Case Report

# Visual Enhance Lesion Scope (VELscope) in Assessing Oral Melanocytic Lesion: A Case Report

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*Abstract:* Scope: Oral melanotic macule is a benign pigmented lesion that tends to occur in the fifth decade of life. The lesions are usually single, smaller than 1cm, but they may also occur as multiple lesions. The most common intraoral sites are the buccal mucosa, lip, palate and gingiva. The average age of presentation is 43 years old, with a female predilection. A 61-year-old Malay female presenting with 2 pigmented lesions on the alveolar ridge of the maxilla was evaluated. They were dark brown, flat & irregularly bordered. No abnormalities were observed in the cone beam computed tomography scan. A biopsy is recommended to distinguish these lesions from other oral melanocytic lesions. This article discusses the utilization of VELscope as a diagnostic tool aiming to provide an accurate diagnosis of oral melanocytic lesion.

## Introduction

Melanocytic or pigmented lesions are commonly found intraorally. The pigmentation is either endogenous or exogenous in origin. The most common cause of exogenous oral pigmented lesions are amalgam tattoos whilst melanocytic naevi is the most common pigmented lesion from endogenous origins. However, oral malignant melanoma should be considered if the appearance and aetiology are suspicious. Today, traditional diagnostic methods coupled with technological advancements improve diagnostic evaluations of these lesions.

## Case Report

A 61-year-old Malay female presented to the Oral and Maxillofacial Surgery Clinic for extraction of her upper right central incisor prior to her denture construction. She has underlying hypertension and diabetes, controlled with medication. She denied familial history of neoplasm. On examination of her right and left maxillary alveolar ridges, irregular, flat and dark brown pigmented lesions were seen (Figure 1a). On the right side, the pigmented lesion extended
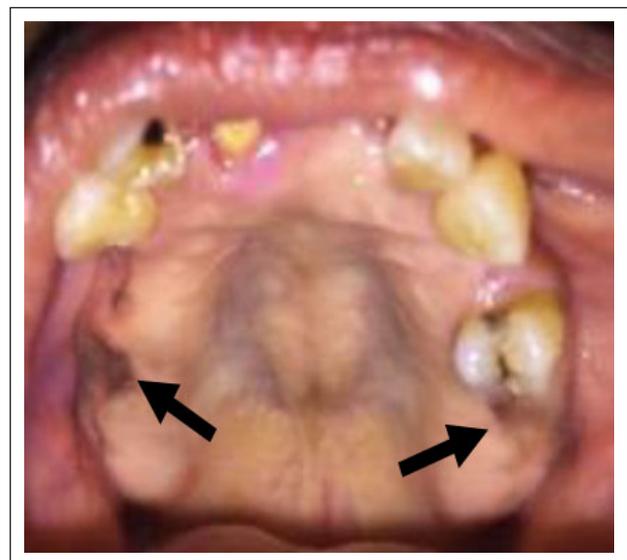


Figure 1a. *Pigmented lesion found on the right and left maxillary alveolar ridge.*

from the crest of alveolar ridge onto the buccal aspect of the ridge measuring around 2cm × 2cm (Figure 1b). On the left side, the pigmented lesion was confined to the crest of the alveolar ridge measuring around 1cm × 1cm. VELscope examination revealed irregular dark areas on both posterior maxillary alveolar ridges (Figure 2).

## Case Management

The clinical differential diagnoses included melanotic macule, melanoma and pigmented nevus. Biopsy was done on the posterior alveolus of the right maxilla at the first molar region and the specimen consisted of greyish elliptical soft tissues measuring 1.2 × 0.5 × 0.2cm in size with attached suture (Figure 3).

The cone beam CT (CBCT) volumetric image was obtained on a 17 × 11cm field of view using a Carestream 9000 scanner and a voxel size of 0.125mm. The data was reconstructed in slices and examined slice by slice in all three dimensions (sagittal, coronal and axial) on 1:1 scaled images on the CS 3D Dental Imaging Software. Left and right posterior alveolar ridges exhibited an irregular pattern of appearance. No opposing teeth or lower dentures were noted that would have suggested combination syndrome. The cortical margin of posterior maxillary alveolar ridges was preserved with no signs of aggressive infiltration. Pneumatisation of maxillary antrum was significant, giving rise to the thin alveolar height on posterior regions. The pneumatisation may be masked by irregular resorption of alveolar ridge.

Microscopic investigation in this case revealed an increase in melanin deposition in the basal and parabasal layers of an otherwise normal parakeratinized stratified squamous epithelium. The underlying connective tissue was dense, fibrous and relatively uninflamed. Based on these histological features the diagnosis was oral melanotic macule.

A decision was taken to manage this case conservatively by close observation and follow-up as the diagnosis is not a neoplasm. Patient was reassured and will be reviewed after 6 months.

## Discussion

The clinical features of malignant melanoma may be summarized by the ABCDE rule: A= Asymmetry, because of its uncontrolled growth pattern. B= Border irregularity, usually with notching. C= Colour variegation, which varies from shades of brown to black, white, red and blue depending on the amount and depth of melanin pigmentation. D= Diameter of greater than 6mm, which is seen in this presented case. E= is for an evolving lesion that has changed with respect to size, shape, colour, surface or symptoms over time[1]. Another clinical clue that can be added to the "D" is Different. For example, if all the patient's nevi are one shade of brown except for one that is much darker, that one should be examined thoroughly. This may be called the ugly duckling sign[2-3]. Attention should be paid to patients who report recent changes in the characteristics of existing nevi[4]. Some authors have proposed adding "F" and "G" to this scheme. The "F" is for family history. The "G" is for great numbers because even great numbers of small nevi double the risk of melanoma[5]. Not all melanomas meet all the criteria. The ABCDE (FG) mnemonic is only a tool to help in diagnosis, not a set of criteria necessary for diagnosis. Malignant melanoma usually manifests in the following five
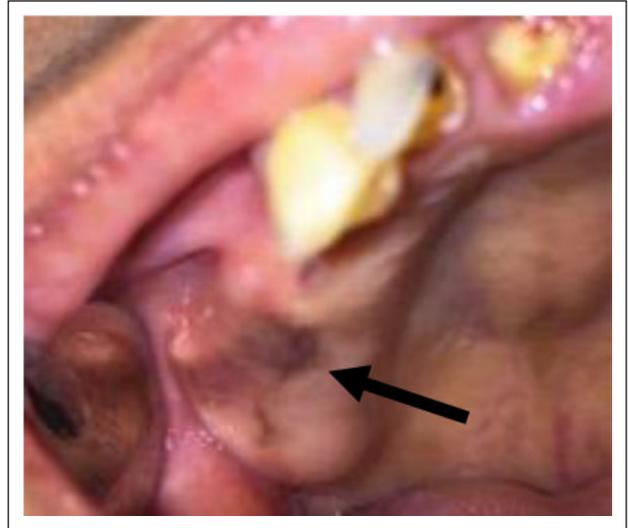


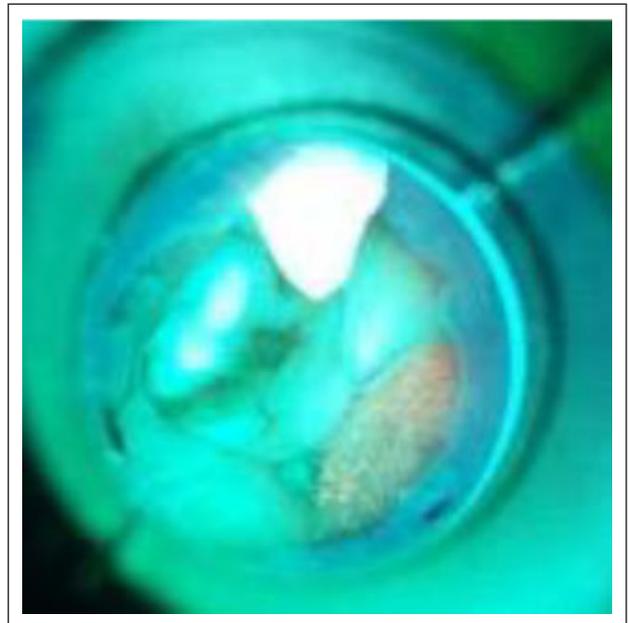Figure 1b. *Pigmented lesion found on the right with size approximately around 2cm × 2cm.*



Figure 2. *Lesion under the view of VEL scope.*



Figure 3. *Specimen obtained from pigmented lesions.*

clinical types: Pigmented nodular type, non-pigmented nodular type, pigmented macular type, pigmented mixed type, and non-pigmented mixed type[6].

Visually Enhanced Lesion Scope (VELscope) is an FDA approved technology that can detect oral cancer by visual information. This simple, hand-held device emits a cone of blue light (400-460 nm) into the mouth that excites various molecules within the cells, causing them to absorb the light energy and re-emit it as visible fluorescence. Remove the light, and the fluorescence of the tissue is no longer visible. Owing to changes in the natural fluorescence of healthy tissue that generally reflect light-scattering biochemical or structural changes indicative of developing tumour cells, the VELscope allows dentists to shine a light onto a suspicious sore in the mouth, look through an attached eyepiece, and watch directly for changes in colour. Normal oral tissue emits a pale green fluorescence, while potentially early tumour, or dysplastic, cells appear dark green to black.

Several studies have investigated the effectiveness of the VELscope system as an adjunct to visual examination for (i) improving the distinction between normal and abnormal tissues (both benign and malignant changes), (ii) differentiating between benign and dysplastic/malignant changes, (iii) and identifying dysplastic/malignant lesions (or lesion's margins) that are not visible to the naked eye under white light[7-10]. With regard to the first aspect, auto fluorescence imaging of the oral mucosa has been reported to possibly improve lesions' contrast and therefore increase the ability to distinguish between mucosal lesions and healthy mucosa, although further research on different patients' population is needed[9]. The ability of auto fluorescence to differentiate between different lesion types has been investigated in a few studies and overall, the technique seems to show high sensitivity, but low specificity[9]. However, the VELscope system seems to be very promising due to its ability and effectiveness in identifying lesions and lesions' margins that are occult to visual examination under white light[7-10]. Using histology as the gold standard, VELscope demonstrated high sensitivity and specificity in identifying areas of dysplasia and cancers that extended beyond the clinically evident tumours[7-11].

Cone beam computed tomography (CBCT) is a medical imaging technique to produce cross sectional images of hard tissues which can improve the efficiency of a dentist in his practice[11]. CBCT can produce cross sectional images in three dimensions (3D) which can detect in detail, the extension of specific lesions in the oral cavity. CBCT has many advantages compared to panoramic radiograph which can only produce two dimensional (2D) images. Multiplanar views from CBCT images provide important information regarding any changes in the hard tissues, including extent of bone resorption, and bone calcification[12]. To examine tumours deep in the tissues, multiplanar views are preferable[13,14]. If the lesion is suspected to be malignant, CBCT is recommended to detect the lesion extension (bucco-lingually), size, margins, destruction, expansion and relationship of the lesion to the nearby tissues[15]. A lesion may have a 'benign' appearance in a panoramic radiograph but have a different appearance in thin slices of CBCT scans[11]. In oral malignant lesions, CBCT images will show ill-defined margins of the lesion, bone resorption or erosion and may also show widening of periodontal ligament on the affected areas[16].

Biopsy is an examination of tissue removed from a living body to further investigate the presence, cause and extent of a certain disease. A biopsy is a must when an oral pigmentation cannot be confidently diagnosed clinically and radio-graphically[16]. Two common types of biopsy are excisional and incisional biopsy which are done to rule out early malignant melanoma[17]. Incisional biopsy remains the gold standard for diagnosis[18]. Fine needle aspiration and exfoliative cytology are not recommended for primary pigmented lesions because it can result in accidental dissemination of malignant cells within the adjacent tissues which leads to a risk of recurrence or metastasis[19]. The lungs, bone, brain and liver are common sites of metastasis in advanced diseases[20].

Melanin pigments are usually found in basal cell layers and in lamina propria. If the melanocytes show proliferation, atypia, and some irregularity in their arrangement, the histopathological diagnosis is atypical melanocytic hyperplasia, which may correspond clinically to early malignant melanoma (melanoma in situ)[21]. If the cells are small, with slow growth rate and flat clinical appearance, it is usually considered a benign lesion. Other malignancies can be excluded from oral melanomas by conducting immunohistochemistry studies. If it is an oral melanoma it will show a strong reactivity of tumour cells to S-100 protein, melan-A, and HMB-45[1].

Oral Malignant Melanoma show a wide range of shapes in its malignant cells including spindle, plasmacytoid, clear cell and epithelioid ones. Common characteristics of these malignant cells are pleomorphism with large, irregular hyperchromatic nuclei and prominent nucleoli with readily detectable mitotic activity[16].

Oral melanoma can be sub-classified into 3 types[22]. Classification of oral melanoma histologically:

1. *In situ* melanoma, which is limited to the epithelium and the epithelial-connective tissue interface.

2. Melanomas with an invasive pattern, in which the neoplasm extends into the connective tissue.

3. Melanomas with a combined pattern of invasive melanoma with an *in-situ* component.

## Conclusion

The clinical presentation of these lesions may lead to several differential diagnoses, and to distinguish among them and other pigmentary lesions, histopathological investigation and analysis is crucial. Oral melanotic macule, pigmented nevi or oral melanoma should be considered in the differential diagnosis when evaluating pigmented lesions of the oral mucosa in a patient. Meticulous examination and investigations are crucial in any suspicious oral melanocytic lesion to rule out malignancy such as oral malignant melanoma. The ability to achieve correct diagnosis will ensure ideal treatment by the clinician and improve the treatment outcome. VELscope is a sensitive investigation in diagnosing oral melanocytic lesion which can be used as a primary diagnostic tool.

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