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ORIGINAL ARTICLE/ARTICOLO ORIGINALE

Periapical tissue evaluation: analysis of existing indexes and application of Periapical and Endodontic Status Scale (PESS) in clinical practice



Valutazione delle lesioni periapicali: analisi degli indici esistenti ed applicazioni cliniche del Periapical and Endodontic Status Scale (PESS)

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KEYWORDS

Cone-beam computed tomography;
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Treatment quality assessment

Abstract

Aim: To compare different indexes used for periapical pathology investigation and to apply them in clinical practice.

Methodology: PAI, CBCT-PAI, and PESS indexes were analyzed in detail using existing literature. Two cases were evaluated using CBCT-PAI and PESS index.

Results: Utilization of PESS index gives the possibility to see the status and changes in periapical tissue with more details. Also, using ETTI part of the index helps to understand the possible causes (filling length, condensation, and complications) of the disease and exact number of roots involved.

Conclusion: PESS index is complex and different from all other indexes already present in the literature. It permits to evaluate not only the status of periapical tissues, but also endodontic treatment quality. Furthermore, the COPI periapical index has prognostic value due to its suggested AP treatment risk degrees. PESS can be used in epidemiological studies and clinical

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PAROLE CHIAVE

Cone-beam computed tomography;
Radiologia dentale;
Diagnosi;
Follow up;
Indici periapicali;
Valutazione della qualità del trattamento.

practice. Future research must validate it. Finally, if universally adopted, this system of evaluation might allow groups worldwide to calibrate and build powerful combined data.

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Riassunto

Obiettivo: Confrontare diversi indici utilizzati per valutare la patologia periapicale e di applicarli nella pratica clinica.

Materiali e Metodi: Gli indici PAI, CBCT-PAI e PESS sono stati analizzati in dettaglio attraverso la letteratura esistente. Due casi sono stati valutati e confrontati utilizzando CBCT-PAI e l'indice PESS.

Risultati: L'utilizzo dell'indice PESS dà la possibilità di visualizzare lo stato e le modifiche nel tessuto periapicale con maggiori dettagli. Inoltre, utilizzando una parte dell'indice denominata ETTI, questa aiuta a capire le possibili cause della patologia (lunghezza di riempimento, condensazione, complicanze) e il numero esatto di radici coinvolte.

Conclusione: L'indice PESS è complesso e diverso da tutti gli altri indici già presenti in letteratura. Permette di valutare non solo lo stato dei tessuti periapicali, ma anche la qualità del trattamento endodontico. Inoltre, l'indice periapicale COPI ha valore prognostico nell'indicare il grado di rischio di trattamento delle periodontiti apicali. L'indice PESS può essere utilizzato in studi epidemiologici e nella pratica clinica, ma ulteriori ricerche dovranno convalidarlo. Infine, se universalmente adottato, questo sistema di valutazione potrebbe consentire ai gruppi di tutto il mondo di calibrare e combinare tutti i dati ottenuti.

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Introduction

Evaluation of periapical tissue is important, it lets clinicians to diagnose the disease, to see progression or regression of the disease and to assess treatments outcome.

Radiographic examination represents an essential part of the contemporary management of endodontic problems, from diagnosis and treatment planning to outcome evaluation. Based on these needs and methods available, various diagnostic indexes for periapical tissue evaluation were proposed using radiographic examination.¹ Orstavik et al. (1986) developed the most popular periapical index (PAI), in which periapical lesions were classified into five scores based on the use of reference periapical radiographs of teeth with confirmed histological diagnosis.² Unfortunately, PAI is based on two-dimensional (2D) periapical radiographs, which attempt to analyze a complex three-dimensional (3D) human anatomy; superimposition of anatomical structures may result in geometric distortion of the area and anatomic noise that can hide the region of interest. Cone-beam computed tomography (CBCT), on the other hand, is a 3D imaging modality, which can provide clinically relevant additional information not found in the periapical radiographs or orthopantomograms.³ Estrela et al. (2008) was the first to develop periapical index (CBCTPAI) based on criteria established from measurements corresponding to periapical radiolucency interpreted on CBCT scans.⁴

Endodontic status and technical quality of the root canal filling scale was developed by Eckerbom and Magnusson.⁵ The main criteria of technical quality of the root canal filling are determined by length and homogeneity of the root canal filling of visible tooth roots.

All above-mentioned scales analyze separate non-systematized parameters of the patient's periapical and endodontic status. Furthermore, some parameters are expressed as morphological changes of bone tissue but do not indicate the size of the lesion,² or, on the other hand, give only the periapical bone lesion size in mm,⁴ which has only limited diagnostic and prognostic value.

Recently, Venskutonis et al. (2015) introduced Periapical and Endodontic Status Scale (PESS) based on periapical bone lesion and endodontic treatment quality evaluation using CBCT.⁶ This scale, propose one system to analyze both, periapical pathology with surrounding tissues, and endodontic treatment quality evaluation.

The aim of this article is to analyze and compare these three indexes.

Materials and methods

PAI, CBCT-PAI, and PESS indexes were analyzed in detail using existing literature. Two cases were evaluated using CBCT-PAI and PESS index.

PAI

The most popular and commonly used periapical scoring system for assessment of apical periodontitis was developed by Orstavik et al. (1986). It consists of five categories:

1. Normal periapical structures.
2. Small changes in bone structures.
3. Change in bone structure with mineral loss.
4. Periodontitis with well-defined radiolucent area.

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