and retreatment cases [26], suggesting that increasing the time periods for follow-ups should be considered [27] and thus with a low recall rate, the reported success rates could be over- or under-estimated [25]. A complete bone healing process is to be expected but it requires monitoring for a longer period [28], and it is more influential in nonsurgical root canal treatment than in intra-oral procedures [29]. The average healing time increased significantly by almost 1 year in type II root canal systems (Weine classification [30]). A follow-up period from 1 year to 4 years is mandatory; we need to motivate the patient and to increase the recall rate, the number of appointments and the radiographs [31]. A one-year follow-up period is too short to judge a tooth as 'diseased', and therefore reduce the number of unnecessary retreatments or surgical interventions unless signs of enlargement of a radiolucency and/or the persistence/ emergence of symptoms.

Several factors alter the healing times and the treatment outcomes:

1-Internal factors regarding pulp condition (vital or non-vital), the periapical condition (with or without radiolucency), number of canals and complex pulp systems.

2-External factors regarding:

a) The patient medical conditions (age, systemic diseases, immune response

b) The operating protocol treatment (apical preparations, reduction of intracanal bacteria, canal irrigation, debris removal or obturation technique fillings) [10].

c) The experienced clinicians performing the endodontic treatment [31].

d) The lack of adequate coronal seal, presence of true cysts, extraradicular infection, foreign body reactions or impaired healing [32].

Persistent post-treatment apical radiolucency (incomplete bone healing and no reduction in the volume of a lesion) may occur due to [33]:

Residual intraradicular biofilm in the complex apical root canal system.

Extraradicular infection, generally in the form of periapical actinomycosis.

Extruded root canal filling or other exogenous materials that cause a foreign body reaction.

Accumulation of endogenous cholesterol crystals that irritate periapical tissues.

True cystic lesions.

Scar tissue healing of the lesion.

Cone beam computed tomography

Digital radiography is becoming increasingly more popular in the dental clinic. CBCT has gained considerable popularity since it was introduced during the 1990s, and has the potential to show periapical bone loss that is not readily visualized by periapical radiographs [34]. The volume of a bone lesion is usually larger than that depicted by the radiographic image. It has long been debated whether the character of the bone destruction and especially the radiological appearance may provide leads indicating that surgical treatment may be preferable to conventional root canal therapy. Also, whether bone healing after root canal treatment is ongoing or whether the treatment effort has been futile.

Although intraoral periapical radiography has been the dominant routine technique for years, there is uncertainty of conclusions about endodontic treatment outcome and it does not accurately demonstrate the presence of every lesion, the real size or its spatial relationship with the anatomical structures. The low values on sensitivity probably reflect the difficulty in detecting small periapical bone lesions. Therefore because of its higher sensitivity and specificity, Cone-beam computed tomography has been more successful in detecting periradicular changes [34, 35]. Thereby CBCT images have better diagnostic yield compared with conventional periapical radiography (PAR) and detect more periradicular defects than PAR in teeth with symptomatic irreversible pulpitis [36]. The outcomes of nonsurgical root canal treatment have also been assessed by CBCT and compared with PAR and that because failure rates have been well reported when using this technique at 6 months and 1 year in dogs and humans, respectively [37]. One advantage of this method is that it is easy to use. It also gives a three-dimensional image of the exposed area, which can be a significant advantage with multi-rooted teeth. However, recent reviews have indicated insufficient scientific evidence to support the assertion that the diagnostic accuracy of CBCT is greater than that of intraoral radiological techniques [38]. Also, the correlation between CBCT and PAR for post-treatment assessment of the presence and dimensions of periapical lesions for root filled molar teeth was poor [39]. The probability of overestimating post-treatment disease with CBCT has been suggested [37]. Nevertheless, in vivo and ex vivo studies have demonstrated that the use of CBCT enhances the interpretation of outcomes for root canal treatment [36, 40, 41]. Although CBCT ought to be employed to reassess the success rate of endodontic treatment there is, however, a risk of overestimating the frequency of endodontic failures as healing of a periapical bone lesion may take longer than anticipated earlier and its accuracy is still unknown. At a one-year follow-up after endodontic treatment, for instance, CBCT can show loss of bone, whilst intraoral periapical radiography indicates healing [42].

CBCT disadvantages are:

Higher cost;

Potentially higher radiation dose, depending on the equipment and the volume (field of view) used.

In a joint position statement by the American Association of Endodontists and the American Academy of Oral and Maxillofacial Radiology, it was recommended that 'CBCT should only be used when the question for which imaging is required cannot be answered adequately by lower dose conventional radiography or alternate imaging modalities' [43]. Also, the literature review performed by Sedentexct [44] recommends that CBCT cannot be justified for routinely for endodontic diagnosis.

Although scientific evidence is lacking, it is reasonable to assume that conventional radiographic examination is not sufficiently sensitive to provide information about different periapical lesion conditions.

Conclusion

The outcome and healing time of this periapical lesion is interpreted with caution through long follow-up periods. The nonsurgical root canal treatment of this case appeared to be more favorable because of simple roots with non-vital pulps rather than treated roots with procedural errors, short or poor root filling density.

The following questions are always addressed:

How much time is needed to evaluate the healing of an apical periodontitis?

Which radiographic method is the most accurate for assessment of bone tissue changes over time?

Do we really gain bone reconstruction from waiting a longer period or do we have to go on a surgical approach?

Cone beam computed tomography can be expected to assume increasing importance in diagnosis of periapical bone tissue changes and in monitoring the status of root canal treated teeth.

To date, the diagnostic accuracy has not been adequately investigated or positively highlighted therefore there are limitations and insufficient knowledge about the accuracy of the different radiographic techniques in use clinically. Unless there is presence of small bone lesions where CBCT is more sensitive than other radiography, adequate evaluation of differences between the radiological techniques is on a histopathological level where biopsy is taken upon surgical intervention.

The gold standard may be to undertake studies with CBCT scanning and subsequent confirmation of periradicular disease with histological examination, but this would be difficult on human ethical bases.

References

1. Chugal NM, Clive JM, Spangberg LS. Endodontic infection: some biologic and treatment factors associated with outcome. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics 2003;96; 81–90.
2. James Guthman, (2104) Surgical endodontics: past, present, and future. Endodontic topics 2014;30(1):29-43.
3. Ørstavik D, Pitt Ford TR. Essential endodontology: prevention and treatment of apical periodontitis. Oxford, UK, Malden, MA: Blackwell Science; 1998.
4. Kakehashi S, Stanley H, Fitzgerald R. The effects of surgical exposures of dental pulps in germ-free and conventional laboratory rats. Oral Surgery, Oral Medicine, and Oral Pathology 1965;20;340–9.
5. Yared GM, Dagher FE. Influence of apical enlargement on bacterial infection during treatment of apical periodontitis. J of Endodont 1994;20:535–7.
6. Aminoshariae A, Kulild JC. Master apical file size– smaller or larger: a systematic review of healing outcomes. Int Endod J 2015 Jul;48(7):639-47.
7. Fristad I, Molven O, Halse A. Nonsurgically retreated root filled teeth–radiographic findings after 20-27 years. Int Endod J 2004;37:12–8.
8. Ørstavik D. Time-course and risk analyses of the development and healing of chronic apical periodontitis in man. Int Endod J 1996;29: 150–5.
9. Imura N, Pinheiro ET, Gomes BP, et al. The outcome of endodontic treatment: a retrospective study of 2000 cases performed by a specialist. J Endod 2007;33:1278–82.
10. Azim AA, Griggs JA& Huang GT-J. The Tennessee study: factors affecting treatment outcome and healing time following nonsurgical root canal treatment. Int Endod J 2015; 48:1-11.
11. Nair PNR. Pathogenesis of apical periodontitis and the causes of endodontic failures. Critical Reviews in Oral Biology and Medicine 2004;15;348–81.
12. Nair PNR. Apical periodontitis: a dynamic encounter between root canal infection and host response. Periodontology 2000 1997;13:121–48.
13. Nair PNR, Henry S, Cano V, Vera J. Microbial status of apical root canal system of human mandibular first molars with primary apical periodontitis after 'one-visit' endodontic treatment. Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontics 2005;99:231–52.
14. Wu M-K, Wesselink PR. The use of cone-beam computed tomography and digital periapical radiographs to diagnose root perforations. J Endod 2011;37(4):513-6.
15. Vera J, Siqueira JF Jr, Ricucci D et al. One-versus two visit endodontic treatment of teeth with apical periodontitis: a histobacteriologic study. J of Endod 2012;38:1040–52.
16. Sundqvist G, Figdor D. Life as an endodontic pathogen: ecological differences between the untreated and root-filled root canals. Endodontic Topics 2003:6:3–28.
17. Sjögren U, Figdor D, Persson S, Sundqvist G. Influence of infection at the time of root filling on the outcome of endodontic treatment of teeth with apical periodontitis Int Endod J 1997;30:297–306.
18. European Society of Endodontology. Quality guidelines for endodontic treatment: consensus report of the European Society of Endodontology. Int Endod J 2006;39:921–30.
19. Wu M-K, Wesselink PR. Timeliness and effectiveness in the surgical management of persistent post-treatment periapicalpathosis. Endodontic Topics 2005;11:25–31.
20. Friedman S. Treatment outcome: the potential for healing and retained function. In: Ingle JI, ed. Endodontics. 6th ed. Hamilton, Ontario, Canada: BC Decker; 2008.
21. Bystrom A, Sundqvist G. Bacteriologic evaluation of the efficacy of mechanical root canal instrumentation in endodontic therapy. Scandinavian Journal of Dental Research 1982;89:321–8.
22. Nair PN. On the causes of persistent apical periodontitis: a review. Int Endod J 2006;39:249–81.
23. Doyle SL, Hodges JS, Pesun IJ, Baisden MK, Bowles WR. Factors affecting outcomes for single-tooth implants and endodontic restorations. J of Endod 2007;33:399–402.
24. Zitzmann NU, Krastl G, Hecker H, Walter C, Weiger R. Endodontics or implants? A review of decisive criteria and guidelines for single tooth restorations and full arch reconstructions. Int Endod J 2009;42:757–74.
25. Molven O, Halse A, Fristad I, MacDonald-Jankowski D. Periapical changes following root canal treatment observed 20-27 years postoperatively. Int Endod J 2002;35:784–90.
26. Fristad I, Molven O, Halse A. Nonsurgically retreated root filled teeth–radiographic findings after 20-27 years. Int Endod J 2004;37:12–8.
27. Tsesis I, Goldberger T, Taschieri S, Seifan M, Tamse A, Rosen E. The dynamics of periapical lesions in endodontically treated teeth that are left without intervention: a longitudinal study. J of Endod 2013;39:1510–5.
28. Tootla S, Owen CP. A comparison of endodontic treatment outcomes between HIV-positive and HIV-negative patients. Journal of the South African Dental Association 2012;67:322–5.
29. Duncan HF, Pitt Ford TR. The potential association between smoking and endodontic disease. Int Endod J 2006;39:843–54.
30. Lloyd A, Uhles JP, Clement DJ, Garcia-Godoy F. Elimination of intracanal tissue and debris through a novel laser-activated system assessed using high-resolution micro-computed tomography: a pilot study. J of Endod 2016;40:584–7.
31. Friedman S, et al. Treatment outcome in endodontics: the Toronto Study—Phase I, II, III: initial treatment. J Endod 2003-2004- 2006;32: 299–306.
32. Ng YL, Mann V, Gulabivala K. A prospective study of the factors affecting outcomes of nonsurgical root canal treatment: part 1: periapical health. Int Endod J 2011;44:583–609.
33. Nair PN. On the causes of persistent apical periodontitis: a review. Int Endod J 2006;39:249–81.
34. Patel S, Wilson R, Dawood A, Foschi F, Mannocci F. The detection of periapicalpathosis using digital periapical radiography and cone beam computed tomography – part 2: a 1-year post-treatment follow-up. Int Endod J 2012;45:711–23.
35. Estrela C, Bueno MR, Leles CR, Azevedo B, Azevedo JR. Accuracy of cone beam computed tomography and panoramic and periapical radiography for detection of apical periodontitis. J of Endod 2008;34:273–9.

36. Abella F, Patel S, Duran-Sindreu F, Mercade M, Bueno R, Roig M. Evaluating the Periapical Status of Teeth with Irreversible Pulpitis by Using Cone-beam Computed Tomography Scanning and Periapical Radiographs. J of Endod 2012;38:1588–91.

37. Patel S, Dawood A, Mannocci F, Wilson R, Pitt Ford T. Detection of periapical bone defects in human jaws using cone beam computed tomography and intraoral radiography. Int Endod J 2009;42:507–515.

38. Petersson A, Axelsson S, Davidson T et al. Radiological diagnosis of periapical bone tissue lesions in endodontics: a systematic review. Int Endod J 2012;45:783–801.

39. Cheung GS, Wei WLL, McGrath C. Agreement between periapical radiographs and cone-beam computed tomography for assessment of periapical status of root filled molar teeth. Int Endod J 2013;10:889–95.

40. de Paula-Silva FW, Hassan B, Bezerra da Silva LA, Leonardo MR, Wu MK. Outcome of root canal treatment in dogs determined by periapical radiography and cone-beam computed tomography scans. J of Endod2009;35:723–6.

41. Tsai P, Torabinejad M, Rice D, Azevedo B. Accuracy of cone-beam computed tomography and periapical radiography in detecting small periapical lesions. J of Endod2012;38:965–70.

42. Christiansen R, Kirkevang LL, Gotfredsen E, Wenzel A. Periapical radiography and cone beam computed tomography for assessment of the periapical bone defect 1 week and 12 months after root-end resection. DentoMaxillo Facial Radiology 2009;38:531–6.

43. AAE and AAOMR joint position statement. Use of cone-beam-computed tomography in endodontics. Pennsylvania Dental Journal 2011;78:37–9.

44. Sendentexct. Radiation protection: Cone-beam CT for dental and maxillofacial radiology. Evidence Based Guidelines [Online]. Report prepared by the Sedentexct project. March 2011. URL http://www.sendentexct.eu/ files/ guidelines _final.pdf [cited 25 January 2014].