

Melanin pigmented periradicular lesions of extracted teeth: a report of 3 cases and review of the literature

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Summary

This article reports 3 cases of melanin pigmented lesions among 75 histologically diagnosed periradicular lesions of extracted teeth.

Case 1 was a 25-year old male who presented with one week history of toothache involving a tender carious left mandibular second molar tooth (37), with periapical radiolucency and diagnosed clinically as acute apical periodontitis. The lesion was diagnosed histologically (using Haematoxylin and Eosin) as periapical granuloma, while histochemical examination (using Masson-Fontana technique) showed the presence of round/oval shaped melanin pigmented macrophages (melanophage) in the lesion. **Case 2** was a 54-year old male with one week history of toothache associated with tender carious right maxillary first molar tooth (16) with periapical radiolucency. A clinical diagnosis of acute apical periodontitis was made, but histological and histochemical examination showed a melanin pigmented periapical granuloma with spindle shaped melanophage.

Case 3 was a 28-year old female who presented with 4 days history of toothache, involving the tender left mandibular first molar tooth (36). The lesion had periapical radiolucency and a clinical diagnosis of acute apical periodontitis. On examination histologically and histochemically, the lesion was diagnosed as an intraosseous melanocytic naevi with dark-brown nests of round naevus cells. In conclusion, this article shows the rarity of melanin pigmented periradicular lesions in the jaws. The cases reported suggest that the trigger for formation of melanin-pigmented cells in the periradicular lesions may be related to the acute phase of the lesions. Further study is recommended to determine if the remnants of the migratory neural crest cells are the precursors of melanin-pigmented cells in the periradicular region.

Key words: *Melanin pigment; periradicular lesion; extracted-teeth*

Résumé

Cet article rapport trois cas de lésions pigmentées de mélanine parmi 75 lésions periradiculaires histologiquement diagnostiquées des dents extraits. Le premier cas était un homme de 25 ans qui se présentait avec une histoire d'une semaine de douleur dentaire due à une légère carie sur le second molaire de la mandibule gauche(37), avec une radiolucence periapicale et cliniquement étant une périodontie apicale aigue. La lésion était diagnostiqué histologiquement en utilisant l'hématoxyline et l'éosine comme granulome periapicale, tan disque l'examen histochimique utilisant la technique de Masson-Fontana montrait la présence des macrophages (melanophages) rondes /ovales pigmentées de mélanine dans la lésion. Le deuxième cas était de 54 ans ayant une histoire d'une semaine de douleur dentaire associée a une carie de la première molaire du maxillaire droit (16) avec une radiolucence periapicale'. Le diagnostic clinique de la périodontie apicale aigu était fait mais les examens histologiques et histochimique démontraient un granulome perapicale pigmentée de mélanine avec de melanophage en forme de fibre. Le troisième cas était une femme de 28 ans qui se présentait avec quatre jours d'histoire de douleur dentaire du a une légère douleur au premier molaire du mandibule gauche (36). La lésion avait une radiolucence periapicale et un diagnostic clinique de la périodontie apicale aigue. L'examen histologique et histochimique de la lésion montre une intra osseuse melanocytique de naevi avec des mèches marron foncées sur les rondes cellules de Naevius. En conclusion. cet article démontre la rareté des lésions pigmentées de mélanine periradulaire dans la bouche. Ces cas rapportaient suggère la stimulation de formation des cellules pigmentées de mélanine dans les lésions periradiculaires peuvent être lié a la phase acute des lésions. Une étude approfondie est recommande pour déterminer si les restes migratoires des cellules neurales qui sont des précurseurs des cellules pigmentées de mélanine dans la région periradulaire.

Introduction

Melanin is an endogenous intracellular pigment that varies from light brown to black in colour, which contributes to the colour of the skin, oral mucosa, eye and substantia nigra. There are specialized pigment cells called melanocytes, situated in the basal layer of the oral mucosa and the epidermis, involved in the production of melanin pigment. Melanocytes possess long dendritic processes that extend between the keratinocytes and passes through several layers of these cells. Melanin pigment is synthesized within the melanocytes as small structures called melanosomes. Melanin pigment synthesis is a product of oxidation and polymerization of amino acid tyrosine to dihydroxyphenylalanine catalyzed by the enzyme tyrosinase before inoculation into the cytoplasm of adjacent keratinocytes through the dendritic processes of the melanocytes. Individuals with very heavy melanin pigmentation has cells containing melanin in the connective tissue, which may be macrophages (melanophages) that have taken up melanosomes produced in the melanocytes in the epithelium. Argentaffin (silver) stain or histochemical reaction for tyrosinase (one of the enzymes involved in the synthesis of melanin) demonstrates the presence of melanin in lightly pigmented tissues [1]

Several studies have reported the presence of melanin pigments in some odontogenic cysts [2,3], odontogenic tumours [4-8], melanotic neuroectodermal tumour of infancy [9-11] and other pigmented lesions in the oral cavity [12-14]. In a reported case of pigmented lateral periodontal cyst [2], the cystic epithelial lining contained an abundant amount of melanin granules throughout the epithelium. Ultrastructural examination showed epithelial cells with mature melanosomes (stage IV melanosomes). In addition, there were melanophages containing aggregates of melanosomes in the capsule of the cyst composed of fibrous connective tissue.

Reports from previous studies [8,9,11-13] of some orofacial lesions related histogenesis, racial predisposition and prognosis of these lesions with the presence of melanin pigments. Although, histological examination may be unreliable in predicting clinical behaviour, morphologic and phenotypic features may be useful indicators [10].

The head and neck region seems more likely to be a common site for melanin-pigmented lesions, especially the periradicular area of a tooth where neural crest cells migrate during embryogenesis and contribute to tooth and periradicular tissue formation [14]. Neural crest cells have been linked with melanin producing lesions in the oral cavity [10]. The

demonstration of melanin pigments and the correlation of their presence in periradicular lesions with the clinical behaviour of these lesions, may be useful to determine the histogenesis and to predict the prognosis of these lesions.

Medline search of the literature shows no record of histochemical study for the presence of melanin pigment in periradicular lesions in a black African population. However, 2 (6.5%) cases of pigmented adenomatoid odontogenic tumours of the jaw have been reported amongst 31 Nigerian cases [8]. This article reports 3 cases of melanin pigmented periradicular lesions of extracted teeth.

Case report

We obtained permission from the Medical Ethics Committee of the hospital to carry out routine histopathologic examination of recoverable periradicular tissues from the extracted teeth of patients who had single tooth extraction, at the Department of Oral and Maxillofacial Surgery and Pathology, University of Benin Teaching Hospital, Benin City, Nigeria. Among the 136 patients who consented to participate in the study carried out over a period of 8 months (February to September 2005), 75 cases had histologically diagnosed periradicular lesions (using Haematoxylin and Eosin). Histochemical staining (using Masson-Fontana technique) was performed on the 75 histologically diagnosed periradicular lesions, to demonstrate the presence of melanin-pigmented cells. The slides of the stained tissues were examined under low (x10) and high power (x40) microscopy. There were 3 (4.0%) cases of melanin pigmented periradicular lesions amongst the 75 selected periradicular lesions.

Case 1

A 25-year old male who presented with one week history of toothache involving a tender carious left mandibular second molar tooth (37), with periapical radiolucency and diagnosed clinically as acute apical periodontitis. The recovered periradicular tissues from the extracted tooth (37) was diagnosed histologically as periapical granuloma, while histochemical examination of the tissues showed the presence of round/oval shaped melanin pigmented macrophage (melanophage) in the lesion [Figure 1]

Case 2

A 54-year old male with one week history of toothache associated with a tender carious right maxillary first molar tooth (16) with periapical radiolucency. A clinical diagnosis of acute apical periodontitis was made.

Histological and histochemical examination of the recovered periradicular tissues from the extracted

tooth (16) showed a melanin pigmented periapical granuloma with predominantly spindle shaped melanophage (Figure 2).

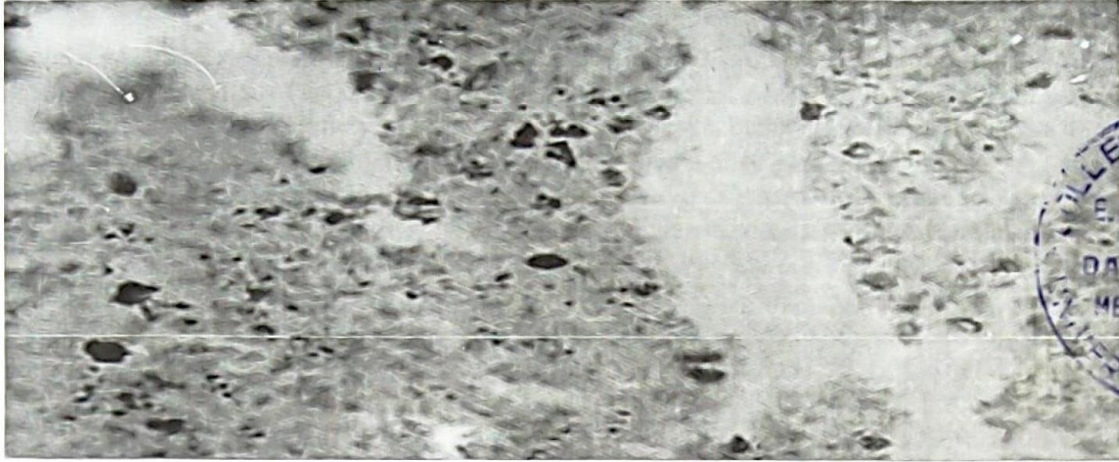


Fig. 1: Periapical granuloma with round or oval shaped melanophage scattered within the granulation tissue [Masson's Fontana method x40]



Fig. 2: Periapical granuloma with predominantly spindle shaped melanophage scattered within granulation tissue [Masson's Fontana method x40]



Fig. 3: Intraosseous melanocytic naevi composed of dark-brown nests of round naevus cells supported by granulation tissue [Masson's Fontana method x40]

Case 3

A 28-year old female who presented with 4 days history of toothache, involving a tender carious left mandibular first molar tooth (36). The lesion had periapical radiolucency and a clinical diagnosis of acute apical periodontitis. On examination of the recovered periradicular tissues from the extracted tooth (36) histologically and histochemically, the lesion was diagnosed as an intraosseous melanocytic naevi consisting of granulation tissue with associated foci of necrotic tissue and islands of dark-brown nests of round naevus cells (Figure 3).

Discussion

Most studies on melanin pigmented orofacial lesions show that odontogenic cysts [2-4,15,16] and odontogenic tumours [6-8, 17-22] constitute majority of the intraosseous melanin pigmented lesions. In contrast, the melanin-pigmented periradicular lesions in this study occurred amongst non-odontogenic lesions, while the odontogenic cysts and tumours had no melanin pigment. This study observed a low incidence (4.0%) of the melanin-pigmented periradicular lesion, which suggests the rarity of these lesions in the jaws.

The periradicular intraosseous melanocytic naevi diagnosed in this study appear to be a novel jaw presentation of the lesion. However, acquired melanocytic naevi is a relatively rare oral mucosa lesion and over 50% are intramucosal (intra-dermal) naevi occurring in most oral sites, but rarely involve the palate. About 25% of reported oral naevi are blue naevi arising mainly in the palate [23,24].

This study demonstrated round and spindle shaped melanin-pigmented macrophages (melanophage) within the periapical granuloma and round melanin-pigmented naevus cells in the intraosseous melanocytic naevi. Similarly, some studies have shown round or spindle shaped melanin-pigmented cells amongst orofacial lesions [5-7,10,14,17-22]. There are reports that migratory neural crest cells from the parachordal plate contribute to dentine and jawbone formation, and the remnants of these cells may persist in the alveolar bone. These cells have the potential to differentiate and form pigmented cells [25,26]. Consequently, neural crest cells may be precursors of the melanin-pigmented cells in the periapical granuloma and the intraosseous melanocytic naevi in the periradicular region. In contrast, recent study [27] has implicated myoepithelial cells as the possible precursors of melanin pigments in salivary gland tumours. Further studies are necessary to ascertain the histogenesis of the melanin-pigmented cells in these lesions.

Some studies [2,3,7,14] have related the presence of melanin pigments with the histogenesis, racial predisposition and prognosis of some orofacial lesions. Only 3 (4.0%) cases of melanin pigmented periradicular lesions were reported in this study. The sample size of the lesions in this study was too small to correlate the clinical behaviour of the periradicular lesions with the presence of melanin pigments. Nevertheless, each of the pigmented lesions presented within a week with a tender carious molar tooth, periapical radiolucency and clinical diagnosis of acute apical periodontitis. This suggests that an acute inflammatory process probably play a role in the development of melanin-pigmented cells within these periradicular lesions.

In conclusion, this article shows the rarity of melanin-pigmented periradicular lesions in the jaws. The cases reported suggest that the trigger for formation of melanin-pigmented cells in periradicular lesions may be related to the acute phase of these lesions. Further study is recommended to determine if the remnants of migratory neural crest cells are the precursors of melanin-pigmented cells in the periradicular region.

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