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Case Report

Treatment of amalgam tattoo with mucoabrasion associated with a bilaminar technique and a subepithelial connective tissue graft: a case report

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ABSTRACT

An amalgam tattoo is an iatrogenic lesion that may lead to aesthetic problems. A 47-year-old woman complained of very unattractive dark pigmentations and a flat macule adjacent to a restored tooth (amalgam tattoo) on the first and second maxillary premolars with a mild gingival recession at the first bicuspid. Following muco-abrasion to eliminate the oral pigmented lesion, a bilaminar mucogingival procedure was planned to treat the gingival recession. At the 8-year follow-up, gingival color and texture blended well with adjacent soft tissue areas, the periodontal tissues appeared healthy, and no scar tissue was present. The patient was very pleased with the final result. Therefore, a one-stage procedure should be considered an effective treatment of amalgam tattoo, providing positive morphologic and cosmetic outcomes over an 8-year follow-up period.

INTRODUCTION

Regarding soft tissue colour, in 1999, 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 (1). The abnormal colour of the gingiva was included in this classification (1). Furthermore, the amalgam tattoos are also included in the new periodontal classification of non–plaque-induced gingival diseases and conditions approved by AAP and European Federation of Periodontology members in 2018 (2).

Although amalgam discoloration of the oral mucosa does not represent a pathological entity per se and is usually asymptomatic, it can still create cosmetic dissatisfaction for the patient, leading to treatment, especially in anterior areas (3, 4). With an approximate incidence of 18.9% among pigmented lesions of the oral mucosa, amalgam tattoo usually appears as a bluish-blue, black, or grayish spot of different diameters and is most frequently located at the level of the keratinized gingiva or alveolar mucosa, often related by evident cause-and-effect: adjacent amalgam restorations (5). Metal particles can become incorporated into the oral mucosa in different manners: by condensation of the material to adjacent tissues during ortho- or retro-grade obturation; injury to the adjacent mucosa during replacement of old amalgam

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restoration; fracture of the material during extractions of the previously amalgam-treated tooth or leakage of the material to the alveolus; corrosion of the apical retrograde obturation (6). A radiograph is recommended to confirm the presence of metallic particles, but the absence of radiographic evidence does not rule out the possibility since particles are often too fine or widely dispersed to be visible on radiographs (6). Depending on the diameter of the leaked particles, aluminium in amalgam may be phagocytosed by macrophages or encapsulated by connective tissue fibres. The cellular mobility of macrophages may be why many of these pigmentations appear to grow over time (6). As anticipated, the localization of the particles may result in aesthetic complaints.

Microscopic examination reveals that amalgam is present in the tissues in two forms: as irregular dark, solid fragments of metal or as numerous, discrete fine, brown, or black granules dispersed along collagen bundles and around small blood vessels and nerves, also disclosing the presence of metal fragments immersed in connective tissue (3, 7, 9). These stains are not associated with inflammatory responses, although in some cases, they can generate fibrosis, chronic inflammation, and even granulomas by foreign body reactions (8).

In the absence of correlation with pre-existing restoration, or evident cause-related factors, a biopsy is recommended to rule out an early melanoma or to exclude association with other pathologies by differential diagnosis (3, 7).

If the pigmentation is cosmetically unacceptable, surgical excision and transplantation of oral mucosal tissue have been suggested, with or without soft tissue harvesting from the palate associated or not with new technologies, such as laser (3, 4, 10-17). Therefore, diagnosis is crucial; assessment of the lesion and appropriate understanding of the patient's aesthetic expectations will be essential to select the most proper technique.

CASE REPORT

A 47-year-old, non-smoking patient complaining of cosmetic dissatisfaction in the right upper maxillary area was referred by a general practitioner. During the first visit, the patient reported that 10 years earlier, she had undergone a prosthetic rehabilitation with single crowns on the first and second maxillary bicuspids. Following endodontic treatment and amalgam restorations, abutments were restored with single metal-ceramic crowns. However, the patient stated that a black pigmentation began to emerge on the buccal aspect of the maxillary premolar area shortly after.

Clinically, the amalgam tattoo presented as a dark grey or blue macula with undefined borders, immobile and flat, at the keratinized mucosa of the first and second upper right bicuspids (Fig. 1a). The periodontal biometric parameters were within normal limits. A periapical x-ray was taken to evaluate pre-existing treatments and confirm the diagnosis of periodontal and endodontic health (Fig. 1b).

The diagnosis thus seemed obvious, as the medical history indicated that the black pigmentations were probably the result of metal fragments released during abutment preparation.

A fine-grain diamond football bur mounted on a high-speed handpiece removes the epithelium and the underlying connective tissue (Fig. 2a) with the simultaneous goal of removing the cosmetic problem and creating a bleeding recipient bed for the planned soft tissue reconstruction (Fig. 2b). The size of the macula will dictate the extension and depth of the bleeding wound site. Nonpigmented periosteal fibres were left in place.

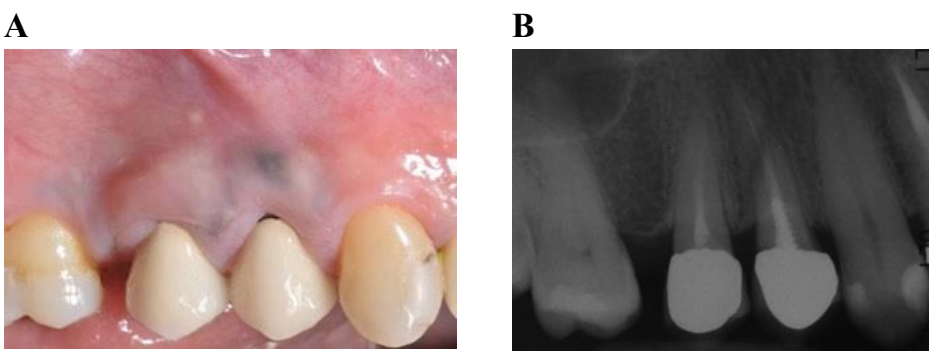


Fig. 1. *A) Clinical aspect of the extended discoloration at teeth 1.4 and 1.5, B) Periapical x-ray of the maxillary right sextant*

A 45-degree beveled ‘’C’’ shaped release incision was then performed mesial at the right maxillary canine. A partial-thickness flap is raised, starting from the most apical portion of the release incision and connecting the muco-abrasive area (Fig. 3a). The objective was to move the flap laterally and distally. The pedicled flap was meticulously passivated, removing muscle insertions, and laid on the periosteal bed, slightly coronal to the cemento-enamel junction (Fig. 3b). The not-abraded tissue by the diamond bur and the interproximal papillae were then de-epithelialized to receive a sub-epithelial connective tissue graft harvested from the palate, with the “L” incision technique (18). The connective tissue graft was immediately placed underneath the buccal flap (Fig. 3c). The donor site is sutured with horizontal mattress sutures, crossed in the palate, and tied buccally. The graft is then stabilized using a resorbable suture material with a combination of single sling sutures at the cementum-enamel junction and horizontal periosteal stabilizing mattress sutures apically to the graft for both premolars, to achieve intimate contact with the underlying periosteal bleeding bed (fig. 4a). The laterally sliding pedicle flap was positioned and sutured coronally to the graft and the cementum-enamel junction using a simple ‘’sling’’ suspended suture. Part of the graft was left exposed at the canine and second premolar but nourished by the underlying periosteal bed. Vertical compressive mattress sutures were implemented to achieve steady, intimate adaptation (Fig. 4b-c).

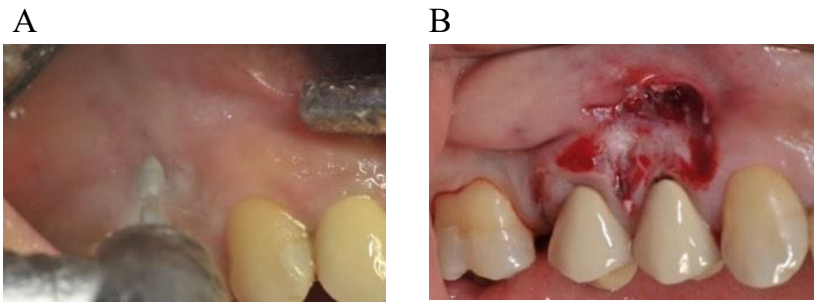


Fig. 2. *A) Fine-grain diamond football burr is used to remove the amalgam discoloration; B) A bleeding recipient bed for the planned soft tissue reconstruction is prepared.*



Fig. 3. *A) Buccal flap design with “C” mesial release incision; B) Raised and tension-free partial-thickness buccal flap; C) The connective tissue graft is covering the exposed periosteum.*

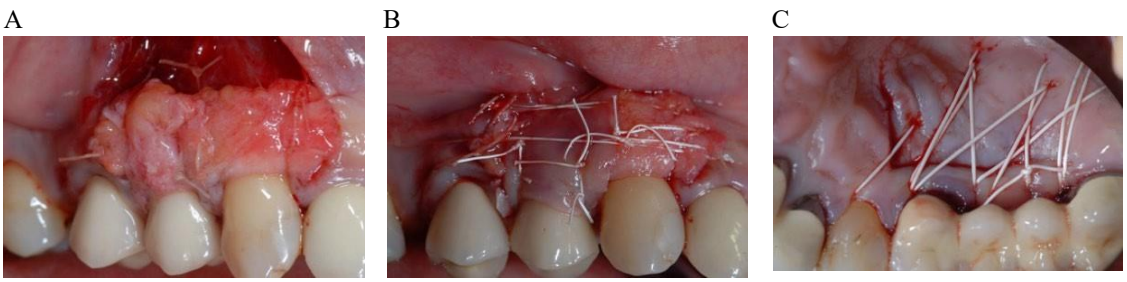


Fig. 4. *A) The connective tissue graft was stabilize with resorbable suture material; B) The laterally sliding pedicle flap was positioned and sutured coronally to the graft and to the cemento-enamel junction; C) The donor site was sutured with crossed horizontal mattress, buccally knotted, stitches.*

The medication protocol included Amoxicillin 500 mg every 8 hours for 7 days, Ibuprofen 600 mg every 8 hours for 3 days, and 0.12% Chlorhexidine Di-gluconate every 12 hours for 7 days. Sutures were removed two weeks following surgery. The healing was uneventful, and 3 weeks later, the patient was allowed to resume mechanical tooth cleaning of the treated area using a soft toothbrush with the roll technique.

The referring dentist carried out postoperative follow-up visits every 4 months for the first year. The treated area was pink, had an adequate amount of keratinized tissue with no pigmentation, and was perfectly integrated with the adjacent tissues without scars.



Fig. 5. *8-year follow-up clinical view*

After 8 years, the periodontal tissues appeared healthy, and no pigmentation was present in the treated area; the tissues were stable with no signs of gingivitis, and the cosmetic result completely satisfied the patient (Fig. 5). The previous mild gingival recession on the first premolar was covered entirely, and an improvement in quantity and quality of the keratinized tissue was detected.

DISCUSSION

Amalgam tattoos are due to the deposition of a mixture of silver, tin, mercury, copper, and zinc, which are components of an amalgam filling, into the oral soft tissues. 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.

There is little documentation in the literature regarding treating these oral mucosal alterations. Surgical treatment with the preparation of a bleeding wound site and soft tissue harvesting from the palate appears to be the most reported case reports with long follow-ups (3, 4, 10). Different types of lasers have also shown good efficacy in amalgam tattoo removal when present in the most superficial tissues or for the preparation of a bleeding bed for a soft tissue graft placement (12-16). Although less invasive therapeutic solutions are proposed in the literature through the use of ER:YAG lasers (12, 15, 16) or through the use of diode lasers (17), the clinician must always consider the width and depth of the cosmetic lesion. Indeed, the cited articles report encouraging evidence and satisfactory cosmetic results when using these devices, emphasizing minor morbidity for the patient, preventing risks related to surgical procedures, and avoiding sutures. Despite this, the extent of amalgam tattoo appears to be particularly limited and confined to the keratinized mucosa.

A recent paper by Aguirre-Zorzano et al. (10) summarizes 11 articles dealing with the treatment of amalgam tattoo. All the articles are case reports with very short-term follow-ups from 2 to 21 months. The longest case report follow-up reported in the literature regarding the surgical treatment of an amalgam tattoo is by Pini-Prato and co-workers with a follow-up of 24 years, describing an optimal aesthetic result maintained over time (4). In the same case report (4), a two-stage approach is illustrated for treating an amalgam tattoo between maxillary incisors with a free gingival graft in the first stage and subsequent apically positioned flap for the final prosthetic restoration artifact. In contrast, Aguirre-Zorzano et al. (10) published a one-stage surgical procedure for treating amalgam tattoo using an association of muco-abrasion and free connective tissue graft; the outcomes seemed promising, and no signs of recurrence during 4-year and 5 month follow-up period. The bilaminar technique can be considered a “gold standard” procedure for the treatment of gingival recessions, with average root coverage (RC) up to 97.3% and complete RC up to 86.7% (19, 20).

All these aspects should be considered during the diagnostic process and treatment plan. In this clinical case, a one-stage approach was selected utilizing a tension-free partial-thickness pedicle flap. The primary goal was to remove the amalgam tattoo, and muco-abrasion with a diamond bur was performed. In addition, connective tissue graft was harvested from the palate to achieve an extremely favourable long-term aesthetic result while creating an adequate band of keratinized tissue around the prosthetic restorations. Furthermore, a pedicle laterally sliding flap was implemented from the canine and positioned distally to cover the mild recession on the first premolar and the connective tissue with a bilaminar approach.

CONCLUSION

Within the limits of this 8-year follow-up case report, a one-stage mucogingival reconstructive procedure with a sub-epithelial connective tissue graft should be considered an effective treatment option in case of amalgam tattoo providing stable morphologic and cosmetic outcomes.

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