Long-Term Results (24 Years) of the Treatment of Amalgam Tattoo in the Anterior Maxillary Region: A Histologic and Clinical Case Report

Amalgam tattoos are a serious cosmetic problem for patients. A 35-year-old woman came to a private periodontal practice complaining of black pigmentation (amalgam tattoo) above temporary crowns on the lateral and central maxillary incisors and asked that the cosmetic problem be solved before the new permanent crowns were cemented into place. A full-thickness coronal incision was made to raise a thick flap; another incision parallel to the surface of the alveolar mucosa made it possible to remove the pigmented connective tissue, which was sent for histologic examination. Due to the fact that the pigmentation extended into the gingival epithelium, the gingiva of the lateral and central incisors was completely removed, with a horizontal incision in the alveolar mucosa from the ends of the distal releasing incisions. Therefore, partially denuded alveolar bone was used as the recipient site for a free gingival graft (FGG). The histologic analysis revealed the presence of amalgam fragments of different sizes in both connective tissue and epithelium. At 6 months, 3 years, and 24 years postoperatively, the periodontal tissues appeared healthy, and the treated area was pink, without pigmentation or scarring, and was perfectly integrated with the adjacent tissues. The patient was very pleased with her appearance. A one-stage procedure, namely an FGG, should be considered an effective treatment of amalgam tattoo providing positive morphologic and cosmetic outcomes over a 24-year follow-up period. Int J Periodontics Restorative Dent 2020;40:891–896. doi: 10.11607/prd.4905

The pink color of the gingiva is an important esthetic characteristic of the mouth. In daily clinical practice, it is possible to see changes in the color of the oral mucosa and gingiva. In addition to being a potential cosmetic problem, pigmentation in the anterior regions of the mouth can also be signs of a more serious or even malignant disease. Therefore, precise diagnostics, including radiographic examination and a biopsy, are necessary.

Regarding soft tissue color, in 1991, the American Academy of Periodontology (AAP) drew up a classification system of developmental or acquired mucogingival deformities and conditions based on clinical and morphologic criteria. Abnormal color of the gingiva was included in this classification.1

A new periodontal classification of non–plaque-induced gingival diseases and conditions was recently proposed by Holmstrup et al2 and approved by a consensus of AAP and European Federation of Periodontology members in 2018.3 This classification includes a variety of conditions that are not caused by dental plaque, are not resolved after plaque removal, and may be manifestations of systemic conditions in the oral cavity. Gingival pigmentation, one of the issues in this classification, includes: (1) melanoplakia, a brown pigmentation of the gums,
commonly associated with systemic diseases; (2) smoker’s melanosis, a benign focal pigmentation of the oral mucosa usually found in heavy users of tobacco, caused by the noxious chemicals in cigarette smoke or by heat-stimulating melanocytes to protectively produce melanin; (3) drug-induced pigmentation, mostly caused by antimalarial agents, hormones, oral contraceptives, chemotherapeutic agents, and antidepressants either inducing melanin synthesis or deposition of the drug or its metabolites; and (4) amalgam tattoo.

Amalgam tattoo (a flat gray, blue, or black discoloration) may occur in cases with a history of amalgam restorations in which fragments enter the oral tissues during abrasion or drilling maneuvers. The fragments usually have a diameter of less than 6 mm and are visible in radiographs.

In addition, gingival pigmentation may be related to the deposition of alloy microparticles in the gingival tissues. The process involves metal ions that can be released from metal-ceramic prostheses through the corrosion process, causing adverse reactions in the adjacent gingival tissues.

Several therapeutic approaches have been suggested. Chemicals such as alcohol, phenols, and ascorbic acid were used in the past. However, they are no longer used due to their systemic side effects (eg, phenols may induce cardiac arrhythmias) and the fact that it is impossible to control the penetration depth.

Surgical approaches include procedures such as gingival abrasion, free gingival graft (FGG), acellular dermal matrix, or electrosurgery, cryosurgery, lasers, and radiosurgery. Cryosurgery and lasers have been considered superior techniques for eliminating pigmentation because they offer better esthetic results and low rates of recurrence.

The aims of this clinical case report are (1) to describe the one-stage treatment of a black pigmentation above the maxillary incisors using FGG; (2) to show the long-term results (24 years); and (3) to assess the histologic findings of the pigmented tissues.

Case Report

In 1995, a 35-year-old woman complained of the presence of a non-elevated black pigmentation of the gingiva above temporary crowns covering the lateral and central maxillary incisors (Fig 1). The patient wanted the cosmetic problem solved before the permanent crowns were placed. The patient’s general dentist removed the old crowns, placed the new temporary crowns, and referred the patient to a periodontist (G.P.P) for evaluation and treatment.

During the first visit, the patient’s history was taken. She reported that 3 years earlier, she had undergone a prosthetic rehabilitation with single crowns on the lateral and central incisors to enhance the cosmetic results of previous restorations. The abutments had received endodontic treatment and amalgam restorations, except for the left lateral incisor, which was prepared without any restoration.

The abutments were covered by single metal-ceramic crowns. Over the following months, a black pigmentation began to appear on the buccal aspect of the right central incisor and then extended to the adjacent treated teeth as months passed.

The diagnosis appeared clear, as the clinical history indicated that the black pigmentation was probably caused by metal fragments released during the preparation of the abutments. Therefore, the periodontist decided to remove the pigmented gingival tissues and restore the area with an FGG.

Surgical Treatment

After administering local anesthesia, a paramarginal incision was made from the distal angle of the right lateral incisor to the distal angle of the left lateral incisor; then, two oblique releasing incisions were made (starting from the ends of the paramarginal incision) in order to raise a flap. A coronal incision was performed to elevate a full-thickness flap (Fig 2a). Another incision parallel to the alveolar surface made it possible to remove the pigmented connective tissue and marginal gingiva. The pigmented connective tissue and the fibers still attached to the bone at the left central incisor were carefully removed using a sharp curette (Fig 2b). Nonpigmented periodontal fibers were left in place.

Due to the presence of pigmentation in the gingival epithelium as well, the attached gingiva was completely removed with a horizontal incision in the alveolar mucosa, close to the mucogingival junction, from the apical ends of the distal releas-
ing incisions. Therefore, a partially denuded alveolar bone was used as the recipient site for placing an FGG. A large, thick (1.5 mm) FGG was harvested from the palate, positioned, and sutured onto the recipient bed, covering all central and lateral incisors (Fig 3). The removed pigmented epithelial connective tissue (Fig 4) was fixed in formalin and processed for the histologic analysis.

The patient was instructed to discontinue toothbrushing in the treated area and to use chlorhexidine mouthwash. The silk sutures were removed after 10 days. Temporary crowns were then relined and re-placed on the abutments.

After 3 weeks, the patient was allowed to resume mechanical tooth cleaning of the treated area using a soft toothbrush and the roll technique.

The healing process was complete after 6 months. The treated area was pink, had an adequate amount of keratinized tissue, was without pigmentation, and was perfectly integrated with the adjacent tissues without scars.

Follow-up

A stringent oral hygiene program was established. The patient was recalled every 4 to 6 months for supportive periodontal care over a 24-year follow-up period. After 3 years, the periodontal tissues appeared healthy, and no pigmentation was present in the treated area (Fig 6). The patient was very happy with her appearance.

Fig 1 Dark pigmentation above the crowns of the maxillary central and lateral incisors.

Fig 2 (a) A full-thickness flap was raised to (b) harvest the pigmented connective tissue. Note that some pigmented periosteal fibers are still attached to the alveolar bone.

Fig 3 An FGG was placed and sutured over the partially denuded bone from the right to the left lateral incisor.

Fig 4 The removed pigmented tissues (connective tissue and epithelium) were sent for histologic examination.

Fig 5 An apically positioned flap procedure was performed to reestablish a proper marginal profile.
At the 24-year follow-up in 2019, the tissues were stable without signs of gingivitis, and the cosmetic result completely satisfied the patient (Fig 7).

**Histologic Analysis**

The histologic examination revealed the presence of exogenous metallic material of irregularly shaped, dark-colored, large-sized fragments and/or smaller-sized particles in the connective tissue. Some fragments were close to the blood vessels, and there was a mild foreign-body reaction associated with macrophages around the metal (Fig 8).

**Discussion**

The pink color of the gingiva is an important esthetic characteristic of the mouth. Changes in color or pigmentation of the gingival and alveolar mucosa should be approached with great caution due to their different etiologic nature. In fact, pigmentation can be physiologic and present from birth, such as skin color or nevi; it can be associated with systemic disorders, such as Addison disease, McCune-Albright Syndrome, melanocanthoma, malignant melanoma, and Kaposi sarcoma; or it can be iatrogenic (amalgam tattoo). Amalgam tattoos were frequent in the past due to the use of amalgam and metallic restorations in daily clinical practice. Nowadays, the shift from amalgam to composite filling materials and the use of metal-free restorations (such as zirconia, disilicates, or feldspathic ceramic instead of metal-ceramic) have reduced the onset of iatrogenic gingival pigmentation.

Several surgical procedures for treating pigmentation of the gingiva and the alveolar mucosa are reported in the literature, including the one- or multiple-stage procedures, FGG, connective tissue grafts, allograft materials, electrotherapy cryosurgery, and lasers. A recent report by Aguirre-Zorzano et al summarizes 11 articles dealing with the treatment of amalgam tattoo. All the articles are case reports with nonhomogeneous information regarding the procedures and the key results; the very short-term follow-ups vary from 2 to 21 months. As for the treatment outcomes, 3 studies reported “optimal” esthetic results, 5 studies mention “good” esthetic results, and 3 articles speak of scars and differences in the final color of the tissues. Moreover, only 6 studies report the absence of recurrence during the observation periods. In that same report, Aguirre-Zorzano et al publish a one-stage surgical procedure for treating amalgam tattoo using an association of mucotrasion and free connective tissue graft; the outcomes seemed good, and no signs of recurrence were noted during 4 years and 5 months of follow-up. Similar considerations can be done dealing with the treatment of physiologic gingival pigmentation. Most approaches have shown successful short-term outcomes. Lyn et al reported in a systematic review that the included articles had a follow-up period of less than 12 months, which is not
sufficient to evaluate the recurrence of repigmentation, and Tal et al.\(^{17}\) stated that repigmentation occurs in 50% of patients after 2 to 4 years. On the contrary, a recent study by Wise et al.\(^{18}\) describes a large area of gingival pigmentation treated with a surgical blade, displaying no recurrence after 25 years.

The patient described in the present report had extensive gingival pigmentation in the anterior maxillary sextant caused by a previous prosthetic rehabilitation. The diagnosis appeared clear due to the patient’s clinical history, which indicated that the black pigmentation was caused by metal fragments released during the preparation of the abutments. Therefore, radiographs were not taken, and the harvested pigmented tissue was sent for biopsy.

Because the metallic fragments were deep in the gingiva, as demonstrated by the histology, a one-stage surgical procedure using an FGG harvested from the palate was planned for removing and completely replacing both the pigmented gingival epithelium and the connective tissues.

Six months after surgery, the healing process was complete; the treated area showed an ideal morphology with pink color, absence of pigmentation, an adequate amount of gingiva, and perfect integration with the adjacent tissues without scarring. These outcomes were stable, with a slight continuous esthetic improvement during the long-term follow-up period (24 years).

Some interesting considerations may be drawn from these long-term results. FGG is an effective cosmetic

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**Fig 8** (a) Histologic aspect of the removed pigmented tissue, showing the epithelium (E) and connective tissue (CT; ×50 magnification; modified Van Gieson stain). (b) A higher magnification (×100) shows E, CT, and metallic fragments (MFs). (c) A closer view (×400 magnification) of the CT shows the presence of large MFs and small granules (G) dispersed along collagen fiber bundles. Note the mild foreign-body reaction around fragments. BV = blood vessels. (d) An even closer view (×500) of the CT shows irregularly shaped MFs.
treatment of amalgam tattoo located in the attached gingiva and offers several advantages when compared with other treatments: It is a simple mucogingival approach that is able to morphologically and functionally replace the pigmented gingival tissues, providing stability over a long period. In addition, FGG is a one-stage surgical procedure, which minimizes chair time, reduces the cost of treatment, and avoids the use of additional devices such as lasers.

Conclusions

Even given the limits of a single case report, the one-stage mucogingival surgical procedure—namely FGG—should be considered an effective treatment of amalgam tattoo providing stable morphologic and cosmetic outcomes during a 24-year follow-up period.

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References