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BRIEF REPORT

Oral pulse granuloma and oral pulse granuloma associated with odontogenic keratocyst: Two clinical cases and a review of the literature

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Abstract Two cases of oral pulse granuloma (OPG) or vegetable granuloma (VG) are presented, one of which was concomitant with an odontogenic keratocyst (OKC), which is an unusual finding. OKC is characterized by the presence of hyaline rings which include vessels, giant cells, other inflammatory cells and collagen fibres. There are two hypotheses as to its histogenesis: firstly, as a reaction to vegetable matter, such as legumes (thus the nomenclature ''pulse'' or edible seed) and secondly as a degenerative change in the vessel walls as a result of localized vasculitis.

Due to the deceptive appearance of OPG, diagnosis can be challenging.

PALABRAS CLAVE
Granuloma oral pulse;
Anillo hialino;
Queratoquiste odontogénico;
Células gigantes;
Granuloma vegetal

Granuloma oral pulse y granuloma oral pulse asociado a un queratoquiste odontogénico: 2 casos clínicos y revisión de la literatura

Resumen En este artículo breve se presentan 2 casos de granuloma oral pulse (GOP) o granuloma vegetal, uno de ellos asociado a un queratoquiste odontogénico. Esta entidad está caracterizada por la presencia de estructuras hialinas en anillo que incluyen vasos, células gigantes, otras células inflamatorias y haces de fibras de colágeno. Sobre su origen todavía se barajan 2 hipótesis: una en la que se sospecha que se producen como reacción a estructuras vegetales como legumbres (de donde toma el nombre de «pulse» o semilla comestible de una leguminosa), y otra en la que se trataría de un cambio degenerativo

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de las paredes vasculares, resultado de una vasculitis localizada. Debido a la apariencia engañosa del GOP es fácil que a los patólogos les suponga un esfuerzo su diagnóstico.

Se describe a continuación un hallazgo inusual de un GOP relacionado con un queratoquiste odontogénico.

Introduction

Oral pulse granuloma (OPG) or vegetable granuloma (VG) is so named because it is caused by the entrapment of vegetable or plant material. Since 1971, this lesion has received many names, such as chronic periostitis with hyaline rings, giant cell hyaline angiopathy, legume-associated lesion, OPG, VG and giant cell granuloma; the most recent term is hyaline-ring granuloma (HRG).[1,2]

OPGs are observed in locations such as the oral cavity, lungs, intestines, skin, gallbladder and fallopian tubes and arise subsequent to an infectious reaction.[3–5] Histologically, these granulomas have been characterized by rings of pale eosinophilic structure-less material (so-called hyaline rings) with numerous multinucleated giant cells around and within the cells making up the rings. In addition, they also present inflammatory exudate, necrotic material and dystrophic calcification.[5–9]

They are commonly found in the periapical or sulcular areas in mandibular third-molar impactions and can occur with recurrent pericoronitis, related to tooth decay, retained roots, in post-extraction tissue reactions or in a cyst wall in communication with the oral cavity.[5,9–11]

There two etiological hypotheses:

(i) Exogenous theory: A granulomatous reaction provoked by the presence of vegetable cells from products such as beans, peas or lentils, which have a high content of proteins, cellulose and starch. Vegetables are rich in phytohaemagglutinin, an element that produces the agglutination of erythrocytes and leucocytes in blood cells.[9,12]

Furthermore, open wounds could be an entry point for vegetable cells; cavities or a third-molar partially erupted opercula, for instance, allow food particles to enter the periodontal pocket, triggering a foreign body reaction.[5,9]

(ii) Endogenous theory: Dunlap and Barker developed this theory in 1977, introducing the term ''Hyaline ring''. The theory states that the hyaline rings represent degenerative changes in the blood vessel walls, initiating a process that can lead to vasculitis and gave rise to the previous nomenclature, ''giant cell hyaline angiopathy'', for OPG.[13]

OPG is defined as an odontogenic cyst of embryological origin deriving from the remains of the dental lamina with an epithelial band, a characteristic of a parakeratinized epithelium which has a potential for aggressive, infiltrative growth.[14,15]

Formerly, the OKC was considered to be an odontogenic tumour (OT), together with the ameloblastoma (AB) and the calcifying epithelial odontogenic tumour (CEOT). In January 2017 the WHO reclassified the OKC as a cystic, not tumorous, lesion.[16,17]

The recurrence of an OKC occurs between 20 and 30 years, with predilection for the mandible at third-molar level and a mandible angle of 65–83% (1, 9:1) to the maxilla.[15,17] It is twice as common in males than females and accounts for 8–11% of all odontogenic cysts, being the third most prevalent cyst, after the radicular cyst and the dentigerous cyst.[17]

We present two distinct cases; an OPG associated with the fibrous wall of an OKC after recurrence, and an OPG in the jaw.

Case 1: oral pulse granuloma associated with an odontogenic keratocyst

A 15-year-old male with no significant past medical history was referred to the maxillofacial surgical department with a cystic lesion of the jaw. A dental piece (third molar) was present in the interior on the angle on the right-hand side, from the mandibular condyle up to the dental midline. The patient underwent intraoral surgery, with subperiosteal detachment, enucleation with curettage of the cystic cavity and a lower molar exeresis preserving the right inferior alveolar nerve.

On biopsy, an irregular, membranous, dun-coloured piece of tissue measuring $7 \times 2 \times 0.1$ cm was removed. Macroscopically, this tissue appeared as a cystic fibrous wall attached to a 1 cm diameter third molar. The histological study with haematoxylin–eosin (H&E) corresponded to fibrous cyst wall fragments, resulting in a histopathological diagnosis of OKC.

Subsequently, the patient had annual follow-ups and 4 years post-operatively a radiolucent lesion was found in the right mandibular angle during a routine orthopantomography. The lesion was biopsied previous to intraoral surgery. An incision was made following the anterior edge of the mandible all the way up to the base of the coronoid apophysis and through the vestibular system up to tooth 4.6. The vestibular and lingual mucosa were both detached in order to identify the lingual nerve then the cyst cavity was reached, the capsule dissected and the dental nerve detached along its entire pathway. The whole cyst was enucleated and the rest of the cavity curetted.

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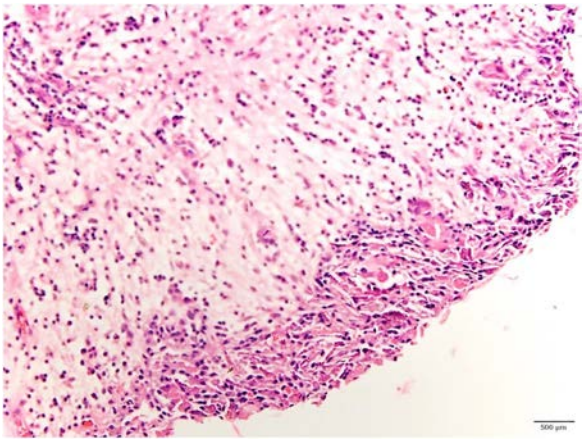

Figure 1 Oral pulse granuloma in association with OKC. Case 1 (H/E 200×).

Macroscopically, an empty, saccular, ovoid-shaped specimen measuring $5 \times 1.5 \times 0.3$ cm with a membranous appearance and reddish, dun-coloured material attached to a coagulated congested wall in its interior was observed. Microscopically, a cystic formation integrally covered by stratified parakeratinized epithelium with a layer of small, aligned cuboid basal cells was seen. On the top of the basal cells, there were 3–4 cell layers with no relevant alteration. The epithelium was detached from the underlying connective tissue in many areas.

Superficially, there was a marked parakeratotic layer with puckering in many areas. The rest of the cyst wall consisted of a dense, laminated fibroconnective tissue, parallel to the internal surface. Focal dehiscences were observed between the epithelium and the underlying stroma. Numerous clusters of histiocytes and multinucleated giant cells were present, surrounding a basophilic or clear, calcified material with the appearance of a foreign body that was not histologically identifiable. Final diagnosis was an OKC and granulomatous reaction to a foreign body. OPG was observed on the wall of the OKC. Periodic acid-Schiff (PAS) revealed fibrinoid degeneration (red) and the presence of polysaccharides. The OPG in the lesion of the recurrent OKC is shown in Fig. 1.

Axial and coronal sections of computed tomography (CT) revealed a lytic lesion over the right mandibular ramus, expanding the bone with no evidence of a cortical bone fracture nor soft-tissue invasion. The lytic lesion occupied the entire mandibular ramus, reaching the condyle base without invading the mandible body.

Subsequently, a 5-year follow-up was carried out and, as there was no indication of recurrence, the patient was discharged.

Case 2: oral pulse granuloma (OPG)

A 47-year-old woman with no significant past medical history presented with a cystic lesion on the left-hand side of the mandible, occupying part of the mandibular body. The lesion was evident in the diagnostic orthopantomography (Fig. 2a). Intraoral surgery was performed with subperiosteal detachment and enucleation with curettage of the cystic cavity.

Three irregular, dun-coloured fragments, collectively measuring $1.3 \times 0.6 \times 0.5$ cm, were extracted on biopsy. Two fragments were elastic in consistency and one solid. H&E examination revealed that the lesion had fibromatous zones with myxoid degeneration and included peripheral woven bone without any relevant alterations, in addition to foreign body giant cells. Finally, mucopolysaccharides were seen with PAS (Fig. 3).

After 2-years, there was no recurrence.

Discussion

OPG is an unusual finding in the oral cavity and has a controversial etiopathogenesis. It appears as a spherical, ovoid, irregular body surrounded by fibroblasts, presenting homogeneous, eosinophilic material with H&E, surrounded by giant and inflammatory cells. Independently of its clinical presentation, the histopathological characteristics are the same, principally hyaluronic rings with fibrous connective tissue. The hyaline material can have a homogenous appearance, with eosinophilic material and multinucleated giant cells.[9] Calcified basophilic bodies can occur within the amorphous hyaline material. These are usually found in the posterior mandibular region.[10] While those authors who favour the endogenous theory consider that

Figure 2 Orthopantomography reveals a large osteolytic lesion of the mandibular body on the left side. Case 2.

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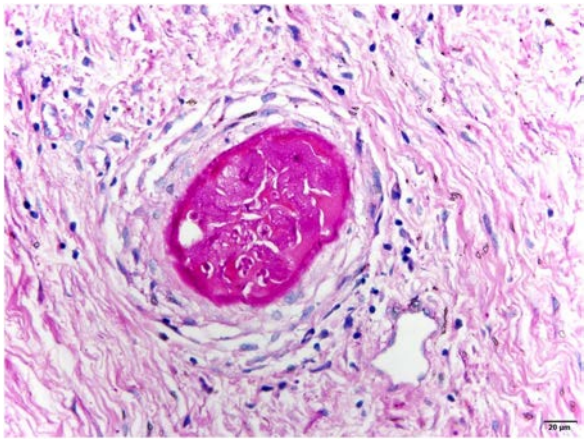

Figure 3 Oral pulse granuloma. Case 2 (PAS, 200×).

this vegetable material is embedded within the edentulous portions of the mandible, periapical lesions and walls of odontogenic cysts, others prefer the exogenous theory which suggests that food particles with vegetable contents are implanted in post-extraction alveoli, periodontal pockets, under-obturated root canals and teeth with extensive cavities. The hypothesis of Talako and Radden states that food particles accessing the tissue are rapidly digested by it, altering the host response. The cellulose contained in some foods, such as legumes, is indigestible and persists as hyaline material, provoking a chronic granulomatous inflammation response.[13]

Adkins considered the lesion as a foreign body granuloma, with the hyaline material being a foreign body of unknown origin.[12]

Conversely, Harrison and Martin supported the theory of hyaline rings being made mainly of cellulose, giving rise to the term ''oral vegetable granuloma''.[10]

Up to 170 cases of oral or extra-oral OPG have been published, 33 of which are associated with inflammatory odontogenic cysts, 2 with dentigerous cysts[11], 8 with odontogenic cysts, 3 with nasopalatine duct cysts and only 3 with OKC.[10] Thus, OPG concomitant with an OKC is very rare and the few reported cases are usually associated with a recurrence, as in the present case.

Gueiros et al. proposed that OPGs are caused by the traumatic implantation, in either an alveolus or an oral ulcer, of vegetable particles and that the indigestible cellulose they contain provokes a chronic granulomatous reaction.[3] This could have occurred in the present case; during the removal of the cyst, the implantation of a legume food particle caused the chronic inflammatory reaction. The OKC is of particular interest due to its local aggressiveness and high recurrence.[15] It has an embryological origin and occurs twice as often in males than females (2:1), most commonly during the third decade of life (28.9%). Its recurrence rate varies between 2.5% and 60%.[17]

OPGs are not frequently diagnosed as they rarely produce large lesions or cause discomfort.[12] The cyst should be fully excised followed by curettage, as in the present case. Recurrence is rare and is due to incomplete removal initially.[10] There was no recurrence in our case 5 years postoperatively.

OPG is a well-described entity, but with a variable histopathology. We present a case of the unusual association of an OPG with an OKC in the wall of the recurrent cyst due to the implantation of food particles in an open wound during the healing phase, thus stressing the need for good oral hygiene as an essential preventative measure.[11]

Ethics approval and consent to participate

This study is approval for the ethics committee Hospital 12 de Octubre and following the Helsinki Declaration.

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Conflict of interest

The authors declare that they have no competing interest.

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