

## REVIEW

**PRICE 2020 guidelines for reporting case reports in Endodontics: explanation and elaboration**

V. Nagendrababu<sup>1</sup> , B. S. Chong<sup>2</sup> , P. McCabe<sup>3</sup>, P. K. Shah<sup>2</sup> , E. Priya<sup>4</sup>, J. Jayaraman<sup>5</sup> , S. J. Pulikkotil<sup>1</sup>  & P. M. H. Dummer<sup>6</sup> 

<sup>1</sup>Division of Clinical Dentistry, School of Dentistry, International Medical University, Kuala Lumpur, Malaysia; <sup>2</sup>Institute of Dentistry, Barts & The London School of Medicine & Dentistry, Queen Mary University of London, London, UK; <sup>3</sup>Oranhill Dental Suite, Galway, Ireland; <sup>4</sup>Division of Community and Children Oral Health, School of Dentistry, International Medical University, Kuala Lumpur, Malaysia; <sup>5</sup>Department of Developmental Dentistry, University of Texas Health School of Dentistry, San Antonio, TX, USA; and <sup>6</sup>School of Dentistry, College of Biomedical and Life Sciences, Cardiff University, Cardiff, UK

**Abstract**

**Nagendrababu V, Chong BS, McCabe P, Shah PK, Priya E, Jayaraman J, Pulikkotil SJ, Dummer PMH.**

PRICE 2020 guidelines for reporting case reports in Endodontics: explanation and elaboration. *International Endodontic Journal*, **53**, 922–947, 2020.

Case reports play a key role in showcasing new, unusual or rare disease(s), and the impact of newer therapeutic approaches or interventions. The Preferred Reporting Items for Case reports in Endodontics (PRICE) 2020 guidelines are being introduced exclusively for Endodontics by adapting and integrating the CAse REport (CARE) guidelines and Clinical and Laboratory Images in Publications principles. The PRICE 2020 guidelines have been developed to help authors improve the completeness, accuracy and transparency of case reports in Endodontics and thus enhance the

standard of manuscripts submitted for publication. The aim of this document is to provide a comprehensive explanation for each item in the PRICE 2020 checklist along with examples from the literature that demonstrate compliance with these guidelines. This information will highlight the importance of each item and provide practical examples to help authors understand the necessity of providing comprehensive information when preparing case reports. A link to this PRICE 2020 explanation and elaboration document is available on the Preferred Reporting Items for study Designs in Endodontology website at <http://www.pride-endodonticguidelines.org>.

**Keywords:** case reports, Endodontics, guidelines, PRICE 2020.

Received 20 March 2020; accepted 20 March 2020

**Introduction**

The main focus of case reports is to present new, rare or unusual clinical cases for the benefit of the clinical and scientific communities. For example, case reports could involve recent discoveries of diseases, anatomical or pathological presentations, newer techniques and materials or consequential impact of interventions or medications (Gopikrishna 2010, Sun *et al.*

2013). They may be the main information source on rare conditions and can assist clinicians when they encounter similar cases in their everyday clinical practice (Wong 2008). Although case reports can be helpful, they have limitations such as a risk of over-emphasis on the specifics, insufficient evidence to establish a true cause–effect relationship and over-interpretation of information based purely on a limited number of reported case(s). They may also be reliant

Correspondence: Venkateshbabu Nagendrababu, Division of Clinical Dentistry, School of Dentistry, International Medical University, Bukit Jalil – 57000, Kuala Lumpur, Malaysia (e-mails: [hivenkateshbabu@yahoo.com](mailto:hivenkateshbabu@yahoo.com); [venkateshbabu@imu.edu.my](mailto:venkateshbabu@imu.edu.my)).

on the subjective and retrospective opinions of the author(s) and may distract readers by focussing purely on the novelty value (Nissen & Wynn 2014, Murad *et al.* 2018).

There is substantial variability in the quality of case reports published in the medical and dental literature. For example, in a review of 150 case reports on treatment modalities for metastasizing basal cell carcinoma (Kaszkin-Bettag & Hildebrandt 2012), important information, such as data on demographics, baseline characteristics, therapies and treatment outcomes, was often missing. In addition, case report manuscripts submitted to journals are often poorly prepared and are consequently rejected as they do not merit acceptance for publication (Gopikrishna 2010).

Case Report (CARE) guidelines provide a framework to enhance the completeness, transparency and accuracy of case reports (Gagnier *et al.* 2013). The CARE guidelines were developed based on a consensus process and consist of a checklist with 13 key items. The Surgical Case Report (SCARE) guidelines with 14 items were introduced exclusively for reporting cases involving surgery, having again been developed through a Delphi consensus process (Agha *et al.* 2016). Significantly, the adoption and implementation of the SCARE guidelines were reported to have resulted in a 10% improvement in the reporting quality of surgical case reports in medicine (Agha *et al.* 2017).

### Need for Preferred Reporting Items for Case reports in Endodontics (PRICE) 2020 guidelines

Adhering to the PRICE 2020 guidelines will facilitate the production of clear, accurate, transparent and high-quality case reports in the field of Endodontics, ultimately for the benefit of patients. Apart from assisting authors with the planning and the preparation of case reports, the guidelines will also help editors and referees to critically assess their quality during the editorial and peer review process (Nagendrababu *et al.* 2020).

### Developing the PRICE 2020 guidelines

The process of developing the PRICE 2020 guidelines (Nagendrababu *et al.* 2019) followed the Guidance for Developers of Health Research Reporting Guidelines (Moher *et al.* 2010). The project leaders (VN, PD) identified the need for PRICE guidelines and formed a steering committee consisting of eight members (PD,

VN, BC, PM, PS, JJ, EP and SP). An initial checklist and flowchart deemed essential for guiding authors when writing case reports, specifically related to Endodontics, were developed by combining and modifying the items from the CARE guidelines (Gagnier *et al.* 2013) and the Clinical and Laboratory Images in Publications principles (Lang *et al.* 2012).

The steering committee formed a PRICE Delphi Group (PDG) of 30 members that included 22 clinical academics, four endodontists, two general dentists and two patient representatives. The PDG members were invited to participate in an online Delphi process to achieve consensus on the items to be included in the PRICE guidelines. The revised PRICE checklist and flowchart created by the online Delphi process were then discussed at a face-to-face meeting held during the 19th European Society of Endodontology (ESE) Biennial Congress in Vienna, Austria, on 13 September 2019. The meeting was chaired by the project leaders (PD, VN) and included 21 members and two postgraduate students. Based on feedback received during the face-to-face meeting, where necessary, the steering committee modified the items. The revised guidelines were then piloted by asking several volunteers to each write a case report whilst following the guidelines and the individual items and flowchart. The final PRICE 2020 guidelines consist of a checklist of 47 items and a flowchart (Nagendrababu *et al.* 2020).

### The PRICE 2020 explanation and elaboration document

The aim of this explanation and elaboration document is to provide the rationale and an explanation for each of the items in the PRICE 2020 checklist and the flowchart. Additionally, each item in the checklist is illustrated with examples of good reporting practice, identified from published case reports or hypothetical situations in the field of Endodontics and related disciplines. In the text of some of the examples, citations or Web addresses have been removed and abbreviations entered in full. Thus, this document complements the guidelines and serves as an additional resource for authors when preparing case reports in Endodontics.

#### Item 1a: Title – The words ‘case report(s)’ must be included in the title

##### *Explanation*

The title must contain the term ‘case report(s)’ so that readers are immediately aware of the nature of the

manuscript. This also allows the article to be indexed in searchable databases. In the Medical Subject Headings (MeSH) of the National Library of Medicine (NLM), the term 'case report' is included for indexing and for effective article searches (Riley *et al.* 2017). It is good practice to mention the number of cases described in the article within the title of the case report (*Examples 1a.1, 1a.2*).

*Example 1a.1*

From Natera & Mukherjee (2018) – 'Regenerative endodontic treatment with orthodontic treatment in a tooth with dens evaginatus: A case report with a 4-year follow-up'.

*Example 1a.2*

From Agrawal *et al.* (2016) – 'A Rare Case of Type III Dens Invaginatus in a Mandibular Second Premolar and Its Nonsurgical Endodontic Management by Using Cone-beam Computed Tomography: A Case Report'.

**Item 1b: Title – The area of interest (e.g. anatomy, disease, treatment) must be included briefly in the title**

*Explanation*

Including the area of interest (e.g. tooth anatomy, disease, treatment) in the title allows readers to understand the focus of the case report (*Examples 1b.1, 1b.2*). It will also allow readers to search for and locate case reports on a specific area of interest or subject.

*Example 1b.1*

From Natera & Mukherjee (2018) – For the case report titled 'Regenerative endodontic treatment with orthodontic treatment in a tooth with dens evaginatus: A case report with a 4-year follow-up', the terms describing the area of interest were included in the title, for example, regenerative Endodontics, orthodontic treatment and dens evaginatus.

*Example 1b.2*

From Agrawal *et al.* (2016) – For the case report titled 'A Rare Case of Type III Dens Invaginatus in a Mandibular Second Premolar and Its Nonsurgical Endodontic Management by Using Cone-beam Computed Tomography: A Case Report', the terms describing the area of interest were included in the title, for example Type III Dens Invaginatus,

Mandibular Second Premolar, Nonsurgical Endodontic Management and Cone-beam Computed Tomography.

**Item 2a: Keywords – At least two relevant keywords, preferably MeSH terms, related to the content of the case report must be included**

*Explanation*

The inclusion of at least two relevant key words helps to identify reports of specific interest to readers and improves the precision of searches (*Example 2a.1*). Terms from the MeSH terminology of the National Library of Medicine (NLM; <https://www.ncbi.nlm.nih.gov/mesh/>) that are aligned to case reports are preferred.

*Example 2a.1*

From Sarmast *et al.* (2017) case report titled 'Classification and Clinical Management of Retrograde Peri-implantitis Associated with Apical Periodontitis: A Proposed Classification System and Case Report', the keywords used were 'Bone regeneration, dental pulp necrosis, periapical diseases, peri-implantitis'.

**Item 3a: Abstract – The Introduction must contain information on how the report is novel and contributes to the literature, clinical practice and/or fills a gap(s) in knowledge**

*Explanation*

The Introduction of the Abstract must provide a concise background to the most important aspects of the case(s) being presented (*Example 3a.1*). The Introduction must also describe new findings and their contribution to the literature, clinical practice or gap(s) in knowledge.

*Example 3a.1*

From Sarmast *et al.* (2017) – 'Biological complications involving dental implants include peri-implant diseases such as peri-implant mucositis and peri-implantitis. The latter presents with progressive bone loss from the alveolar crest in a coronal apical direction. However, a separate disease entity termed retrograde peri-implantitis (RPI), which presents with progressive bone loss at the periapex of the implant, also exists and may be of particular interest to endodontists because it typically presents with periapical pathology of both the implant and adjacent tooth or at a site that previously housed an

endodontically treated tooth. The reported prevalence of retrograde peri-implantitis is 0.26%, which is much lower than the prevalence of marginal peri-implantitis; however, its incidence increases to 7.8% when teeth adjacent to the implant exhibit an endodontic infection. It is positively correlated with a shorter distance between the implant and the adjacent tooth and a shorter time elapsed from the endodontically treated adjacent tooth to implant placement. This case report describes a patient diagnosed with an RPI lesion associated with an adjacent endodontically treated tooth with a persistent periapical radiolucent lesion’.

**Item 3b: Abstract – The Body must describe the main clinical findings, including symptoms and signs, if present**

*Explanation*

The Body of the Abstract must include a short description of the main clinical findings, including the signs and symptoms, for example pain (*Example 3b.1*), swelling (*Example 3b.2*) and sinus tract, of the case(s).

*Example 3b.1*

From Lara-Mendes *et al.* (2018) – ‘The aim of this study was to describe a guided endodontic technique that facilitates access to root canals of molars presenting with pulp calcifications. A 61-year-old woman presented to our service with pain in the upper left molar region. The second and third left molars showed signs of apical periodontitis confirmed by the cone-beam computed tomographic (CBCT) scans brought to us by the patient at the initial appointment’.

*Example 3b.2*

From Goel *et al.* (2017) – ‘The case was managed using cone-beam computed tomography (CBCT), operating microscope, platelet-rich fibrin (PRF), and Biodentine. A 15-year-old male patient presented with palatal swelling. Pulp sensibility testing of right maxillary lateral incisor was negative. Intraoral periapical digital radiograph revealed an Oehlers type II dens invaginatus with open apex and periapical radiolucency. A CBCT scan was performed to study the anatomy, determine the true extent of the periapical lesion, and form a treatment plan. A diagnosis of Oehlers type II dens invaginatus with pulp necrosis and acute periapical abscess was made’.

**Item 3c: Abstract – The Body must describe the main radiographic/histological/laboratory/ diagnostic findings**

*Explanation*

The Body of the Abstract must contain a short description of the relevant radiographic images used to illustrate the case(s), for example periapical, cone-beam computed tomography (*Example 3c.1*); histological, for example histological section of the lesion (*Example 3c.2*); and laboratory (e.g. blood report) or diagnostic findings, for example pulp testing (*Example 3c.1*).

*Example 3c.1*

From Goel *et al.* (2017) – ‘The case was managed using cone-beam computed tomography (CBCT), operating microscope, platelet-rich fibrin (PRF), and Biodentine. A 15-year-old male patient presented with palatal swelling. Pulp sensibility testing of right maxillary lateral incisor was negative. Intraoral periapical digital radiograph revealed an Oehlers type II dens invaginatus with open apex and periapical radiolucency. A CBCT scan was performed to study the anatomy, determine the true extent of the periapical lesion, and form a treatment plan. A diagnosis of Oehlers type II dens invaginatus with pulp necrosis and acute periapical abscess was made’.

*Example 3c.2*

From Ricucci *et al.* (2018a) – ‘During surgery, the root apices were resected to within the alveolus and the fenestrated area covered by the flap. Specimens consisting of the root apex and surrounding soft tissues were subjected to histopathological and histobacteriological analyses. Histobacteriological analysis revealed extensive resorptive defects on the root apices filled with thick bacterial biofilm, irregular detachment of the cementum layers with consequent infection of the underlying spaces, and heavy infection in the apical foramina. The soft tissue specimens exhibited no or minimal inflammation. The two cases showed satisfactory postsurgical healing of the hard and soft tissues. Both cases of mucosal fenestration showed root apices covered with dense bacterial biofilms and associated with a bone crypt with no significant inflammatory tissue therein’.

**Item 3d: Abstract – The Body must describe the main outcomes of treatment, if active treatment has been provided**

*Explanation*

The Body of the Abstract must include the main outcomes of the case(s) presented in a brief and succinct manner after a suitable follow-up period (*Examples 3d.1, 3d.2*), for example treatment outcomes (e.g. asymptomatic after 4 years; *Example 3d.1*)/tooth survival/periapical healing after 4 years (*Example 3d.1*).

*Example 3d.1*

From Natera & Mukherjee (2018) – ‘The tooth was treated with regenerative endodontic treatment; after which, the patient received orthodontic treatment with fixed appliances for 2 years. The tooth responded favorably to the regenerative endodontic treatment and orthodontic tooth movement. Clinically and radiographically, all the follow-up examinations revealed an asymptomatic tooth with evidence of periapical healing with stunted root development. The tooth remained asymptomatic even after 4 years’.

*Example 3d.2*

From de Carvalhosa *et al.* (2014) – ‘At a follow-up visit 10 years after surgery, panoramic and periapical radiographs showed new bone formation; the patient did not have any pain, and pulp vitality was maintained in all teeth in this area’.

**Item 3e: Abstract – The Conclusion(s) must contain the main ‘take-away’ lesson(s), sometimes referred to as key learning point(s)**

*Explanation*

The Conclusion(s) of the Abstract must include explicit conclusions (or key learning points) based on the diagnostic findings, treatment provided and/or the outcome(s) (*Examples 3e.1, 3e.2*). It should include the main ‘take-away’ lesson(s) to aid clinicians in their daily practice, to inform researchers and/or other relevant healthcare workers.

*Example 3e.1*

From Krug *et al.* (2019) – ‘Two and a half years after replantation, clinical and radiographic examinations revealed normal healing and no symptoms but a slight reduction of bone level compared with the

preoperative level and no signs of root resorption or ankylosis. The successful outcome in this case supports the idea of performing intentional replantation with an atraumatic extraction system to save teeth with extensive cervical root resorption and a high risk of fracture during extraction’.

*Example 3e.2*

From Cho & Jung (2019) – ‘At subsequent follow-up examinations, cone-beam computed tomography and periapical radiographs confirmed that complete healing had occurred around the periapical and lateral areas of affected teeth. This case report indicates the potential for healing of large cystic lesions by nonsurgical root canal treatment’.

**Item 4a: Introduction – A background summary of the case(s) with relevant information must be provided**

*Explanation*

The Introduction must provide the background to the diagnostic or clinical problem with reference to the relevant literature so as to provide context for the specific case report(s). The literature search must be comprehensive, and the relevant, preferably recent, information from similar published case reports (if available) must be provided (*Examples 4a.1, 4a.2*).

*Example 4a.1*

From Natera & Mukherjee (2018) – ‘Published case reports and case series on immature permanent teeth with pulp necrosis have shown that REP is an effective therapy for conserving these teeth with compromised structural integrity (7, 11–13). Moreover, taking into consideration that the age of the patient population treated with REP is generally between 6 and 17 years of age, it is possible that those patients may undergo orthodontic treatment. The literature is not very clear regarding the precise effects of orthodontic tooth movement on endodontically treated teeth. Root resorption and apical blunting are common iatrogenic effects of orthodontic treatment in many patients. However, endodontically treated teeth show minimal root resorption if the canal is well sealed in all three dimensions. Also, it has been reported that teeth with incomplete root formation show a lesser degree of root resorption when moved orthodontically (14). However, to the best of our knowledge, there are no reports on cases treated with

orthodontic treatment on teeth previously treated with regenerative endodontic therapy’.

#### Example 4a.2

From Timmerman & Parashos (2017) – ‘A regenerative endodontic procedure (REP) is a ‘biologically based procedure designed to replace damaged structures including dentine and root structures, as well as cells of the pulp-dentine complex’ (8). The goal of repair rather than regeneration of pulpal tissues is more realistic with REP because histologic studies of human teeth after REPs (9–15) have reported the presence of cementum-like, bone-like, osteodentine, collagen fibers, or fibrous connective tissues. An advantage of this treatment option is that the root canal can be easily re-accessed if the treatment goals are not achieved with REP, and mineral trioxide aggregate (MTA) apexification can then be considered as the next step.

Currently there is limited evidence (16–18) reporting REP as a treatment option of dens invaginatus (DI) in permanent maxillary lateral incisors. In general, these cases were diagnosed with infected necrotic pulps before REP, and the treatment outcomes were positive with periapical healing. In two of these cases (16, 17), there was completed apex formation and hard tissue deposition on the canal walls. Despite the heterogeneity of the protocols in these case reports, they show that REP can be considered as an alternative treatment option. This article reports the treatment of a type II DI in an immature permanent lateral incisor tooth with an outcome that has not been previously described’.

#### Item 5a: Informed consent – A clear statement that informed, valid consent was obtained from the patient(s) must be provided

##### Explanation

A statement that informed, valid consent for the treatment and ideally for reporting of the case was given by the patient must be included (*Example 5a.1*). In exceptional situations or if the patient is unable to give consent or is a minor, consent should be obtained from the responsible legal representative (e.g. parents, spouse; *Example 5a.2*), or suitable carer/guardian (*Example 5a.3*). The form in which the consent was obtained must be mentioned (e.g. verbal, written etc.; *Examples 5a.3, 5a.4*). Good practice dictates it is best to obtain informed consent for both investigations and any subsequent treatment.

#### Example 5a.1

From Jalali & Kim (2016) – ‘After informed consent was obtained, the root canal treatment for tooth 37 was performed under a surgical microscope’.

#### Example 5a.2

From Natera & Mukherjee (2018) – ‘After reviewing the risks, benefits, and treatment options with the patient and her parent, informed consent was obtained to perform a regenerative endodontic procedure on tooth #20’.

#### Example 5a.3

From Farhad *et al.* (2016) – ‘A written informed consent was obtained from the patient’s guardian after explaining the treatment procedure, risks, and benefits’.

#### Example 5a.4

From Al-Tammami & Al-Nazhan (2017) – ‘A consent form was signed after approval of the proposed protocol to initiate revascularization treatment’.

#### Item 6a: Case report information – The age of the patient(s) must be provided

##### Explanation

The age of the patient(s) must be provided (*Example 6a.1*) as it may be a factor of relevance, for example, its likely influence on the overall treatment plan and potentially the treatment outcome.

#### Example 6a.1

From Natera & Mukherjee (2018) – ‘14-year-old female presented to the endodontic department at Rutgers School of Dental Medicine, Newark, NJ, with discomfort in her lower left premolar’.

#### Item 6b: Case report information – The gender of the patient(s) must be provided

##### Explanation

The gender of the patient(s) must be provided (*Example 6b.1*) as gender-specific features may apply.

#### Example 6b.1

From Natera & Mukherjee (2018) – ‘14-year-old female presented to the endodontic department at Rutgers School of Dental Medicine, Newark, NJ, with discomfort in her lower left premolar’.

**Item 6c: Case report information – The ethnicity of the patient(s) must be provided, if relevant***Explanation*

The ethnicity of the patient(s) must be provided where this is relevant to the case(s) (*Examples 6c.1, 6c.2*). For example, in the Asian ethnic group there is a higher prevalence of C-shaped canal morphology in mandibular second molars (Martins *et al.* 2019), and different pathways of fear appear to be influenced by ethnicity (Carter *et al.* 2015).

*Example 6c.1*

From Bertrand & Kim (2016) – ‘A 14 year old African American female was referred to the postgraduate endodontic clinic by her general dentist for the consultation and treatment of the left mandibular second premolar’.

*Example 6c.2*

From Jalali & Kim (2016) – ‘A 47-year-old Asian woman was referred to the postgraduate endodontic clinic by her general dentist for assessment and root canal treatment of multiple teeth with associated periapical radiolucencies’.

**Item 6d: Case report information – The main concern, chief complaint or symptoms of the patient(s), if any, must be provided***Explanation*

The main concern, chief complaint or symptoms must be reported in the patient’s own words or verbatim, without resorting to jargon (*Examples 6d.1, 6d.2, 6d.3, 6d.4, 6d.5*). Where appropriate, and in relation to pain, this should include the intensity, for example severe and mild (*Examples 6d.1, 6d.2*); frequency, for example continuous and intermittent (*Example 6d.3*); location, for example localized, generalized, quadrant and tooth specific (*Examples 6d.2, 6d.4*); and aggravating or alleviating factors, for example cold, heat and biting (*Example 6d.1*).

*Example 6d.1*

From Moshari *et al.* (2017) – ‘According to the patient, nature of the pain was dull, constant and diffused with moderate severity which was spontaneous and aggravated by mastication’.

*Example 6d.2*

From Lara-Mendes *et al.* (2018) – ‘A 61-year-old woman presented for treatment, reporting discomfort in the region of her left upper molars’.

*Example 6d.3*

From Zhang & Wei (2017) – ‘26-year-old man presented to the dental hospital with complaints of frequent episodes of pain and occasional swelling in his right mandibular region for the past 2 months’.

*Example 6d.4*

From Natera & Mukherjee (2018) – ‘The patient reported that the pain started around 3 weeks after her general dentist “ground” her tooth (pointing to tooth #20)’.

*Example 6d.5*

From Dogui *et al.* (2018) – ‘A 23-year-old female was referred to our medicine dental department in UHC Sahloul, Sousse, for treatment of tooth #46. She suffered from major coronal destruction and needed to have her first molar restored’.

**Item 6e: Case report information – The medical history of the patient(s) must be provided, if relevant***Explanation*

A brief history of the general medical health of the patient(s) must be provided as well as medications taken (*Example 6e.1*), hospitalizations (*Example 6e.2*), allergies and any other medical conditions (*Examples 6e.2, 6e.3*), associated with the presenting complaint. If there is no medical history of relevance, as good practice, this should still be mentioned (*Examples 6e.4, 6e.5*).

*Example 6e.1*

From Sarmast *et al.* (2017) – ‘His medical history was contributory for seizures in the past; however, this was well controlled, and his last episode was more than 10 years ago. He is currently taking levetiracetam, dexamethasone, and clonazepam medications without complaint’.

*Example 6e.2*

From Patel *et al.* (2016) – ‘The patient was medically fit and healthy at the initial consultation. In 1987, he suffered from an episode of herpes zoster affecting the right trigeminal nerve branch V3’.

(lower right quadrant). He was hospitalized for 10 days and experienced severe pain and vesicles localized to this distribution. He subsequently suffered from postherpetic neuralgia and reported mild anesthesia in this area’.

*Example 6e.3*

From Jalali & Kim (2016) – ‘The patient’s medical history included chronic renal failure. The patient’s medication included sevelamer carbonate (RenvelaR) for the treatment of hyperphosphatemia caused by her renal disease’.

*Example 6e.4*

From Agrawal *et al.* (2016) – ‘There was no significant medical history. Extraoral examination revealed no abnormalities. Intraoral examination revealed aberrant coronal anatomy and deep distal pit with left mandibular second premolar’.

*Example 6e.5*

From Natera & Mukherjee (2018) – ‘The patient reported that the pain started around 3 weeks after her general dentist “ground” her tooth (pointing to tooth #20). Her medical history was noncontributory’.

**Item 6f: Case report information – The dental history of the patient(s) must be provided, if relevant**

*Explanation*

A brief history of the overall dental health status of the patient(s) must be provided, for example, details of relevant recent dental visit(s) and any treatment provided, allergies to dental materials, as well as any oral/dental conditions that may be associated with the presenting complaint or are relevant to the case(s) (*Examples 6f.1, 6f.2*). When there is no significant or relevant dental history (*Example 6f.3*), this should still be mentioned.

*Example 6f.1*

From Sarmast *et al.* (2017) – ‘His dental history included multiple endodontically treated teeth and fractured restorations. He presented with multiple nonrestorable teeth and missing dentition’.

*Example 6f.2*

From Bolhari *et al.* (2016) – ‘Dental history revealed a previous trauma to primary mandibular anterior teeth (teeth #71, 81) when she was three years old’.

*Example 6f.3*

From Lim & Le Clerc (2019) – ‘The patient’s dental, medical and family history was non-contributory’.

**Item 6g: Case report information – The family history of the patient if associated with the primary complaint must be provided, if relevant**

*Explanation*

Details of any relevant family history must be provided, including whether there are similar dental conditions/complaints/anomalies in other family members (*Example 6g.1*). When there is no significant family history (*Example 6g.2*), it is good practice to mention this in manuscript, as it will help readers to understand that this is not a factor for consideration.

*Example 6g.1*

From Dudeja *et al.* (2014) – ‘The patient first reported with gum bleed at the age of 1 year and 6 months and was diagnosed with haemophilia at the age of three years. There was associated family history of haemophilia (maternal cousin suffered from it)’.

*Example 6g.2*

From Lim & Le Clerc (2019) – ‘The patient’s dental, medical and family history was non-contributory’.

**Item 6h: Case report information – The psychosocial history of the patient if associated with the primary complaint must be provided, if relevant**

*Explanation*

Details of any relevant psychosocial history and lifestyle factors must be provided, including, for example, sleep patterns, stress management, exercise, smoking, alcohol consumption, nutrition/diet, occupation, social support and education level (*Example 6h.1*).

*Example 6h.1*

From Padhye *et al.* (2018) – ‘He reported with neither relevant medical history nor a history of tobacco habits’.



**Item 6i: Case report information – Genetic information, including details of relevant comorbidities and past interventions and their outcomes must be provided when possible, if relevant**

*Explanation*

Details of relevant genetic information must be provided, including disorders or comorbidities and past treatments and their outcomes if relevant to the case (s) (*Example 6i.1*).

*Example 6i.1*

From Pavlič *et al.* (2019) – ‘The medical history of a 12.5-year-old boy, referred due to pain in the area of the lower left permanent first molar (tooth 36), reported serious health conditions since the first year of life. At the age of 3.5 years, he was diagnosed with autoimmune lymphoproliferative syndrome; although all of the findings were indicative of autoimmune lymphoproliferative syndrome, there was no history of autoimmune lymphoproliferative syndrome in the family and no mutation of the most commonly involved genes (FAS, FASLG), as confirmed by genetic analysis’.

**Item 6j: Case report information – Extra-oral findings must be provided, if relevant**

*Explanation*

Findings from the extra-oral examination must be included where relevant (*Examples 6j.1, 6j.2, 6j.3*), including a brief overview of the examination methods and process. If there are no extra-oral findings, that must be stated. If the extra-oral findings are extensive, a summary table or figure could be provided.

*Example 6j.1*

From D’Mello & Moloney (2017) – ‘On presentation to the Royal Children’s Hospital Melbourne, she had a firm extraoral swelling that involved the upper lip across the midline and extended up the right hand side of the nose’.

*Example 6j.2*

From Ahlgren *et al.* (2003) – ‘Extraoral examination revealed a diffuse swelling at the lower right buccal mandibular border. There was also a palpable tender jugulodigastric lymph node present’.

*Example 6j.3*

From Farhad *et al.* (2016) – ‘Extra-oral examination revealed an upper left facial swelling’.

**Item 6k: Case report information – General intra-oral findings must be provided when relevant, e.g. carious lesions, restorations, periodontal condition, soft tissues etc.**

*Explanation*

Findings from the intraoral examination must be included where relevant, including a brief overview of the examination methods and process (*Examples 6k.1, 6k.2*). If the intraoral findings are extensive, a summary table or figure should be provided.

*Example 6k.1*

From Farhad *et al.* (2016) – ‘Intra-oral examination showed a buccal vestibule swelling next to the maxillary left central incisor’.

*Example 6k.2*

From Agrawal *et al.* (2016) – ‘Intraoral examination revealed aberrant coronal anatomy and deep distal pit with left mandibular second premolar. The clinical crown was larger than the contralateral tooth. The tooth was caries-free and had no restoration in it. The tooth was tender on vertical percussion. There were no horizontal mobility and depressibility’.

**Item 6l: Case report information – Important/relevant dates and times (in the text, or a table or figure) must be provided in chronological order**

*Explanation*

A brief timeline (in the text or in the form of a table or figure) of relevant events, in chronological order, in the patient’s history must be provided to allow readers to understand core elements of the case(s), such as main complaint(s) or concern(s); history of the presenting condition (*Example 6l.1*), risk factors and susceptibility; and diagnostic methods/assessment and any treatment and care received, follow-ups and outcomes (*Examples 6l.2, 6l.3*). It would be easier for the readers to follow if a table is included to show the timelines associated with managing the case(s) (*Example 6l.4*).

*Example 6l.1*

From D’Mello & Moloney (2017) – ‘A 7 year and 10-month-old girl presented to The Royal Children’s Hospital Melbourne with an extraoral swelling in

**Table 1** Timelines

Time	Event	
0	Patient visited clinic, history, clinical and radiographic examination	Abscess related to lower right second primary molar, and root resorption in distal root of adjacent first primary molar
0	Pulpectomy procedure	
+ 2 weeks	1 <sup>st</sup> Follow up (Phone inquiry)	No pain, no swelling (symptom free)
+ 3 months	2 <sup>nd</sup> follow up (Phone inquiry)	No pain, no swelling (symptom free)
+ 6 months	3 <sup>rd</sup> follow up (Phone inquiry)	No pain, no swelling (symptom free)
+ 8 months	4 <sup>th</sup> follow up (clinical and radiographic assessment)	No pain, no swelling (symptom free). Arrested root resorption, Improvement of bone density.

Reprinted from F1000Research, Vol 7, Azab MM, Moheb DM, El Shahawy OI. Case Report: Root resorption caused after pulp death of adjacent primary molar [version 1; peer review: 2 approved], Pages No 1186 (<https://doi.org/10.12688/f1000research.15375.1>), Copyright (2018) with permission from F1000Research (CC-BY 4.0 license).

August 2012. In June 2012, she had suffered a fall off her bicycle resulting in uncomplicated crown fractures of teeth 11 and 21. These fractures were restored with composite resin by her general dental practitioner. In August 2012, she developed a throbbing pain and presented to the emergency department at the Royal Dental Hospital of Melbourne, where the infected root canal of the 11 was accessed, debrided and dressed with Odontopaste (Australian Dental Manufacturing, Brisbane, Qld, Australia), a calcium hydroxide-based medicament with clindamycin hydrochloride 5% and triamcinolone acetonide 1%. The following day, an extraoral swelling developed and rapidly increased in size’.

#### Example 6l.2

From Natera & Mukherjee (2018) – ‘The patient was scheduled for follow-up visits and was seen again at 4 months and thereafter approximately every 6 months during the next 4 years. At 4 months, the radiograph exhibited resolution of the periapical radiolucency. At the 1-year follow-up it was noted that the patient had begun orthodontic treatment that lasted for 2 years’.

#### Example 6l.3

From Agrawal *et al.* (2016) – ‘At 6-month follow-up the tooth was asymptomatic, and there was

radiographic evidence of periapical repair. Further follow-up was taken at 12 months and 2 years’.

#### Example 6l.4

From Azab *et al.* (2019) – Table 1 shows the timelines.

**Item 6m: Case report information – The diagnostic methods and the results for the specific tooth/teeth (e.g. pulp sensibility test, tenderness, mobility, periodontal probing depths, laboratory investigations, imaging techniques, or other special tests) must be provided**

#### Explanation

An accurate diagnosis is essential. Clear and complete descriptions of why the diagnostic methodology and aids were used, for example radiology (including periapical films and CBCT scans) and pulp tester with details of the manufacturer, city and country must be provided. Whenever possible, additional details about the methods (e.g. pixel size, frame and scanning seconds) must be described. Results of relevant investigations and other diagnostic assessments such as pulp sensibility tests, radiographic findings and laboratory analysis should be reported (*Examples 6m.1, 6m.2*). It is good practice to tabulate the results of diagnostic test (*Example 6m.3*). Whenever possible, a brief

**Table 2** Results of the diagnostic test

Tooth number	Cold	Heat	Electrical pulp tester	Percussion	Palpation	Mobility
#7	Normal	Normal	Response	Mild	Mild	Within normal limit
#8	Normal	Normal	Response	Mild	Mild	Within normal limit
#9	No response	No response	No response	Moderate	Moderate	First distinguishable sign of movement greater than normal
#10	Normal	Normal	Response	Mild	Mild	Within normal limit

Recreated from Dental Traumatology, Vol 32, Farhad AR, Shokraneh A, Shekarchizade N. (2016) Regeneration or replacement? A case report and review of literature, Pages No 71-9, Copyright (2015) with permission from Wiley.

explanation of the relevant results with normal reference ranges should be included.

#### Example 6m.1

From Natera & Mukherjee (2018) – ‘Tooth #20 had a negative response to cold test with Endo-Ice (Coltene, Cuyahoga, OH) and responded positively to both percussion and palpation. Periodontal probing exhibited probing depths that were less than 3 mm. Radiographic examination showed periapical radiolucency associated with tooth #20 with an immature apex and absence of any caries. Tooth #20 with dens evaginatus was diagnosed with pulp necrosis with chronic apical abscess. The other second premolars (#4, #13, and #29) also presented with dens evaginatus; however, the patient did not have any pain or discomfort associated with these teeth. Pulp tests were performed on all of them, and we observed normal responses’.

#### Example 6m.2

From Farhad *et al.* (2016) – ‘The adjacent maxillary anterior teeth responded normally to cold when tested and were slightly sensitive to percussion and palpation’.

#### Example 6m.3

From Farhad *et al.* (2016) – Table 2 shows the results of the diagnostic tests.

### Item 6n: Case report information – The diagnostic challenges, if any, must be provided

#### Explanation

If relevant, the challenges or problems encountered during the diagnostic process should be reported; suitable literature should be cited to support or challenge the diagnostic hypotheses (*Example 6n.1*). Other

challenges, such as obstacles to completing a full case evaluation, may also be important and must be included, if relevant.

#### Example 6n.1

From Park *et al.* (2012) – ‘On follow-up 2 week later, the patient was still experiencing what she described as ‘sharp pain’ from her lower right tooth not from tooth #15. At this time she pointed to tooth #45 and insisted that sharp pain resulted when chewing. Tooth #45 was slightly sensitive to percussion and pain could be elicited by bite test of the tooth. Tooth #45 responded within normal limits when tested with cold and electronic pulp tester. A caries cavity was observed at the distal surface of #45 on the radiograph. Intraligamental injection on #45 area resulted in relieving the pain. A definitive diagnosis could not be made from the clinical findings. Distal caries on #45 was removed and the tooth was restored with composite resin.

On follow-up 1 week later, the patient informed us that the sharp pain on chewing had not resolved. The failure of standard dental tests to ascertain the cause of pain necessitated further investigation. Palpating of the right masseter muscle, medial pterygoid muscle, lateral pterygoid muscle and temporalis muscle was performed. When palpating of the right lateral pterygoid muscle, the pain was elicited. Based on contributing factors of the pain that were chewing on #45 and palpation of the right lateral pterygoid muscle and the pattern and nature of the pain, a possible diagnosis of myofascial pain or trigeminal neuralgia was suspected. The patient was referred to the Department of Oral Medicine, Kyungpook National Dental Hospital. Further questioning revealed the pain episodes consisted of ‘severe stabbing pain’ that radiated to the right cheek and continued less than 1 min. The pain could be elicited by chewing right side and tooth brushing. The presenting complaint was

diagnosed as trigeminal neuralgia, and carbamazepine was recommended as the treatment of choice. 200 mg of carbamazepine, taken twice daily, was prescribed. The patient's symptoms resolved within 2 weeks'.

#### Example 6n.2

Rehman *et al.* (2014) – 'A definitive diagnosis could not be reached at that point in time, her occlusal contacts on teeth #13, 14 and 15 were adjusted, full mouth scaling and polishing was carried out and she was advised to come back for a follow up after 3 weeks time. She was also advised to consult with the ENT specialist for management of chronic sinusitis.

The patient consulted with ENT and was advised a Para-nasal Sinuses Radiograph (PNS view) and a cystic lesion in the right maxillary sinus area was identified. She was prescribed antibiotics and nasal decongestants and surgical drainage and resection if the symptoms did not subside.

The patient did not return for a follow-up until December 2011 with acute pain in her right maxillary first premolar area. She reported of worsening symptoms during the past 4 months with a decrease in her chewing efficiency on the affected side for which she was on multiple courses of antibiotics advised by her ENT and general physician. Periapical radiograph was repeated of tooth #13, 14 and 15 and an apical radiolucency with tooth #14 was evident. The tooth was acutely tender to palpation, thermal testing was repeated and the tooth was not responsive to any of the stimuli (cold, hot, EPT). Mobility of this tooth was within normal limits (2mm) and periodontal probing depth was 3.5 mm. The diagnosis made was Pulp necrosis secondary to crack tooth syndrome and the treatment plan advised was root canal treatment of tooth #14 followed by a crown, full mouth debridement and replacement of missing teeth by fixed or removable prostheses. Root canal treatment was carried out and completed after which the symptoms resolved completely in 3 weeks' time'.

#### Item 6o: Case report information – The diagnostic reasoning including other possible diagnoses that were considered must be provided

##### Explanation

The differential and/or provisional diagnoses must be provided and the evidence to support the confirmed diagnosis discussed (*Examples 6o.1, 6o.2*).

#### Example 6o.1

From Natera & Mukherjee (2018) – 'Tooth #20 had a negative response to cold test with Endo-Ice (Coltene, Cuyahoga, OH) and responded positively to both percussion and palpation. Periodontal probing exhibited probing depths that were less than 3 mm. Radiographic examination showed periapical radiolucency associated with tooth #20 with an immature apex and absence of any caries. Tooth #20 with dens evaginatus was diagnosed with pulp necrosis with chronic apical abscess'.

#### Example 6o.2

From Connert *et al.* (2018) – 'Both mandibular central incisors were tender to percussion, had a yellowish discoloration and did not respond to thermal and electrical sensitivity tests. Two periapical radiographs at different projections revealed severe pulp canal calcification on both central incisors in contrast to the lateral incisors. Tooth 41 had radiologic signs of apical periodontitis, whilst the periapical health of tooth 31 was less clear. In accordance with the guidelines of the European Society of Endodontology (2014), a CBCT scan with a limited field of view and high resolution was performed (Accuitomo 80; J. Morita Mfg. Corp., Irvine, CA, USA) to clarify apical pathosis of tooth 31 and to allow a detailed view of the potentially complex anatomy of both teeth. The CBCT images confirmed the presence of apical periodontitis and severe pulp canal calcification in both teeth'.

#### Item 6p: Case report information – The active treatment(s) or intervention(s) performed, if any, must be provided

##### Explanation

A clear and detailed description of the intervention(s) performed, if any, must be provided to illustrate the management of the case(s). A brief explanation of the rationale for the intervention(s) should also be provided (*Examples 6p.1, 6p.2*). Where commercially available products, equipment or devices were used, full details of manufacturer(s) should be included (*Example 6p.3*).

#### Example 6p.1

From Torres *et al.* (2019) – 'The CBCT revealed a calcified root canal up to the apical third of the root and an apical radiolucency of 39.8 mm<sup>3</sup>, and the buccal bone plate was preserved.

Due to the difficulty and potentially high risk of iatrogenic damage to the root whilst searching for the

root canal, a 3D-printed guide was designed to aid with the access cavity’.

*Example 6p.2*

From Farhad *et al.* (2016) – ‘Based on clinical and radiographic findings, a pulpal diagnosis of necrotic pulp and periapical diagnosis of acute apical abscess were made for tooth #9. As immature permanent teeth with necrotic pulp, with or without apical pathosis, and incomplete root development with an apical opening of 1 mm or larger are considered suitable candidates for regenerative Endodontics, this treatment was selected’.

*Example 6p.3*

From Lara-Mendes *et al.* (2018) – ‘The following steps were undertaken in order to manufacture the guide: an intraoral impression was taken and then scanned using the R700 Desktop (3Shape, Copenhagen, Denmark) and uploaded into virtual implant planning software (SimPlant Version 11; Materialise Dental, Leuven, Belgium). After the additional upload of the CBCT images, both the CBCT scan and the surface scan were matched based on radiographically visible structures (eg, the patient’s teeth). The drill that was used for the guided endodontic access (Neodent SA, Curitiba, Brazil)’.

**Item 6q: Case report information – Any modifications to the proposed treatment(s) or intervention(s), if necessary, must be provided**

*Explanation*

An explanation to justify any changes made to the proposed intervention(s) including a full description of the care received from other healthcare providers, if any, must be provided (*Example 6q.1*).

*Example 6q1*

From Chong (1995) – ‘Standard root canal techniques were used including tooth isolation with rubber dam and the use of sodium hypochlorite for irrigation. The tooth was cleaned, shaped, and dressed. The patient was reappointed for completion of the root canal treatment at the next visit.

Unfortunately, the symptoms did not resolve after the commencement of treatment. She had to return to see her dentist twice after the first visit as her toothache persisted. The root canal was given a thorough cleaning on each occasion and redressed, but it remained uncomfortable. A different intracanal medication was used at each visit, including calcium hydroxide and a

steroid paste (Ledermix; Lederle Pharmaceuticals, Wolfratshausen, Germany), to no avail. A course of penicillin V was also prescribed but provided little relief’.

**Item 6r: Case report information – The assessment method(s) used to determine the clinician-assessed and patient-assessed treatment outcomes and their results must be provided**

*Explanation*

The method(s) used throughout the treatment and care to assess the outcome(s) of interest should be provided. The positive and negative results from longitudinal or follow-up data including the relevant objective and subjective clinician-assessed and patient-assessed outcomes relevant to the outcome(s) of interest must be reported (*Examples 6r.1, 6r.2*). Relevant details of any other clinical interventions provided along with their impact on the outcome(s) must also be included.

*Example 6r.1*

From Farhad *et al.* (2016) – ‘The patient was recalled at 6, 9, 15, and 18 months postoperatively for clinical and radiographic follow ups. At follow-up appointments, the tooth was asymptomatic and functional. No recurrence of pain and/or swelling was reported by the patient during this period. At 18-month recall, teeth #8 and #9 responded normally to cold and electrical pulp tester vitality tests. Radiographic examinations revealed that the periapical lesion had healed, exhibiting similar root development to that of maxillary right central incisor. The root length and thickness had increased and apical closure was evident’.

*Example 6r.2*

From Pinto *et al.* (2017) – ‘The patient remained completely asymptomatic during follow up. The radiographs and CBCT images after 1 year showed a repair of the periapical lesion and reestablishment of the vestibular cortical bone. According to the PAI score, the results showed that the initial score was 5 and was reduced to 2 after 1 year. Also, the initial CBCT PAI score was 5 + D, and it was reduced to 1 after 1 year. The initial tooth length was 18.47 mm and increased to 19.51 mm at the 1-year follow-up. The thickness of the dentinal walls increased from 0.86 to 1.00 mm in a vestibular measurement and from 0.63 to 0.70 mm in a palatal measurement, both realized at the same point in pre- and posttreatment CBCT images. The sensitivity tests and electric pulp tests were positive 6 months and 1 year later. Moreover, the vitality test using the laser

Doppler flowmeter (Moor LAB/FloLAB; Moor Instruments Ltd, Axminster, UK) was positive; it showed a blood pulse of 7.2 perfusion units after 1 year'.

**Item 6s: Case report information – Adverse and unanticipated events or consequences, if any, must be provided**

*Explanation*

Details of any unexpected events or negative consequences associated with the intervention, along with its potential impact on the outcome(s), should be provided. Thus, the nature of the adverse event (s) or consequence(s), frequency of occurrence, and intensity should be reported (*Examples 6s.1, 6s.2*). If no adverse event(s) or consequence(s) were observed, this may be stated explicitly as 'No adverse events were observed after the treatment/intervention'.

*Example 6s.1*

From Sharma *et al.* (2008) – 'A previously fit and well 50-year-old female was referred acutely to our maxillofacial unit by a local dental practitioner. She had undergone the first stage of endodontic treatment to a lower left second molar. Following local anesthesia with a left inferior dental block using a standard solution of lignocaine 2% with adrenaline 1:80,000, the procedure progressed uneventfully. Thirty minutes later, calcium hydroxide paste (QED Calcium hydroxide, Nordiska Dental) was injected, using the manufacturer's syringe, into the distal root canal. Immediately following this, bleeding was noted in the access chamber and the patient experienced severe ipsilateral facial pain radiating to the orbit and scalp, blurring of vision, nausea, and trismus. A purple discoloration rapidly developed over the left cheek and temple area together with a progressive developing ipsilateral facial weakness'.

*Example 6s.2*

From Natera & Mukherjee (2018) – 'The parent reported that the patient was completely asymptomatic and was doing well. The patient was asked to return after 2 weeks. The tooth was asymptomatic, and there was no evidence of the sinus tracts. However, the crown of tooth #20 exhibited slight discoloration'.

**Item 7a: Discussion – The specific treatment(s) and intervention(s) (if any) must be discussed with reference to the relevant literature**

*Explanation*

The Discussion section in a case report should focus on the new, rare or previously undiscovered diseases/anatomy/presentation; new or management modifications; and unreported negative effects or outcomes from the perspective of the author(s). The important features of the case(s) and any explanation on the mechanism (e.g. pathophysiological, immunological and social) with any diagnostic challenges must also be discussed with reference to existing knowledge; findings and interpretations can then be compared with clinical trial results (*Examples 7a.1, 7a.2, 7a.3*).

*Example 7a.1*

From Natera & Mukherjee (2018) – 'Despite the increase in the published literature on regenerative endodontic procedures, there are no studies that have documented cases that were simultaneously treated with orthodontic therapy. Based on the available literature, we know that endodontically treated teeth can be successfully treated with orthodontic therapy. However, the effects of orthodontic treatment on endodontically treated teeth depend on a variety of factors such as the force applied, the seal of the canal, any previous history of trauma, and the clinical symptoms of the patient. The literature does support that endodontically treated teeth are less prone to apical root resorption.

In the present report, we describe a case that was simultaneously treated with regenerative endodontic and orthodontic therapy for 2 years. After 4 years of follow-up, the healing process of tooth #20 was normal with complete resolution of the signs and symptoms and without any complications'.

*Example 7a.2*

From Bertrand & Kim (2016) – 'Endodontic treatment of mandibular premolars may require a high level of clinical skills due to their wide anatomical variations. The most common root canal morphology in mandibular second premolars is one canal whose prevalence is reported to be as high as 98.8%. This tooth type also often has two canals, of which the occurrence ranges from 1.2% to 29%. The prevalence of three canals varies from 0.4% to 0.5%, and the presence of four and five canals has been reported only in case reports. The

endodontic treatment of C-shaped mandibular second premolars with multiple canals is a challenge to clinicians although they are rarely encountered. There was only one case report describing the C-shaped canal morphology with two root canals in a mandibular second premolar and its endodontic management. We described the endodontic treatment of a C-shaped mandibular second premolar with four canals with the aid of CBCT in this case report'.

#### *Example 7a.3*

From Connert *et al.* (2018) – 'This is the first case report describing the treatment of mandibular incisors with pulp canal calcification and apical periodontitis using the Microguided Endodontics technique.

The technique was successful in both teeth, and it allowed adequate root canal treatment without significant removal of coronal or radicular tooth structure. Conventional root canal treatment would have been associated with a high risk of perforation or at least overpreparation of the thin roots. In this context, it has been demonstrated that any alteration of the natural geometry of the root leads to significant changes in tooth rigidity.

Two *ex vivo* studies have already shown the high success rate of the Guided Endodontics technique with a low deviation of angle (1.59–1.8°) for all 3D-aspects at the tip of the bur (0.12–0.47 mm)'.

### **Item 7b: Discussion – The strengths of the case report and its importance must be discussed with reference to the relevant literature**

#### *Explanation*

The Discussion should discuss the strength of the report and provide a summary of its clinical relevance and its implications for clinical practice. This may be related to a change(s) in clinical practice and can be referenced against existing knowledge (*Example 7b.1, 7b.2*).

#### *Example 7b.1*

From Lara-Mendes *et al.* (2018) – 'Inspired by the guided implant procedure, the guided endodontic technique consists of accessing and locating root canals with severe calcification by means of guiding templates created by tomographic planning as reported by some authors. This technique seems to be a safe and clinically feasible method, especially when the calcified canals could not be accessed by conventional endodontic strategies in a predictable manner. The procedure reduces the treatment time and can be

performed by less experienced operators. Authors were unanimous in acknowledging the accuracy of the technique and its relevance for the new possibility of negotiating severely calcified root canals. Therefore, even without the aid of an operating microscope, the guided endodontic treatment could be very helpful to professionals when facing more complex cases'.

#### *Example 7b.2*

From Chaniotis & Filippatos (2017) – 'The novel instrumentation approach followed in the present case can be described by the term Tactile Controlled Activation (TCA). The TCA instrumentation technique can be defined as the outstroke activation of an engine-driven file only after it becomes fully engaged inside a patent canal. It utilizes file activation only after maximum engagement of the flutes is achieved. This technique aims to minimize file engagement during curved canal management using file activation only when needed. Starting from the point of maximum engagement around an abrupt curvature, a passively inserted engine-driven file can be activated by maintaining apical pressure and moved outwards. In this way, tactile feedback from the canal anatomy is maintained throughout the shaping procedure and the files move from maximum engagement without activation to no engagement upon activation'.

### **Item 7c: Discussion – The limitations of the case report must be discussed**

#### *Explanation*

A brief summary of any limitations of the case report (s) will help clinicians to reduce or eliminate similar issues they may encounter (*Example 7c.1, 7c.2*). It should be mentioned that limitations, such as a single case report, may not be applicable to patients or clinical situations in general.

#### *Example 7c.1*

From Lara-Mendes *et al.* (2018) – 'The guided endodontic technique was also performed in lower incisors *ex vivo* using miniaturized 0.86-mm burs that were shown to be sufficiently precise even in narrow roots. However, these same authors reported in this study that it would not be possible to perform the technique in the posterior region of the arch, in molar teeth for instance, because of the limitation of space to fit in the guide plus the access drill. Nevertheless, the present study showed that it was possible to perform the procedure of guided endodontic treatment in both upper

second and third molars. Clinicians must take into consideration that patients with limited mouth opening might have this technique as a counterindication.

Another constraint to the guided technique would be the need to access calcified canals around curvatures because the drill should only be introduced into the straight part of the canal. Bearing in mind that calcifications are by and large located in the cervical and/or middle third of the canals and the main curvatures usually occur in the apical thirds, this technique seems to be promising for addressing molars as well. In cases in which the root curvature is an absolute impediment to the safe access of the drill to the desired region, the guided surgery technique would be indicated'.

#### Example 7c.2

From Torres *et al.* (2019) – 'One of the limitations of this case was that multiple teeth must be isolated at once to support the guide and ensure its stability'.

#### Item 7d: Discussion – The rationale for the conclusion(s) must be discussed

##### Explanation

The author(s) must explain the reason(s) for making the conclusion(s) from the case report(s). This should be correlated against previous clinical or scientific knowledge so any implication(s) for clinical practice can be appreciated (*Example 7d.1*). This will help in decision-making, for example the cost-effectiveness or safety of newer intervention(s).

#### Example 7d.1

From Vidal *et al.* (2016) – 'Several authors describe case reports of apexification procedures in immature permanent teeth with an apical plug of Biodentine. The first case was reported by Nayak and Hasan, who used Biodentine as an apical barrier and a synthetic collagen membrane to serve as matrix after 1 month of CH dressing. Sinha *et al.* had used a triple antibiotic paste in the root canal for a week before placing an apical plug of Biodentine. A 12-month follow-up with cone-beam computed tomography exhibited progressive involution of periapical radiolucency, with evidence of good healing of the periapical tissues and absence of clinical symptoms. A single-visit apexification procedure of a traumatically injured tooth with Biodentine revealed that this bioactive and biocompatible calcium-based cement can regenerate damaged dental tissues and represents a promising alternative to the multi-visit apexification technique. In all case reports the thickness of the

apical plug was 5 mm, and the canal was back-filled with gutta-percha and resin based sealer.

Physical properties of Biodentine are important when considering it as material for crown restorations. Recent studies have demonstrated that teeth treated with Biodentine did not exhibit crown discoloration. Biodentine is easy to prepare and to handle, and time required for setting is shorter than other silicate-based cements.

On the basis of sealing ability and biocompatibility, apexification treatment with Biodentine was applied in the present case report'.

#### Item 8a: Patient perspective – Feedback from the patient on the treatment and the care they received should be provided, if relevant

##### Explanation

Case reports provide much richer information when the perspective of the patient(s) (guardians or carers if relevant) is included as it offers a different viewpoint from that of the clinician and can impart valuable additional insights. At this point in time, the OHIP-14 (Slade 1997) has been commonly used in Endodontics (Dugas *et al.* 2002) to assess the impact of treatment on the quality of patients' lives and several of its domains are relevant to patient care in the context of endodontic treatments.

Given that the use of the full OHIP-14 instrument is likely to be too onerous for most case reports, it is recommended that patients should be asked to provide their motivations for seeking care, changes they associate with an intervention/treatment, or the impact of care on their quality of life (*Examples 8a.1, 8a.2, 8a.3*). In other words, the clinician should encourage the patients to mention what originally made them seek endodontic treatment/advice, ask them to provide their chief/primary concern(s), and how treatment altered their signs and symptoms (Rison 2013). In summary, patient-reported outcome measures (PROMs) should be reported in case reports. The following questions provide examples of how patients can reflect on the effect treatment had on their quality of life: Have you had painful aching in your mouth? Have you found it uncomfortable to eat any foods because of problems with your teeth/mouth? Have you had to interrupt meals because of problems with your teeth, mouth or dentures? Have you felt that life in general was less satisfying because of problems with your teeth/mouth? The responses of



patients must not include details that may allow their identity to be recognized.

*Example 8a.1*

From Rajput *et al.* (2014) – ‘The 12-month follow-up radiograph showed that healing had occurred and revealed normal periapical structures. The patient reported that he was free of pain and could use the tooth normally’.

*Example 8a.2*

From Pandey *et al.* (2018) – ‘The doctor has saved my teeth for which I had lost all hope. I am happy and satisfied with the treatment’.

*Example 8a.3*

From Rai *et al.* (2016) – ‘According to the father, the entire traumatic incident was very disturbing for the child and the whole family. Everybody from the family to friends and family physicians had a different opinion on what treatment should be carried out. The treatment we provided required multiple visits but the considerable progress over time was very encouraging’.

**Item 9a: Conclusion – Explicit conclusion(s), i.e. the main ‘take-away’ lessons must be provided**

*Explanation*

The conclusion(s) and points of note must be reported. The conclusions should be brief and be based on the outcome(s) of the case report (*Examples 9a.1, 9a.2*).

*Example 9a.1*

From Vidal *et al.* (2016) – ‘The favorable clinical and radiographic outcome in this case demonstrated that Biodentine may be an efficient alternative to the conventional apexification materials’.

*Example 9a.2*

From Pinto *et al.* (2017) – ‘This case report is the first to evaluate the use of leukocyte - platelet-rich fibrin in regenerative endodontic procedure for simultaneous treatment in a root canal and an extensive apical lesion. The successful outcomes, patient centered and clinician centered, showed that this clinical protocol

is a viable alternative therapy for similar clinical cases’.

**Item 9b: Conclusion – Implications for clinical practice or future research must be provided**

*Explanation*

The impact of the case report on clinical practice or future research must be stated and explained so that recommendations may be made (*Examples 9b.1, 9b.2, 9b.3*). The recommendation(s) may indicate the magnitude of the problem, the direction and the need for further research or change(s) to clinical practice.

*Example 9b.1*

From Natera & Mukherjee (2018) – ‘Regenerative endodontic procedure was successful in treating an immature permanent premolar with pulp necrosis and apical periodontitis with dens evaginatus. In this case, the tooth treated with regenerative endodontic procedure responded to orthodontic treatment similar to the nonendodontically treated teeth. Further studies are recommended to clarify the precise effects of orthodontic treatment on teeth treated with regenerative endodontic procedures’.

*Example 9b.2*

From Pinto *et al.* 2017 – ‘This case report is the first to evaluate the use of leukocyte – plasma rich fibrin in regenerative endodontic procedures for simultaneous treatment in a root canal and an extensive apical lesion. The successful outcomes, patient centered and clinician centered, showed that this clinical protocol is a viable alternative therapy for similar clinical cases. Future randomized controlled studies are needed to confirm the promising effects of using leukocyte – plasma rich fibrin in regenerative endodontic procedures associated with apical surgery’.

*Example 9b.3*

From Perotti *et al.* (2018) – ‘The case presented proves that NaOCl is able to produce permanent facial and trigeminal nerve weakness. From a medico-legal point of view a correct informed consent, before endodontic treatment, should include information on the adverse reactions of NaOCl. A proper protocol and management of complications are mandatory’.

**Item 10a: Funding details – Sources of funding and other support (such as supply of instruments, equipment) as well as the role of funders must be acknowledged and described**

*Explanation*

The source of funding or support in any form should be reported such as supply of drugs or equipment or analysis of data must be reported in the manuscript (*Examples 10a.1, 10a.2*). It is a good practice to mention both name and number of the grant or funding (*Examples 10a.1, 10a.2*). The name of any individuals who helped in preparing the manuscript (e.g. translation/planning/illustrations/editing) must be acknowledged (*Examples 10a.3, 10a.4, 10a.5*). Disclosure of individuals involved in preparing the manuscript and the role of the funding agency should be reported explicitly (Moher *et al.* 2012). If the funder had no such involvement, the authors should explicitly state so (Moher *et al.* 2012).

*Example 10a.1*

From Shi *et al.* (2018) – This work was supported by a grant from the Science and Technology Planning Project of Liwan District of GuangZhou City, China (No. 20151217075) and a special fund for the International Cooperation from the Science and Technology Planning Project, Guangdong Province, China (No. 610277164093).

*Example 10a.2*

From Zhang & Wei (2017), Supported by the Jiangsu Qinglan Project Foundation and the Foundation of the Priority Academic Program Development of Jiangsu Higher Education Institutions (PAPD, 2014-37).

*Example 10a.3*

From Peng *et al.* (2017) - ‘The authors thank Dr Yan Gao from the Department of Oral Pathology at Beking University School and Hospital of Stomatology for histologic evaluations of our case’.

*Example 10a.4*

From Natera & Mukherjee (2018) – ‘We thank both the endodontic and orthodontic departments at the Rutgers School of Dental Medicine for their resources during the treatment of this case’.

*Example 10a.5*

From Lim & Le Clerc (2019) - ‘The authors thank Dr Matthieu Perard for his contribution and Celine Allaire for editorial assistance’.

**Item 11a: Conflict of interest – An explicit statement on conflicts of interest must be provided**

*Explanation*

A conflict of interest statement should be given by the researcher or clinician reporting on the case report when there is a financial, commercial, legal, professional or personal relationship that could affect the result. Reporting of a product by its producer/developer even in the form of a sponsor can create a conflict of interest, and its disclosure is important to the readers. The conflict of interest must be disclosed when the authors (s) of the manuscript is directly or indirectly related to the work that the authors describe in their paper. Potential sources of conflict of interest include but are not limited to patent or stock ownership, membership of a company board of directors, membership of an advisory board or committee for a company, and consultancy for or receipt of speaker’s fees from a company. Hence, all authors (both the corresponding author and co-authors) should provide conflict of interest statements (*Example 11a.1*) or where no conflict of interest exists, that should be reported clearly (*Example 11a.2*).

*Example 11a.1*

From Chaniotis & Filippatos (2017) – Dr. Antonis Chaniotis reports personal affiliation with Coltene/Whaledent outside of the submitted work. The other author has stated explicitly that there is no conflict of interest in connection with this article.

*Example 11a.2*

From Natera & Mukherjee (2018) ‘The authors deny any conflicts of interest related to this study’.

**Item 12a: Quality of images – Details of the equipment, software and settings used to acquire the image(s) must be described in the text or legend**

*Explanation*

Information on the equipment, software and settings used to capture and process the image(s) must be

described. The manufacturer and the model/version number of the image capture device(s) used for recording and reproduction should be given, that is city, country (*Examples 12a.1, 12a.2*); for software, the name of the programme, the developer and version and other related details must be provided. If histopathological images are included, the reagents used for processing the specimen and the image capture techniques must be described (*Example 12a.3*).

#### *Example 12a.1*

From Kaval *et al.* (2018) – ‘In order to acquire more information about the location and borders of the resorption area, a CBCT (Kodak 9000 3D; Practice Works, Inc., Atlanta, GA, USA) image of the tooth was obtained using standard settings (10.8 s exposure time, 70 kV, and 10 mA). Axial, sagittal and coronal CBCT cross sections (76 µm thickness) confirmed the severe resorption area which had perforated the root surface. The buccal and palatal surfaces of the tooth were resorbed, and the resorptive process had invaded the buccal cortical plate of bone. The mesial surface of the tooth was also involved, and only the distal side of the root appeared sound. Using the measurement tool of the software (CS 3D Imaging Software version 3.1.9; Carestream Dental LLC, Atlanta, GA, USA), the resorption area was established as 4.6 9 4.5 9 3.8 mm’.

#### *Example 12a.2*

From Bjørndal *et al.* (2016) – ‘Sections were stained with uranyl acetate and lead citrate and subsequently examined with a Philips CM 100 transmission electron microscope operated at an accelerating voltage of 80 kV. Digital images were recorded with an OSIS Veleta digital slow scan 2k × 2k charge coupled device camera (EMSIS GmbH, Muenster, Germany) and the ITEM software package (FEI, Eindhoven, Holland)’.

#### *Example 12a.3*

From Ricucci *et al.* (2018b) – ‘Serial 5-mm-thick sections were cut for each portion until the tissue was exhausted. Sections were stained with hematoxylin-eosin and the Taylor modified Brown and Brenn technique for staining bacteria’.

### **Item 12b: Quality of images – The reason why the image(s) was acquired and the rationale for its inclusion in the manuscript must be provided in the text**

#### *Explanation*

All images should be of the highest possible quality and be accompanied by descriptive information in the text why they were included. For example, to illustrate the severity of the condition, to help diagnosis (*Example 12b.1*), to illustrate treatment procedure (*Example 12b.2*), or to demonstrate treatment effectiveness/outcomes (*Example 12b.3*).

#### *Example 12b.1*

From Agrawal *et al.* (2016) – ‘A CBCT scan of the involved tooth was performed as a complementary examination (Planmeca ProMax 3D-MID CBCT Machine, Finland) at 90 kV, 10 mA, and a scanning time of 13.8 s. The CBCT images revealed the periapical radiolucency was larger than seen radiographically, measuring 6.6 × 8.3 × 7.1 mm’.

#### *Example 12b.2*

From Pinto *et al.* (2017) – ‘An intracrevicular incision and full-thickness flap with 2 relieving incisions that exceeded the mucogingival line were raised. An osteotomy was not necessary because the buccal plate was resorbed’.

#### *Example 12b.3*

From Pinto *et al.* (2017) – ‘The radiographs and CBCT images after 1 year showed a repair of the periapical lesion and reestablishment of the vestibular cortical bone’.

### **Item 12c: Quality of images – The circumstances (conditions) under which the image(s) were viewed and evaluated by the authors must be provided in the text**

#### *Explanation*

The process used to analyse and interpret the image (s) should be clearly described. The examiners’ evaluating and interpreting the images should be identified with their credentials and eligibility to be able to do so (*Example 12c.1*). If applicable, the equipment

(screen resolution/size) and viewing conditions used by all the examiners should be detailed.

#### Example 12c.1

Hypothetical case – ‘The Cone-beam computed tomographic axial sections were viewed and interpreted by a specialist endodontist with 12 years’ experience and the findings confirmed by specialist oral radiologist with 10 years’ experience’. The images were assessed on a 24" LCD screen where image brightness and contrast could be changed using the software Medident (Imagevision, Kruibeke, Belgium)’.

**Item 12d: Quality of images – The resolution and any magnification of the image(s) or any modifications/enhancements (e.g. adjustments for brightness, colour balance, or magnification, image smoothing, staining etc.) that were carried out must be described in the text or legend**

#### Explanation

The image resolution, magnification, colour balance or any modifications should be described and explained (*Examples 12d.1, 12d.2*). Any software or digital tools used to enhance/modify the image(s) and the reasons for doing so should be described. A scale bar should be included with magnified images. Modifications/enhancements to images are acceptable if they are applied to the entire image and do not mask, confuse, remove or misrepresent any details from the original image. Undisclosed image modifications/enhancements, especially if the changes appear to intentionally mask, misrepresent or falsify data is not acceptable and could be treated as scientific misconduct (Rossner & Yamada 2004, Lang *et al.* 2012).

#### Example 12d.1

From Ricucci *et al.* (2018b) – ‘(A) The surgical biopsy. A view of the resected apices. (B) A buccal view of the biopsy. (C) A radiograph of the biopsy. (D) A longitudinal section cut approximately at the center of the lesion on a buccopalatal plane at the level of line 2 in (C) (hematoxylin-eosin, original magnification  $\times 6$ ). (E) Detail from the center of the pathologic mass (original magnification  $\times 16$ ). (F) The upper portion of the lesion in D revealing a pseudocapsular structure (original magnification  $\times 16$ ). (G) The section proximal to that in D (Taylor-modified Brown and Brenn, original magnification  $\times 16$ ). (H) Middle magnification of the area of the central mass

indicated by the lower arrow in G. Bacterial aggregations exhibiting ‘ray fungus’ appearance (original magnification  $\times 100$ ). (I) A high-power view from the area of the colony indicated by the arrow in H (original magnification  $\times 400$ ). (J) Middle magnification of the area of the central mass indicated by the upper arrow in G (original magnification  $\times 100$ )’.

#### Example 12d.2

From Bjørndal *et al.* (2016) – ‘(A) A CBCT image of the core carrier; the white asterisk marks the section that was examined with SEM. (B) A scanning electron microscopic overview of the tip of the core carrier revealing an area covered with biofilm (white arrow). Bar = 200  $\mu\text{m}$ . (C) A larger magnification of the biofilm with microorganisms. Bar = 10  $\mu\text{m}$ . (D) The area marked with the white asterisk is shown in detail in D. (E) A cocci-shaped microorganism is shown (white asterisk). Bar = 1  $\mu\text{m}$ ’.

**Item 12e: Quality of images – Patient(s) identifiers (names, patient numbers) must be removed to ensure they are anonymised**

#### Explanation

Any personal information pertaining to, for example, the identity of patient(s) must be removed or masked (*Example 12e.1*).

#### Example 12e.1

From Jalalil & Kim (2016) – Fig. 1 shows the clinical photographs.

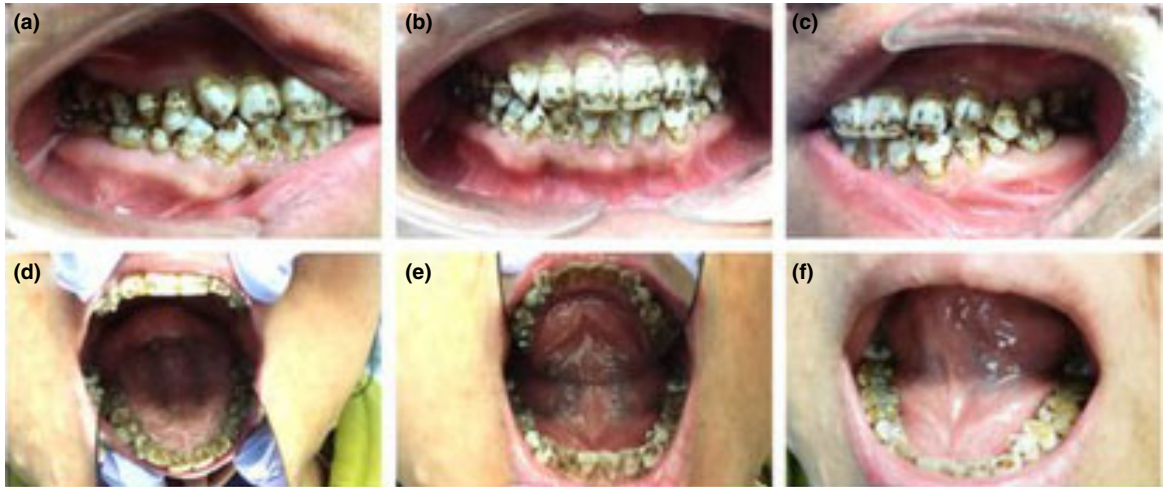
**Item 12f: Quality of images – An interpretation of the findings (meaning and implications) from the image (s) must be provided in the text**

#### Explanation

The case report should contain all relevant details and information derived following the evaluation and interpretation of the images (*Examples 12f.1, 12f.2*). The relevance and implications of the image(s) in light of all the information must be included.

#### Examples 12f.1

From Ricucci *et al.* (2018b) – ‘Longitudinal histobacteriologic sections including the entirety of the lesion revealed that the large bacterial colony was located in the direction of the root apex of tooth #10. Sections passing through the apex of tooth #9 no



**Figure 1** Clinical photographs. Reprinted from International Endodontic Journal, Vol 49, Jalali P, Kim SG. Multiple periradicular radiolucencies mimicking endodontic lesions in renal osteodystrophy of the mandible: a case report, Pages No. 706-714, Copyright (2016) with permission from Wiley.

longer showed the bacterial colony but rather inflamed and abscessed tissue areas. This may suggest that tooth #10 was the primary source of the extraradicular infection although this cannot be stated for sure'.

#### Examples 12f.2

From Vidal *et al.* (2016) – 'A 12-month follow-up with cone-beam computed tomography exhibited progressive involution of periapical radiolucency, with evidence of good healing of the periapical tissues and absence of clinical symptoms. A single-visit apexification procedure of a traumatically injured tooth with Biodentine revealed that this bioactive and biocompatible calcium-based cement can regenerate damaged dental tissues and represents a promising alternative to the multi-visit apexification technique'.

**Item 12g: Quality of images – The legend associated with each image must describe clearly what the subject is and what specific feature(s) it illustrates. Legends associated with images of patients must describe the age, gender and ethnicity of the person, if relevant**

#### Explanation

Images should have legends that are brief, succinct and comprehensive. Important, stand-alone details such as demographics and image views, for example radiographic views, (*Example 12g.1*) must be

provided. Legends should allow the reader to fully comprehend the message delivered by the image in the context of the case report.

#### Example 12g.1

From Cosme-Silva *et al.* (2017) – 'Intraoral clinical examination of a 25-year-old woman presenting with pain in the maxillary left canine (tooth 11). A. Left canine demonstrating cusp wear caused by occlusal trauma. B. Maxillary right canine with complete cusp'.

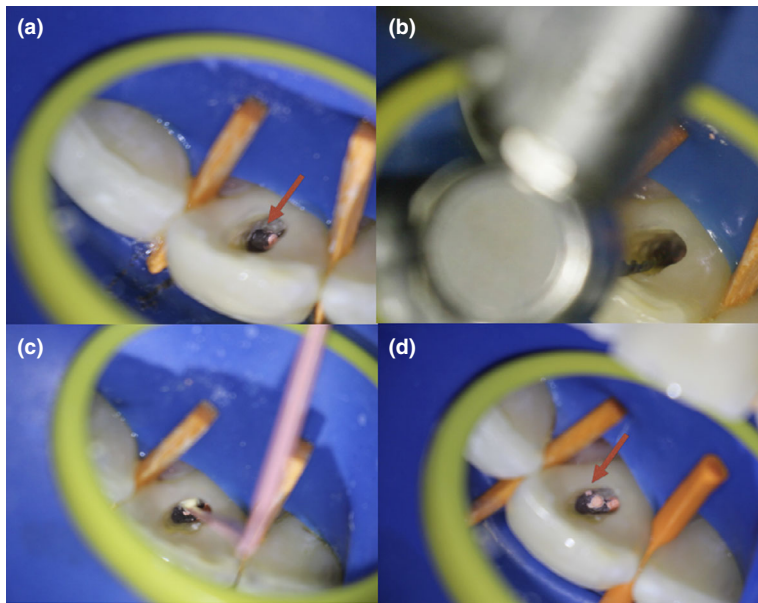
**Item 12h: Quality of images – Markers/labels must be used to identify the key information in the image(s) and be defined in the legend or as a footnote**

#### Explanation

The important findings and key information on images must be identified using label(s) or arrow (s) or key(s) with an explanation in the corresponding legend (*Example 12h.1*). Each image and legend should be meaningful and stand-alone. The authors must confirm the presence of markers/labels on an image and make sure they do not obscure/mask the important information.

#### Example 12h.1

From Chaniotis & Filippatos (2017) – Fig. 2 shows the clinical photographs.



**Figure 2** Clinical images. (a) Microscopic clinical image of the lateral canal entrance (arrow,  $\times 8$  magnification); (b) microscopic clinical image of the EDM 10, .05 taper file passively engaged inside the lateral canal ( $\times 8$  magnification); (c) lateral canal gutta-percha plus sealer cone fitting microscopic clinical image ( $\times 8$  magnification); and (d) microscopic clinical image of the orifices after the completion of obturation procedures (arrow,  $\times 8$  magnification). Reprinted from Journal of Endodontics, Vol 43, Chaniotis A, Filippatos C, The Use of a Novel Approach for the Instrumentation of a Cone-beam Computed Tomography-discernible Lateral Canal in an Unusual Maxillary Incisor: Case Report., Pages No. 1023-1027, Copyright (2017) with permission from Elsevier.

**Item 12i: Quality of images – The legend of each image must include an explanation whether it is pre-treatment, intra-treatment or post-treatment and, if relevant, how images over time were standardised**

*Explanation*

The legend of the image must explain whether the image(s), for example radiographs or clinical photographs, were taken preoperative, during the intervention, post-intervention or at the follow-up visit(s) (*Example 12i.1*). It is a good practice to mention in the legend the dates or the time intervals when the follow-up(s) took place. Details on how sequential images were standardized to allow comparisons to be made must be provided.

*Example 12i.1*

From Agrawal *et al.* (2016) – ‘Intraoral radiographs: (A) preoperative, (B) working length determination, (C) immediate postoperative, (D) 6-month recall, and (E) 24-month recall’.

**PRICE 2020 flowchart**

*Explanation*

The PRICE 2020 flowchart allows readers to gain an overall understanding, at a glance, of the stages involved in developing the case report. It includes demographic details, patient findings/symptoms, informed, valid consent for investigations, medical history, previous dental history, clinical findings, diagnostic tests performed and their results, differential diagnosis, definitive diagnosis, management options considered, informed, valid consent for treatment, interventions performed (if any), follow-up period (s), follow-up assessment method(s), outcome of treatment, patient perspective, conclusion (s), funding details and conflict of interest.

*Example flowchart*

From hypothetical case report titled ‘Managing the immature permanent mandibular first premolar by regenerative endodontic treatment’ (Fig. 3).

**Figure 3** PRICE 2020 flowchart showing the steps (hypothetical) involved in the case report. CBCT, cone-beam computed tomography; EPT, electric pulp testing; IOPA, intraoral periapical radiograph; MTA, mineral trioxide aggregate.

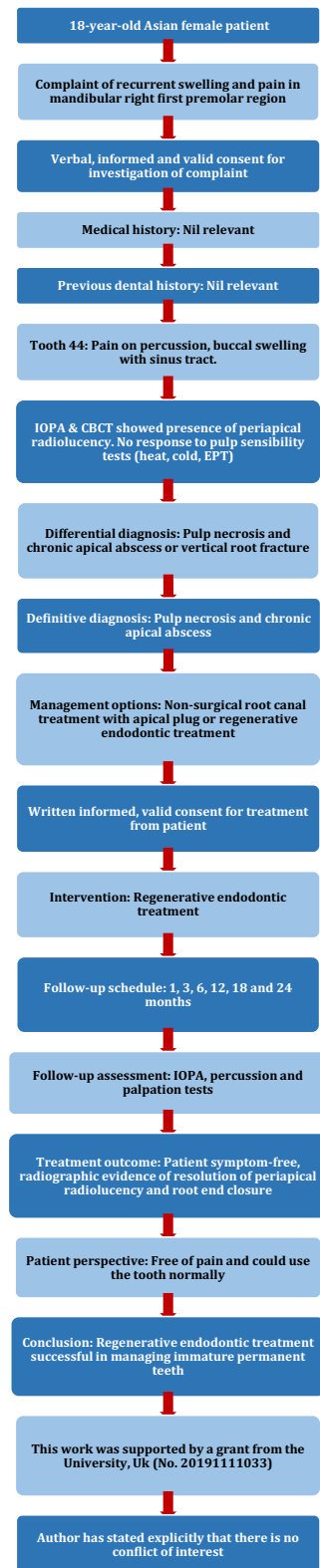
## Discussion

Case reports in medicine and dentistry are useful as they have the potential to provide important or additional information and can be the major source of knowledge on unusual, rare or new diseases, variations or presentations. Furthermore, case reports may help clinicians by providing guidance when facing challenges in their day-to-day clinical practice. A large number of the case reports submitted to journals are often poorly prepared and do not merit acceptance for publication (Gopikrishna 2010). As a consequence, the substantial variability in the quality of case reports in Endodontics has been the catalyst for developing the PRICE 2020 guidelines.

This PRICE explanation and elaboration document was developed to facilitate the understanding, uptake and dissemination of the PRICE 2020 guidelines and to provide a framework for authors interested in publishing high-quality case reports in Endodontics. A similar process and overall structure to that used in other guidelines was employed, for example CARE (Riley *et al.* 2017), Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Liberati *et al.* 2009) and CONSolidated Standards Of Reporting Trials (CONSORT; Moher *et al.* 2010). Although an attempt was made to cite real examples from the literature to complement the explanations, some hypothetical examples have been included.

Images are an important source of knowledge for biomedical researchers (Polepalli Ramesh *et al.* 2015) and clinicians as they provide visual evidence to support the text (Kotz & Cals 2013, Polepalli Ramesh *et al.* 2015). Due to the importance of images in case reports in Endodontics, several items related to images have been included in the checklist, in an attempt to improve the quality of images submitted along with manuscripts.

Flow diagrams have been reported to improve the quality of randomized controlled trials and systematic reviews (Egger *et al.* 2001, Vu-Ngoc *et al.* 2018). Hence, a flowchart has been included in the PRICE 2020 guidelines. It is anticipated that this will enable readers to rapidly understand the stages involved in preparing case reports.



Case reports prepared following the PRICE 2020 guidelines should include the following sentence 'This case report was prepared according to the PRICE 2020 Guidelines' and include a reference to the PRICE 2020 consensus publication (Nagendrababu *et al.* 2020). Referencing the PRICE 2020 reporting guidelines confirms that the recommended standards for reporting were followed. It is possible that adherence to the PRICE 2020 guidelines may result in an increase in the word counts of abstracts and manuscripts; however, advantage is gained in terms of better quality and more comprehensive reporting. In order to enjoy the maximum benefit, journals are encouraged to adopt and endorse these guidelines when peer-reviewing case reports in Endodontics; their 'Instructions to Authors' or 'Author guidelines' should be updated accordingly. We also expect journal editors to change their instructions to authors to accommodate a larger word count, especially for abstracts, which would also benefit from being structured (with headings). Furthermore, the guidelines will allow readers to be better able to critically appraise case report(s). The key domains in the PRICE 2020 checklist are numbered in sequential order from 1 to 10. However, depending on the structure and context of the case report(s), the numerical sequence of the items within each section/topic can be changed to ensure that all the required information is provided in a logical manner for each specific case.

## Conclusion

High-quality case reports can help improve patient care, aid critical analysis and facilitate good clinical decision-making. This manuscript provides a detailed explanation, with examples, for each item in the PRICE 2020 guidelines.

## Acknowledgement

We would like to thank those who helped in revising/editing and sharing their views on the PRICE 2020 explanation and elaboration document: Frank Setzer, USA; Giampiero Rossi-Fedele, Australia; Hal Duncan, Ireland; João Miguel Marques dos Santos, Portugal; Jorge Martins, Portugal; Josette Camilleri, UK; Juan J. Segura, Spain; Marco Versiani, Brazil; Pia Titterud Sunde, Norway; and Velmurugan Natanasabapathy, India.

## Conflict of interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

## Funding

This work was supported by the International Medical University, Kuala Lumpur, Malaysia, under Grant no: IMU 450/2019.

## References

- Agha RA, Fowler AJ, Saeta A *et al.* (2016) The SCARE statement: consensus-based surgical case report guidelines. *International Journal of Surgery* **34**, 180–6.
- Agha RA, Farwana R, Borrelli MR *et al.* (2017) Impact of SCARE guideline on the reporting of surgical case reports: A before and after Study. *International Journal of Surgery* **45**, 144–8.
- Agrawal PK, Wankhade J, Warhadpande M (2016) A rare case of Type III dens invaginatus in a mandibular second premolar and its nonsurgical endodontic management by using cone-beam computed tomography: a case report. *Journal of Endodontics* **42**, 669–72.
- Ahlgren FK, Johannessen AC, Hellem S (2003) Displaced calcium hydroxide paste causing inferior alveolar nerve paraesthesia: report of a case. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology* **96**, 734–7.
- Al-Tammami MF, Al-Nazhan SA (2017) Retreatment of failed regenerative endodontic of orthodontically treated immature permanent maxillary central incisor: a case report. *Restorative Dentistry & Endodontics* **42**, 65–71.
- Bertrand T, Kim SG (2016) Endodontic treatment of a C-shaped mandibular second premolar with four root canals and three apical foramina: a case report. *Restorative Dentistry & Endodontics* **41**, 68–73.
- Bjørndal L, Amaloo C, Markqvist M *et al.* (2016) Maxillary sinus impaction of a core carrier causing sustained apical periodontitis, sinusitis, and nasal stenosis: a 3-year follow-up. *Journal of Endodontics* **42**, 1851–8.
- Bolhari B, Pirmoazen S, Taftian E, Dehghan S (2016) A case report of dilacerated crown of a permanent mandibular central incisor. *Journal of Dentistry (Tehran)* **13**, 448–52.
- Carter AE, Carter G, Boschen M, AlShwaimi E, George R (2015) Ethnicity and pathways of fear in endodontics. *Journal of Endodontics* **41**, 1437–40.
- Chaniotis A, Filippatos C (2017) Root canal treatment of a dilacerated mandibular premolar using a novel instrumentation approach. A case report. *International Endodontic Journal* **50**, 202–11.
- Cho YS, Jung IY (2019) Complete healing of a large cystic lesion following root canal treatment with concurrent surgical drainage: a case report with 14-year follow-up. *Journal of Endodontics* **45**, 343–8.
- Chong BS (1995) Coronal leakage and treatment failure. *Journal of Endodontics* **21**, 159–60.
- Connert T, Zehnder MS, Amato M, Weiger R, Kühl S, Krastl G (2018) Microguided endodontics: a method to achieve minimally invasive access cavity preparation and root



- canal location in mandibular incisors using a novel computer-guided technique. *International Endodontic Journal* **51**, 247–5.
- Cosme-Silva L, Marcos AFO, Ferreira JF, Gomes Filho JE, Viola NV (2017) Traumatic periapical lesion only identified through cone beam computed tomography: a case report. *General Dentistry* **65**, e9–e12.
- de Carvalho AA, de Araújo Estrela CR, Borges AH, Guedes OA, Estrela C (2014) 10-year follow-up of calcifying odontogenic cyst in the periapical region of vital maxillary central incisor. *Journal of Endodontics* **40**, 1695–7.
- D'Mello G, Moloney L (2017) Management of coronal discoloration following a regenerative endodontic procedure in a maxillary incisor. *Australian Dental Journal* **62**, 111–6.
- Dogui H, Abdelmalek F, Amor A, Douki N (2018) Endocrown: an alternative approach for restoring endodontically treated molars with large coronal destruction. *Case Reports in Dentistry* **30**, 1581952.
- Dudeja PG, Dudeja KK, Lakhanpal M, Ali S (2014) Endodontic management of a haemophilic patient—a clinical perspective. *Journal of Clinical Diagnostic Research* **8**, ZD17–8.
- Dugas NN, Lawrence HP, Teplitsky P, Friedman S (2002) Quality of life and satisfaction outcomes of endodontic treatment. *Journal of Endodontics* **28**, 819–27.
- Egger M, Jüni P, Bartlett C; CONSORT Group (Consolidated Standards of Reporting of Trials) (2001) Value of flow diagrams in reports of randomized controlled trials. *JAMA* **285**, 1996–9.
- Farhad AR, Shokraneh A, Shekarchizade N (2016) Regeneration or replacement? A case report and review of literature. *Dental Traumatology* **32**, 71–9.
- Gagnier JJ, Kienle G, Altman DG et al. (2013) The CARE guidelines: consensus-based clinical case reporting guideline development. *Global Advances in Health and Medicine* **2**, 38–43.
- Goel S, Nawal RR, Talwar S (2017) Management of dens invaginatus type II associated with immature apex and large periradicular lesion using platelet-rich fibrin and Biodentine. *Journal of Endodontics* **43**, 1750–5.
- Gopikrishna V (2010) A report on case reports. *Journal of Conservative Dentistry* **13**, 265–71.
- Jalali P, Kim SG (2016) Multiple periradicular radiolucencies mimicking endodontic lesions in renal osteodystrophy of the mandible: a case report. *International Endodontic Journal* **49**, 706–14.
- Kaszkin-Bettag M, Hildebrandt W (2012) Case reports on cancer therapies: the urgent need to improve the reporting quality. *Global Advances in Health and Medicine* **1**, 8–10.
- Kaval ME, Güneri P, Çalışkan MK (2018) Regenerative endodontic treatment of perforated internal root resorption: a case report. *International Endodontic Journal* **51**, 128–37.
- Kotz D, Cals JW (2013) Effective writing and publishing scientific papers, part VII: tables and figures. *Journal of Clinical Epidemiology* **66**, 1197.
- Krug R, Soliman S, Krastl G (2019) Intentional replantation with an atraumatic extraction system in teeth with extensive cervical resorption. *Journal of Endodontics* **45**, 1390–96.
- Lang TA, Talerico C, Siontis GCM (2012) Documenting clinical and laboratory images in publications: the CLIP principles. *Chest* **141**, 1626–32.
- Lara-Mendes STO, Barbosa CFM, Santa-Rosa CC, Machado VC (2018) guided endodontic access in maxillary molars using cone-beam computed tomography and computer-aided design/computer-aided manufacturing system: a case report. *Journal of Endodontics* **44**, 875–9.
- Liberati A, Altman DG, Tetzlaff J et al. (2009) The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS Medicine* **6**, e1000100.
- Lim A, Le Clerc J (2019) Endodontic treatment of a hyper-taurodontic mandibular left second molar in a patient with many taurodonts combined with multiple pulp stones. *Australian Endodontic Journal* **45**, 414–9.
- Martins JNR, Marques D, Silva EJNL et al. (2019) Prevalence of C-shaped canal morphology using cone beam computed tomography—a systematic review with meta-analysis. *International Endodontic Journal* **52**, 1556–72.
- Moher D, Schulz KF, Simera I, Altman DG (2010) Guidance for developers of health research reporting guidelines. *PLoS Medicine* **7**, e1000217.
- Moher D, Hopewell S, Schulz KF et al. (2012) CONSORT 2010 explanation and elaboration: updated guidelines for reporting parallel group randomised trials. *International Journal of Surgery* **10**, 28–55.
- Moshari A, Vatanpour M, EsnaAshari E, Zakershahra M, Jalali Ara A (2017) Nonsurgical management of an extensive endodontic periapical lesion: a case report. *Iranian Endodontic Journal* **12**, 116–9.
- Murad MH, Sultan S, Haffar S, Bazerbachi F (2018) Methodological quality and synthesis of case series and case reports. *BMJ Evidence-Based Medicine* **23**, 60–3.
- Nagendrababu V, Chong BS, McCabe P et al. (2019) Guidelines for reporting the quality of clinical case reports in endodontics: a development protocol. *International Endodontic Journal* **52**, 775–8.
- Nagendrababu V, Chong BS, McCabe P et al. (2020) PRICE 2020 guidelines for reporting case reports in endodontics: a consensus-based development. *International Endodontic Journal* **53**, 619–26.
- Natera M, Mukherjee PM (2018) Regenerative endodontic treatment with orthodontic treatment in a tooth with dens evaginatus: a case report with a 4-year follow-up. *Journal of Endodontics* **44**, 952–5.
- Nissen T, Wynn R (2014) The clinical case report: a review of its merits and limitations. *BMC Research Notes* **7**, 264.
- Padhye L, Jagan IN, Unnikrishnan P, Mandke L, Kulkarni R, Toprani N (2018) Management of extraoral sinus via non-surgical root canal treatment. *Indian Journal of Oral Health and Research* **4**, 66.

- Pandey P, Nandkeoliar T, Bains R, Singh D (2018) Use of mineral trioxide aggregate for retreatment of a tooth with large periapical lesion, wide-open apices and vertical root fracture. *BMJ Case Reports*. <https://doi.org/10.1136/bcr-2018-227627>
- Park HO, Ha JH, Jin MU, Kim YK, Kim SK (2012) Diagnostic challenges of nonodontogenic toothache. *Restorative Dentistry & Endodontics* **37**, 170–4.
- Patel K, Schirru E, Niazi S, Mitchell P, Mannocci F (2016) Multiple apical radiolucencies and external cervical resorption associated with varicella zoster virus: a case report. *Journal of Endodontics* **42**, 978–83.
- Pavlič A, Vrecl M, Jan J, Bizjak M, Nemeč A (2019) Case report of a molar-root incisor malformation in a patient with an autoimmune lymphoproliferative syndrome. *BMC Oral Health* **19**, 49.
- Peng C, Zhao Y, Wang W, Yang Y, Qin M, Ge L (2017) Histologic findings of a human immature revascularized/regenerated tooth with symptomatic irreversible pulpitis. *Journal of Endodontics* **43**, 905–9.
- Perotti S, Bin P, Cecchi R (2018) Hypochlorite accident during endodontic therapy with nerve damage—a case report. *Acta Biomedica* **89**, 104–8.
- Pinto N, Harnish A, Cabrera C, Andrade C, Druttman T, Bri-zuela C (2017) An innovative regenerative endodontic procedure using leukocyte and platelet-rich fibrin associated with apical surgery: a case report. *Journal of Endodontics* **43**, 1828–34.
- Polepalli Ramesh B, Sethi RJ, Yu H (2015) Figure-associated text summarization and evaluation. *PLoS ONE* **10**, e0115671.
- Rai P, Pandey RK, Khanna R (2016) A multidisciplinary approach to the management of traumatic intrusion in immature permanent teeth. *BMJ Case Report*.
- Rajput A, Garg G, Talwar S, Verma M (2014) Fusion of a maxillary lateral incisor with a supernumerary tooth associated with incomplete root development: a case report. *ENDO (Lond Engl)* **8**, 41–5.
- Rehman K, Ghafoor R, Khan FR (2014) Root canal treatment of maxillary premolar in a subject with retention cyst in maxillary sinus: a diagnostic challenge. *Journal of Pakistan Dental Association* **23**, 85–9.
- Ricucci D, Siqueira JF Jr, Loghin S *et al.* (2018a) Management and histobacteriological findings of mucosal fenestration: a report of 2 cases. *Journal of Endodontics* **44**, 1583–92.
- Ricucci D, Lopes WSP, Loghin S, Rôças IN, Siqueira JF Jr (2018b) Large bacterial floc causing an independent extraradicular infection and posttreatment apical periodontitis: a case report. *Journal of Endodontics* **44**, 1308–16.
- Riley DS, Barber MS, Kienle GS *et al.* (2017) CARE guidelines for case reports: explanation and elaboration document. *Journal of Clinical Epidemiology* **89**, 218–35.
- Rison RA (2013) A guide to writing case reports for the Journal of Medical Case Reports and BioMed Central Research Notes. *Journal of Medical Case Reports* **7**, 239.
- Rossner M, Yamada KM (2004) What's in a picture? The temptation of image manipulation. *Journal of Cell Biology* **166**, 11–15.
- Sarmast ND, Wang HH, Sajadi AS, Angelov N, Dorn SO (2017) Classification and clinical management of retrograde peri-implantitis associated with apical periodontitis: a proposed classification system and case report. *Journal of Endodontics* **43**, 1921–24.
- Sharma S, Hackett R, Webb R, Macpherson D, Wilson A (2008) Severe tissue necrosis following intra-arterial injection of endodontic calcium hydroxide: a case series. *Oral Surgery, Oral Medicine, Oral Pathology, and Oral Radiology* **105**, 666–9.
- Shi X, Zhao S, Wang W, Jiang Q, Yang X (2018) Novel navigation technique for the endodontic treatment of a molar with pulp canal calcification and apical pathology. *Australian Endodontic Journal* **44**, 66–70.
- Slade GD (1997) Derivation and validation of a short-form oral health impact profile. *Community Dentistry and Oral Epidemiology* **25**, 284–90.
- Sun GH, Aliu O, Hayward RA (2013) Open-access electronic case report journals: the rationale for case report guidelines. *Journal of Clinical Epidemiology* **66**, 1065–70.
- Timmerman A, Parashos P (2017) Delayed root development by displaced mineral trioxide aggregate after regenerative endodontics: a case report. *Journal of Endodontics* **43**, 252–6.
- Torres A, Shaheen E, Lambrechts P, Politis C, Jacobs R (2019) Microguided endodontics: a case report of a maxillary lateral incisor with pulp canal obliteration and apical periodontitis. *International Endodontic Journal* **52**, 540–9.
- Vidal K, Martin G, Lozano O, Salas M, Trigueros J, Aguilar G (2016) Apical closure in apexification: a review and case report of apexification treatment of an immature permanent tooth with Biodentine. *Journal of Endodontics* **42**, 730–4.
- Vu-Ngoc H, Elawady SS, Mehayar GM, *et al.* (2018) Quality of flow diagram in systematic review and/or meta-analysis. *PLoS One* **13**, e0195955.
- Wong G (2008) Case reports: a helping hand to generalists. *Journal of Medical Case Reports* **2**, 311.
- Zhang P, Wei X (2017) Combined therapy for a rare case of type III dens invaginatus in a mandibular central incisor with a periapical lesion: a case Report. *Journal of Endodontics* **43**, 1378–82.