

Pigmented Oral Lesion Associated with Root Canal Sealers: A diagnostic Dilemma

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Abstract— *The mucosa exogenous pigmentation may occur in consequence of dental materials contact, such as amalgam pigmentation. Aim: This paper reports a rare case of oral pigmentation due to extrusion of N-Rickert root canal sealer from a pre-existing fistula associated with a lateral canal in a 47-year-old female patient. Subjects and Methods: The clinical presentation was a well-defined grayish macule of about 3 mm located in the attached gingiva close to the maxillary left central incisor. Analysis Used and Results: Upon identification of endodontic treatment and a mesial lateral canal, a CT scan was requested. According to the endodontist that performed the prior treatment the tooth was filled with Rickert Pulp Canal Sealer™ (Sybron Endo) and there was a material extrusion through a fistula associated with the infected lateral canal at the time. Conclusion: The knowledge of exogenous pigmentations caused by dental materials is necessary to proper diagnosis.*

Keywords— *exogenous pigmentation, melanoma, oral mucosa pigmentation, root canal filling materials, root canal sealers.*

I. INTRODUCTION

Melanin, one of the responsible for oral mucosa pigmentation, is synthesized by melanocytes present in the basal layer of the epithelium and its amount is determined genetically. However, exogenous stimuli, such as trauma, inflammation, medications, hormones and radiation, may increase melanin production [1], originating pigmented oral

lesions. In addition, endogenous factors like reactive, neoplastic, systemic, physiological and idiopathic processes can make the diagnosis of these lesions more challenging [2].

Oral pigmentations are common and can be either focal or diffuse. Melanoma is the most concerning pigmented lesion and should always be included as a differential diagnosis in all cases. The most common solitary pigmented oral lesion is amalgam tattoo, caused by amalgam restorations [3-10]. However, other dental materials can produce tattoos, such as N-Rickert root canal sealer [11].

Commonly used in endodontics, N-Rickert sealer has a high antimicrobial action and excellent flow and sealing ability. Its composition includes oil of cloves, aristol and silver [12]. Silver might cause pigmentation of tissues in an exposed mucosal site.

In the literature search, no other case reports of oral pigmentation due to extrusion of N-Rickert sealer were found. It is likely that dentists dealing with black or bluish macules in the mucosa without contacting amalgam restorations would not consider pigmentation caused by the root canal sealer and only suspect of a malignant lesion or other options. It is therefore important to publish cases like this one and disseminated information among clinicians and researchers in order to increase the chances of establishing an accurate diagnosis.

This paper reports a rare case of oral pigmentation due to extrusion of N-Rickert root canal sealer from a pre-

existing fistula associated with a lateral root canal in a maxillary central incisor.

II. CASE REPORT

A 47-year-old female Asian patient sought care with a general dentist complaining of a lesion on her gingiva that appeared 1 year before. The intraoral examination revealed a grayish macule with approximately 3 mm on the attached gingiva close to the maxillary left central incisor (Fig. 1). The patient was referred to an oral diagnosis specialist, who requested a radiograph. Upon identification of endodontic treatment and a mesial lateral canal (Fig. 1 B and C), the professional recommended monitoring the lesion and requested a CT scan (Fig. 2A and 2B) for diagnostic investigation. It was suggested that the patient returned to the endodontist that performed the treatment for a reevaluation. According to the endodontist's records the tooth had been filled with thermoplasticized gutta-percha and Rickert Pulp Canal Sealer™ (Sybron Endo) and there had been extrusion of material through a fistula associated with the infected lateral canal at the time. Therefore, a diagnostic hypothesis of an oral pigmented lesion caused by the silver-containing N-Rickert sealer was formulated. Since the patient did not have esthetic complaints, a decision was made not to remove the tattoo and monitor the lesion closely. The patient has been under follow-up for 8 years without alteration.

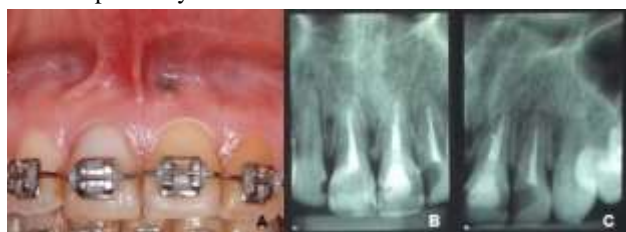


Fig. 1: Clinical and radiographic features: A. Grayish macule on the attached gingiva above the maxillary left central incisor. B. Radiographic image of the maxillary central incisor region. C. Radiographic image of the region of the maxillary anterior teeth on the left side.

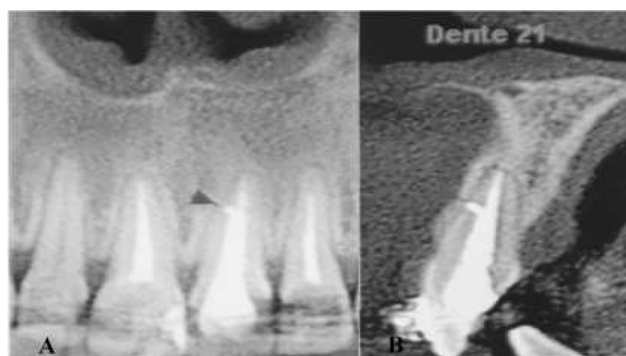


Fig. 2: Computed tomography scan. A. CT image of the anterior maxilla region B. CT image of the maxillary left central incisor 21 (sagittal view).

III. DISCUSSION

Although it is not a frequent subject in the literature, it is known oral pigmentation of exogenous origin can be caused by the deposition of metal from some dental materials, such as amalgam [3], silver cones [13] or silver-containing root canal sealers [11]. Figueiredo et al. [14] compared root canal sealers with and without silver (N-Ricket and Rickert, respectively) and concluded that the silver present in the chemical composition of the sealer could produce oral mucosa tattoos.

However, there is only one clinical report of oral pigmentation caused by a root canal sealer, AH-26, an epoxy resin-based sealer containing silver [15], which reinforces the relevance of our case report. It is important to consider this hypothesis in cases of pigmented lesion close to endodontically treated teeth without history of apical surgery. In cases of apicoectomy, amalgam tattoo remains a possibility since the amalgam used to be indicated as retrofilling material and could pigment hard and soft tissues, especially in mucosal regions distant from the apical root third [16].

Regarding the prevalence of oral pigmentations, Hassona et al. [9] evaluated the oral mucosa of 1,275 patients and found that 386 (30.2%) of them presented pigmented oral lesions, 18.9% of which being amalgam tattoo. Although the oral pigmentations were frequent, the authors did not consider silver-containing root canal sealers as possible etiological agents of these tattoos. Likewise, in clinical practice, amalgam restorations are the primary hypothesis when these lesions are identified and, in the absence of amalgam restorations, dentists usually do not consider other dental materials, like root canal sealers, as the source of pigmentation.

Amalgam tattoos are relatively common lesions that appear clinically isolated bluish, grayish or black macules and spots that may occur more frequently in the gingiva or other sites as the buccal mucosa, palate, or tongue [7]. They are harmless and asymptomatic lesions [6]. In lesions with incorporation of large particles, the diagnosis can also be established radiographically as the metal particles appear as radiopaque granules inside the lesion [4]. In this case report, the tattoo was located in the gingiva and there were no amalgam restorations close to the region, which led us to assume that the silver-containing endodontic sealer could be the source of the pigmentation.

The diagnosis is often clinical, but, in non-typical cases, biopsy is necessary to exclude malignant lesions, such as melanoma. In the present case, the clinical history combined with intraoral and radiographic examination was sufficient to confirm the diagnosis, and a biopsy was not necessary.

Oral pigmentations should have a differential diagnosis with malignant lesions (Table 1), including oral melanoma. Although reports and occurrence are rare, with

a prevalence of 1.3 to 6.3% among all melanomas [17], oral melanoma is one of the most aggressive malignancies [18, 19, 20], and its etiology is still unknown [21, 22]. Clinically, oral melanomas present as black or brown macules or nodules with blackish, brownish, grayish, reddish tonalities, or as nonpigmented lesions. The alveolar gingiva and the hard palate are the most common locations [21, 22]. Thus, dentists must be careful with pigmented lesions located on the hard palate and gingiva, and a biopsy should be done if there is any alteration, even if minimal, because these sites are the most frequently affected by nevi and oral melanomas [10].

Table.1: Clinical features and etiology of major pigmented oral lesions found on oral mucosa.

	Etiology	Clinical features
Melanocytic nevi	Congenital or developmental disorder	Well-demarcated dark black / brown /blue macule or papule (0.1-3.0 cm in diameter)
Melanotic macules	Racial/smoking/ drug induced/post inflammatory	Single / multiple (lower frequency) brownish, well-demarcated macule (<1cm in diameter)
Melanoma	Unknown	Pigmented mass with irregular borders, color variation, and rapid growth
Systemic disease associated	Endocrinopathies (Addison's, Nelson's, Albright, pregnancy, Graves Genetic disorders (Peutz-leghers, Laugier-Hnuziker, Carney Others (HIV, hemochromatosis, Wilson disease	Diffuse brown pigmentation on tongue, lips and mucosae Brown circum-oral macules, mucosal brown patches Brown-blue pigmented patches
Oral melanoacanthoma or melanoacantosis	Reactive process Increased dendritic melanocytes	Dark brown macule, usually solitary

The majority of patients with pigmented lesions on the oral mucosa seek treatment due to esthetic reasons and an excisional biopsy is the most common form to eliminate amalgam tattoos [5]. Alternatively, if esthetics is not a complaint, clinical and photographic follow-up every 3 to 6 months can be done, as performed in the present case.

It has been shown that the histopathological features of sealer and amalgam tattoos are, consisting of granular, thin, sharp, reticular fibers around the blood vessel walls, with rare larger black metal particles. Mononuclear inflammatory cell infiltrate is a frequent

finding, while giant cells are uncommon [4]. Figueiredo et al. [23] compared the histopathological response to four root canal sealers and found that N-Rickert produced the greatest amount of granulation tissue, followed by Fillcanal, Sealer 26 and AH-26 sealers. All materials induced the migration of a large number of macrophages and giant cells. Only the silver-containing sealers exhibited a visible deposition on the vessel walls. Fillcanal was the most aggressive sealer, causing severe irritation, followed by N- Rickert and AH-26, which caused moderate irritation, and Sealer 26 which caused only mild irritation. Oral pigmentations produced by root canal sealers seems to cause a more intense granulomatous chronic inflammatory response compared with amalgam tattoos, which could be attributed to the greater amount of silver in the sealer.

Although N-Rickert can cause pigmentation of oral tissues, it has highly desirable properties for an endodontic sealer, including excellent sealing ability [24], and good antimicrobial activity [12], which justifies its widespread use in endodontics.

Ricket sealer can be considered as an etiological agent of pigmented oral lesions, especially when there are no amalgam restorations at the lesion region. In addition, as a primary rule, any oral pigmented lesion that does not fulfill the clinical criteria to establish a diagnosis or present alterations over time must be biopsied to exclude other lesions, especially oral melanoma. As all dental professionals, endodontists must maintain proper patient records and documentation, including the root canal filling material and technique used in each case. In patients that present with oral pigmentations, having this information is essential to make an accurate differential diagnosis with malignant lesions.

IV. CONCLUSION

The presented case emphasizes the need of the correct differential diagnosis of exogenous pigmentations of the mucosa caused by dental materials, that due to its clinical appearance, they may resemble melanocytic and melanocytic lesions.

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