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Local Argyrosis of Oral Mucosa: Diagnostic and Treatment Considerations

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Abstract: ***This paper describes an unusual clinical report of local argyrosis due to corrosion of endodontic silver point within the buccal root canal of an upper left second premolar. Localized oral pigmentation of the periapical mucosa was observed during routine dental check-up. The X-ray examination revealed endodonticaly treated tooth with overextended silver point and periapical resorption. Removal of the silver point using braiding technique and conventional retreatment were performed. The silver point observation revealed significantly corroded apical portion. Microleakage and galvanic reaction are possible hypotheses as to the reason for the degradation of the silver point and consequent local argyrosis. The diagnostic and treatment problems are discussed in details.***

Keywords: Local argyrosis, Silver point, Endodontic retreatment

1. Introduction

Silver points were historically indicated and well accepted as root canal obturation materials. However, there are clinically problems associated with the use of silver points: they have been shown to corrode spontaneously in the presence of serum and blood due to an unstable electrochemical behavior. Corrosion byproducts can also cause irreversible staining of the tooth structure and surrounding soft tissues (local argyrosis). Silver points lack plasticity, and the consequent failure to flow and conform to the shape of the root canal system makes them less favorable as filling materials. There are additional practical problems associated with the use of silver points. Post and core buildups become impossible with intact silver points, necessitating retreatment and replacement of the points with another material. Apical surgery becomes more complicated due to the difficulties encountered when attempting a root-end preparation in canals that are filled with metal. The corrosion products, which cause argyrosis and periradicular irritation, have the potential to induce inflammatory root resorption and non-esthetic gingival appearance. Additionally the local argyrosis clinical view is similar to other pigmented lesions in oral cavity which may cause misdiagnosis or negligence of potentially malignant conditions with fatal consequences. This paper presents a rare clinical case of local argyrosis due to corrosion of endodontic silver point. The diagnostic and treatment considerations are described in details.

2. Case Report

A 67-years female patient is referred to the Faculty of Dental Medicine, Plovdiv, Bulgaria for routine dental check-up. The clinical examination revealed a two-unit bridge, normal gingival attachment, and a localized mucosal pigmentation in upper left second premolar periapical area (Figure 1). A radiograph confirmed the single bridge abutment 25 had over extended silver point and demonstrates periapical lesion (Figure 2).

Figure 1: Clinical view of the pigmented lesion localized at the mucosa (periapical area of 25)

Figure 2: The radiograph examination revealed tooth 25 with over extended silver point.

Nonsurgical endodontic retreatment was performed. The endodontic access cavity is prepared after removal the resin-fused-to-metal bridge which enhances safe excavation of

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restoratives circumferential to the silver point. For safely and progressively gain deeper access, piezoelectric ultrasonic system with endodontic tip 3E was used (Pyon FGVT2, W&H, Austria).

Figure 3: When braiding technique is performing the handles of the Hedström files are twisted to produces a good interlocking between the silver point and Hedström files.

Figure 4: The extracted silver point observation revealed significantly corroded apical portion. In the coronal part the core is shiny due to mechanical removal of the superficial layer by the ultrasound tip.

Figure 5: The radiograph examination revealed tooth 25 free from the silver point and ready for retreatment procedures.

The ultrasonic instrument was used lightly circumferential to the silver point, breaking up cements, until its coronal-most aspect was free. The looseness of the silver post coronally was confirmed and then a by-pass with K-file # 10 was performed. Braiding technique was used for the post removal. In this technique, the silver point is bypassed on multiple sides and then three Hedström files are threaded past the silver post. The handles of the Hedström files are then twisted to produces a good interlocking between the silver point and Hedström files (Figure 3). The connected objects can be removed coronally using relatively high forces (Figure 4). The liberated root canal was cleaned and shaped while irrigated with 2.5% sodium hypochlorite during preparation for three-dimensional obturation (Figure 5). The final obturation was performed with warm gutta percha and sealer (AH plus).

3. Discussion

Proper diagnosis of local argyrosis

Because the pathologic manifestations associated with the electrochemical phenomenon of silver corrosion are nonspecific, making the differential diagnosis can be difficult. In endodontically treated teeth, periapical electrolytic corrosion phenomena with associated symptoms can easily be misinterpreted, and the clinical presentation may be accepted as a diagnosis rather than a symptom. Goon and Lugassy described two cases of symptomatic periapical electrolytic corrosion resulting from the creation of "active" bimetallic galvanic cells involving silver points. Usually the local argyrosis caused by silver points corrosion is non-symptomatic. The clinical findings must correspond with radiograph evidence for root canal treatment with silver point. However, the potentially malignant pigmented lesions have to be discussed also. An important difference is that unlike local argyrosis that usually exhibits smooth outlines, melanoma shows jagged irregular margins. Gray and black discolorations constitute the pigmented lesions of the oral mucosa, and such color changes can be attributed to the deposition of either endogenous or exogenous pigments. The potential differential diagnosis are summarized in **table 1**, according Kauzman A. et al. (1).

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Table 1: The potential differential diagnosis

Pigmented Lesions						
Diffuse and bilateral			Focal			
Early onset	Predominantly adult onset		Red-blue-purple		**Blue–grey**	**Brown**
	With systemic signs and symptoms	No systemic signs and symptoms	Blanching	Non blanching		
Physiologic pigmentation Peutz-Jeghers syndrome	Addison's disease Heavy metal pigmentation Kaposi's sarcoma	Drug-induced pigmentation Postinflammatory pigmentation Smoker's melanosis	Hemangioma Varix	Thrombus Hematoma	Blue nevus Amalgam tattoo **Local argyrosis**	Melanotic macule Pigmented nevus Melano acanthoma Melanoma

Silver cones related problems.

Seltzer et al. (7) reported for twenty-five silver cones removed from teeth which had been treated endodontically from 3 months to 20 years previously. Examination by the scanning electron microscope revealed that these cones were moderately to severely corrode. The corrosion patterns were described as ranging from pitting to deep crater formation with globular or spherical agglomerations. Examinations with the electron probe showed sulfur peaks on the corroded portions of the cones. X-ray diffraction analyses indicated that the chemical compounds formed were silver sulfides, silver sulfates, silver carbonates, and silver amine sulfate amide hydrates. Tissue culture studies indicated that the corrosion products were highly cytotoxic. The mechanisms for the formation of the corrosion products have been postulated as being due to plastic deformations and metal transfer to the silver cones, plus contact of the silver with tissue fluids.

Zimener and Dominguez (6) studied series of cytologic imprints obtained from periapical granulomas with the conventional light microscope, the scanning electron microscope, and the electron microprobe and analyzed the chemical composition of several black deposits that were randomly observed near or in the cytoplasm of macrophages and multinucleated giant cells. These granulomas had been removed from endodontically treated human teeth in which the root canals had been obturated with silver cones and Grossman's sealer 3 to 5 years previously. To investigate whether corrosion had occurred on the silver cones, the cones were also examined with the scanning electron microscope and the electron microprobe. The observations revealed that all the examined silver cones showed different degrees of corrosion on their surfaces, whereas different concentrations of silver, sulfur, and chlorine were detected at the same sites in the cytologic imprints. However, it is impossible to determine from this study whether the presence of corrosive by-products in the periapical tissues is responsible for the development of a pathologic reaction at these sites. Case reports indicate that loosening or other dysfunction of metallic implants may be related to Type IV metal allergy (2) or allergy to components in the bone cement (3), as revealed by patch tests. These reactions are sometimes accompanied by allergic contact dermatitis and urticaria and are considered to be the result of previous sensitization, although the opposite mechanism has not been excluded from the discussion: metal sensitization by grinding parts of a loosening implant (4). The observed allergic side effects in endodontics are similar dermal reactions and, as has been speculated, local tissue reactions inhibiting apical healing (5). In principle, silver ions are allergens. Silver cones as core material are subject to corrosive reactions, but allergic reactions have not been reported. The prognosis of local argyrosis is good. However caution should be exercised not to use ultrasonic instruments directly on silver points because elemental silver is soft and rapidly erodes during mechanical manipulation.

4. Conclusion

Despite the shortcomings of silver points relative to newer materials, the prophylactic revision of silver point obturation is not recommend, unless there is clear evidence of endodontic pathosis or if the silver points complicate proper restoration of the tooth. The presence of local argyrosis indicates for coronal microleakage, silver corrosion and endodontic failure (8, 9). The retreatment depends on clinical situation and operator's skills. In case of localized pigmented lesion without evidence for root canal treatment with silver post the biopsy is mandatory to rule out melanoma and once the diagnosis is established, no further treatment is usually required.

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