



Correlation of clinical, radiographic and histological diagnoses of apical dental lesions

Correlación en el diagnóstico clínico, radiográfico e histológico de lesiones apicales dentales

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ABSTRACT

Objective: To establish a correlation amongst clinical, radiographic and histological characteristics of dental apical lesions at the time of diagnosis. **Material and methods:** A descriptive study which undertook to establish comparison of clinical and radiographic characteristics with histopathological study of lesions. Included in the study were samples of individuals which had been previously diagnosed with periapical disease processes; samples were harvested from apicoectomies and dental extractions. In order to achieve histological diagnosis, a pathologist routinely processed and assessed all specimens. **Results:** 50% of all samples were diagnosed as apical periodontitis, followed by periapical cysts (28.5%). An association of ($p = 0.01$) was found when correlating clinical characteristics such as sensitivity to percussion and spontaneous pain. The same situation arose when relating vertical bone loss to dental mobility ($p = 0.023$), and dental mobility with affected tooth ($p = 0.036$), nevertheless, no association was found with correlation of patient's symptomatic status, such as spontaneous pain, and type of predominant inflammatory infiltrate in the lesions ($p = 1.4$), nevertheless, association was found with the secondary infiltrate type existing in them ($p = 0.057$). Dental mobility was taken as diagnostic marker for granuloma and periapical cyst ($p = 0.025$). **Conclusions:** Certain clinical markers were found with the ability to predict histological manifestation of the lesions, such as dental mobility for granuloma and periapical cyst cases. Nevertheless, exact prediction of each one of the diseases is still difficult to obtain, this is due to the lesion's dynamics and the scarce correlation existing among clinical and radiographic characteristics with the histological description of the lesions.

Key words: Histology, periapical lesion, exodontics, periapical granuloma, radicular cyst, periapical periodontitis (MeSH).

Palabras clave: Histología, lesión apical, exodoncia, granuloma periapical, quiste radicular, periodontitis periapical (DeCs).

RESUMEN

Objetivo: Establecer la correlación entre las características clínicas, radiográficas e histológicas de lesiones apicales dentales al momento de su diagnóstico. **Material y métodos:** Estudio descriptivo en el que se realizó la comparación de las características clínico-radiográficas con el estudio histopatológico de las lesiones. Se incluyeron muestras de individuos que fueron diagnosticados con procesos de patología periapical, obtenidas a través de apicoectomías y extracciones dentales. Los cortes fueron procesados rutinariamente y evaluados por patólogo para su diagnóstico histológico. **Resultados:** El 50% de las muestras fue diagnosticado como periodontitis apical, seguido por quistes periapicales (28.5%). Al correlacionar entre sí características clínicas como sensibilidad a la percusión y dolor espontáneo hubo asociación ($p = 0.01$). Igualmente, al relacionar la pérdida ósea vertical con movilidad dental ($p = 0.023$) y ésta con el órgano dentario afectado ($p = 0.036$). Sin embargo, no mostró asociación, la correlación entre el estado sintomático del paciente como dolor espontáneo y el tipo de infiltrado inflamatorio predominante en las lesiones ($p = 1.4$); pero sí la hubo, con el tipo de infiltrado secundario que existía en ellas ($p = 0.057$). La movilidad dental se mostró como un marcador diagnóstico para granuloma y quiste periapical ($p = 0.025$). **Conclusiones:** Se hallaron ciertos marcadores clínicos capaces de predecir la presentación histológica de las lesiones, como la movilidad dental para granuloma y quiste periapical. Sin embargo, la predicción exacta de cada una de las patologías aún se hace difícil, debido a la misma dinámica de las lesiones y a la poca correlación que existe entre las características clínico-radiográficas con la descripción histológica de las lesiones.

INTRODUCTION

Apical lesions are a set of chronic inflammatory processes generally caused by microorganisms or their by-products. They reside in or invade the periapical tissue located at the root canal, and they manifest due to the defense response of the host to the microbial stimulus in the root canal system.^{1,2} It has been mentioned that its pathogenesis begins with the development of soft tissues' peri-radicular destruction after bacterial infection of the dental

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pulp, so that components of bacteria's cell wall react to monocytes, macrophages, fibroblasts and other cells of the immune system. This causes production of pro-inflammatory cytokines responsible for tissue destruction and degradation of extracellular matrix (ECM) components, including collagen and proteoglycans, and resulting in the resorption of hard tissues as well as destruction of other periapical tissues.^{2,3}

According to the American Association of Endodontics, from the histopathological point of view, the first changes produced at periapical level are characterized by hyperemia, vascular congestion, periodontal ligament edema and neutrophil extravasation, which are attracted to the area through chemotaxis, initially induced by tissue lesion, bacterial products, lipopolysaccharides (LPS) and C5 factor of the complement.¹⁻⁵

Among factors associated to the origins of this alteration we can count mechanical type factors such as trauma and instrument-caused lesions and chemical factors such as tissue irritation caused by endodontic materials. It is worth noting that these mechanisms can trigger a mild or severe response of the host organism, which might be accompanied by clinical symptoms such as pain upon pressure on the tooth and in some cases tooth elevation.^{6,7}

It has been reported that this condition mostly affects patients in their third decade of life,⁷ nevertheless and in spite of the fact that periapical disease has been treated for years, it has been reported that 79% of all endodontically treated teeth present a lesion of some kind. This figure is influenced by the high error rate in diagnosis and wrong treatment decisions, as well as by the high percentage of cases, which, in spite of receiving endodontic treatment could not culminate in a resolution of the condition.^{8,9} Jaramillo, conducted a study of 47 teeth in 2009. He reported that 87.8% of studied teeth were poorly filled, bearing in mind ideal apical seal and length. This would partly justify the high prevalence of lesions found in the population.⁸ This last factor, along with the existence of other factors which hinder total tissue repair such as pulp necrosis and proteolytic activity, prevent root physiological growth as well as permanent apical closure.⁹

With respect to clinical evaluation, Kuc et al¹⁰ reported that only 59% of clinically diagnosed cases were consistent with the histopathology, they additionally informed that about 30% of all diagnoses emitted were completely wrong.¹⁰ Radiographic evaluation was considered the most widely used method to detect periapical lesions, nevertheless, this assessment offers images in two dimensions of

tridimensional structures, thus, accuracy regarding lesion size, extension and location⁹ might be lost along the way. Accurate clinical and radiographic diagnosis guarantees suitable endodontic treatment of teeth presenting pulp and/or periodontal lesions, without overlooking suitable crown filling or rehabilitation, therefore, this factor becomes vital.

Bearing all the aforementioned in mind, many authors suggest performing histological studies in those cases where apical lesions do not disappear, so as to determine their relationship with the clinical aspects.^{11,12} Nevertheless, use of histopathology, the diagnosis gold standard, is presently subject to controversy since there is no universal protocol for examining all soft tissue recovered from extracted teeth or apical surgeries.¹³ Walton mentioned that histological examination might be important in cases where the lesion does not disappear and implies a severe health risk for the patient, but he does not support routine use of the analysis, based on cost/benefit reasons for the patient.¹¹⁻¹³

The aim of the present study was to determine relationship between clinical, radiographic and histopathological evaluation of dental apical lesions at the moment of their diagnosis.

MATERIAL AND METHODS

The present was a comparative, descriptive study where samples of apical lesions were taken through extraction procedures and apicoestomies of subjects treated at the undergraduate and graduate clinics of the School of Dentistry, University of Cartagena, in the period comprised between 2014-2015. Teeth presenting apical lesions of endodontic origin and soft tissue harvested by means of their curettage were included in the project.

The following were excluded: lesions not associated to endodontic condition and radiographs in poor condition (due to errors incurred when taking or developing them). In order to be suitably preserved, samples were fixated in 10% buffered formalin, later they were bathed in paraffin and histological cuts of X microns were performed, to be then examined under a light microscope.

Clinical analysis

Patients were initially subjected to a clinical assessment which took into account the following variables:

Tooth mobility: this was determined according to movement exhibited by the affected tooth in horizontal

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