

Cutaneous amalgam tattoo in a dental professional: an unreported occupational argyria

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MADAM, Amalgam tattoo is the most common exogenous pigmentation of the oral mucosa^{1,2}; surprisingly, there are no reports of similar lesions on the skin. It is caused by traumatic implantation of amalgam fragments into the oral mucosa following dental treatment, particularly when amalgam fillings are removed with high-speed instruments. Amalgam tattoo occurs mostly in the gingiva and alveolar mucosa. Clinically it presents as an asymptomatic bluish to black macule, eventually observed by the patient or discovered during routine dental treatment. Histologically it shows brown to black aggregates of granules interspersed among collagen fibres and around blood vessels. Most cases show a slight inflammatory response, and eventually a foreign body granulomatous reaction is found.¹⁻⁴ Cases of cutaneous localized argyria are uncommon, and are usually attributed to trauma, acupuncture, topical silver-based medication or use of pieces of jewellery such as earrings.⁵⁻⁷ We report a case of cutaneous amalgam tattoo caused by implantation of amalgam particles on the skin of the eyebrow of a dental surgeon.

A 45-year-old female dental surgeon presented with a dark macule on the skin of the left eyebrow. She reported that it was probably associated with a traumatic lesion acquired 20 years previously when she was working as a dentist. The lesion was surgically removed, and histologically showed deposits of fine black granules among collagen fibres, involving the papillary and reticular dermis, surrounding cutaneous adnexa (hair follicles and sebaceous glands; Fig. 1a). The patient denied the use of acupuncture, topical silver-based medications or piercings. Considering the clinical history and histological picture, the diagnosis was of cutaneous amalgam tattoo. Scanning electron microscopy (SEM) of 5- μ m unstained paraffin sections showed bright particles of about 1 μ m long (Fig. 1c), and energy dispersive X-ray microanalysis (EDX) revealed silver as major element and sulphur as the second component (Fig. 2a). For comparison of histological and SEM aspects, we used a typical case of oral amalgam tattoo, obtained from our files, including EDX (Figs 1b, d and 2b). Histological, SEM and EDX results of the oral lesion were similar to those of the skin lesion, supporting the initial diagnosis of cutaneous amalgam tattoo.

To our knowledge there are no reports in the literature of cutaneous amalgam tattoo, which is surprising because amalgam fragments can easily reach the dental surgeon during clinical procedures, especially if there is a lack of complete

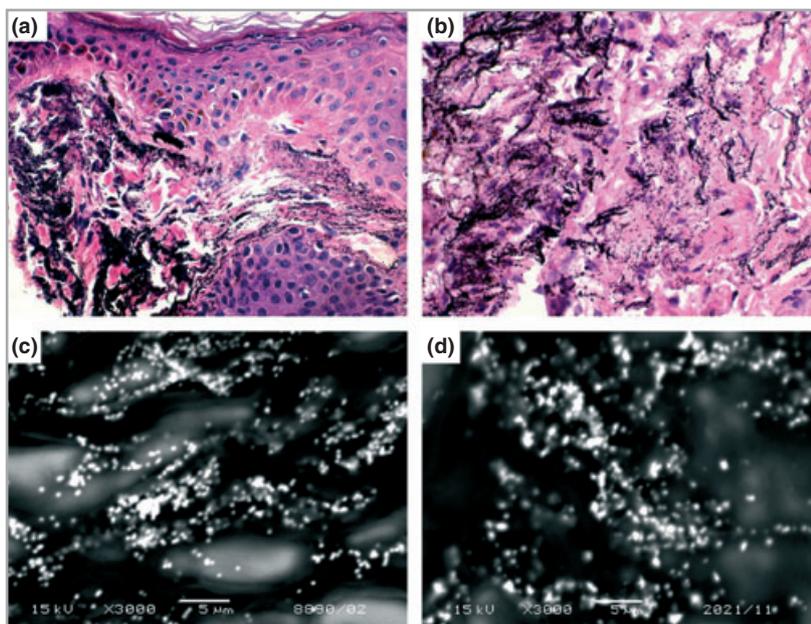


Fig 1. Histological appearance of pigmented skin lesion of the eyebrow of a female dental surgeon. (a) Diffuse deposition of fine dark granules involving the papillary and reticular dermis, confirmed as amalgam tattoo (haematoxylin and eosin; original magnification $\times 400$). (b) Similar appearance of a case of oral amalgam tattoo (haematoxylin and eosin; original magnification $\times 400$). (c) Scanning electron microscopy (SEM) backscatter image of an area of the case shown in (a) (skin), showing bright particles dispersed among the collagen fibres. (d) Similar SEM backscatter image of an area of the case shown in (b) (oral mucosa).

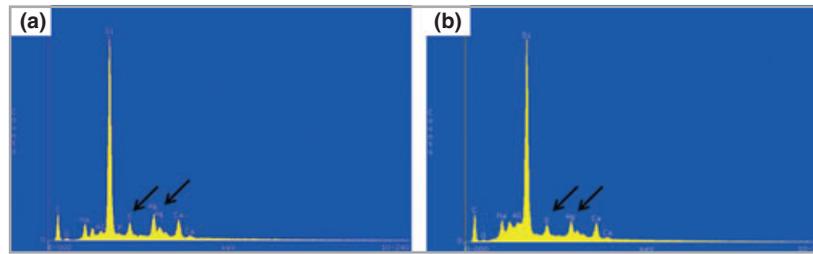


Fig 2. Energy dispersive X-ray microanalysis. (a) Cutaneous amalgam tattoo of the case shown in Figure 1a. (b) Oral amalgam tattoo of the case shown in Figure 1b. The larger peak in both images is silicon from the glass slide used for tissue support. The black arrows show the peaks of sulphur (S) and silver (Ag), indicative of amalgam particles.

protective barriers. In the present case, amalgam particles were tattooing the eyebrow skin, and as the patient is a dental surgeon the most probable explanation is direct implantation by propulsion when using high-speed instruments to remove amalgam fillings.

Although clinically it is not difficult to make the correct diagnosis of amalgam tattoo of the oral mucosa, the lesion is usually removed and the diagnosis confirmed histologically. The particles are easily seen in haematoxylin and eosin routine preparations, dispersed among the collagen fibres, and painting the basal membrane and the perineurial and perivascular tissues. The inflammatory reaction is variable: usually only a few inflammatory cells are found, but in some cases it can be more intense and eventually areas of foreign body granuloma with giant cells can be seen.^{1–3} Amalgam tattoo of the oral mucosa showed similar histology, ultrastructural aspects and chemical composition as the skin lesion here described, helping to confirm and better to illustrate the present case. The main elements in dental amalgam are silver and mercury, but other minor constituents can be present such as copper, zinc and tin in various proportions.³ When in the tissues, mercury and other elements such as tin decrease progressively with time, while silver is kept in a complex with sulphur derived from cellular enzymes. Studies with EDX of oral amalgam tattoos have shown major peaks of silver and sulphur.^{1,8} As expected, mercury was not detected in our oral mucosa and skin cases analysed. An experimental study showed that in guinea pig skin implanted with amalgam, the particles rapidly lost mercury, leaving mainly silver.⁸ An EDX of oral pigmentations diagnosed clinically and histopathologically as amalgam tattoo contained combinations of amalgam components including silver, mercury, tin and copper.⁹ In short, silver is the main element detected in amalgam tattoo, with traces of sulphur and tin, while mercury is either absent or found in small quantities.

In summary, we present a case of cutaneous amalgam tattoo, illustrating the histological and SEM aspects, with the EDX showing silver as the main element, with sulphur also present. It is surprising that there are no other reports in the literature of cutaneous amalgam tattoo, as it is a common

lesion in the oral mucosa. Cutaneous amalgam tattoo should be considered in the differential diagnosis of cutaneous facial pigmented lesions, particularly if the patient is a dental surgeon.

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