

Visual examination for caries detection

Visual examination for caries using the merged-ICDAS system can be an important aid to minimally invasive dentistry.

Introduction

Dental caries is a multifactorial, non-communicable disease, which results in mineral loss and subsequent caries lesion formation.¹ A clinically detectable lesion (white spot lesion) is a result of numerous pH fluctuations in the dental biofilm caused by cariogenic bacteria when exposed to frequent sugar consumption. This lesion may or may not progress into a cavitation depending on the control of the aetiological factors of the disease, such as biofilm and diet control. Lesion progression can be controlled, slowed down or arrested when in the early stages by simple maintenance of good oral hygiene and restriction of sugar consumption.^{2,3} Therefore, given the behavioural nature of this condition, the main treatment for caries as a disease should be a responsibility of the patient (and not exclusively of the dentist).

Cariou lesion activity, presence of cavitation and cleansability will determine the intervention threshold needed (e.g., non-invasive treatment, micro-invasive restorative treatment, endodontic treatment, etc).³ Therefore, the dental professional should be able to diagnose caries by assessing patients' caries risk, detecting and staging carious lesions as the clinical manifestation of the disease, and stabilising their activity status in order to provide an appropriate management plan. Visual examination is the main method used by dentists for caries detection and this method has shown good overall performance. The International Caries Detection and Assessment System (ICDAS) is one of the most used systems worldwide, with a substantial level of reproducibility and accuracy for assessing primary coronal caries. This system has recently been simplified and used as part of the International Caries Classification and Management system (ICCMS) and CariesCare International practice guide as merged-ICDAS.⁴

This article will summarise the use of visual examination for caries detection using merged-ICDAS stages.

Step-by-step guide to clinical carious lesion diagnosis

1. Prepare the tooth

Ensure that the tooth is plaque free and dry, and use good lighting to determine the severity of the lesion.



FIGURE 1: Sound tooth surface (0).



FIGURE 2: Initial carious lesion – carious lesion into enamel without any cavitation (A).



FIGURE 3: Moderate carious lesion – microcavitation into enamel (B3).



FIGURE 4: Moderate carious lesion – underlying dentine shadow due to caries with no visible cavitation into dentine (B4).



FIGURE 5: Extensive carious lesion – obvious visible dentine cavitation (C).



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Table 1: Merged-ICDAS visual coronal caries stages.⁴

Merged-ICDAS score	Code	Description
Sound (ICDAS 0)	0	No evidence of change in enamel translucency due to caries after plaque removal and air drying
Initial caries lesions (ICDAS 1-2)	A	Changes in enamel seen as a caries opacity or visible discolouration (white/brown spot) not consistent with clinical appearance of sound enamel, with no evidence of surface breakdown, no underlying dentine shadowing and no cavitation
Moderate caries lesions (ICDAS 3-4)	B3	White/brown spot lesion with localised microcavity/discontinuity, without visible dentine exposure. Best seen after air drying
	B4	Obviously discoloured dentine visible through apparently intact or microcavitated enamel surface, which originated on the surface being evaluated. Often seen easiest with the tooth surface wet
Extensive caries lesions (ICDAS 5-6)	C	Obvious visible dentine cavity in opaque/discoloured enamel. A WHO/CPI/PSR probe can gently confirm if the cavity extends into dentine

2. Assess the staging of the coronal carious lesion

The staging of the carious lesion is based on the surface characteristics of the lesion seen clinically, which is linked to its histological depth. The merged-ICDAS scores can be used to record the severity of the lesion (Table 1). Figures 1-5 illustrate carious lesion severity stages and histological presentation (0-A-B3-B4-C).

3. Assess the activity

Assess the carious lesion activity by gentle blunt probing and by visually examining the site (i.e., plaque stagnation areas). Active carious lesions restricted to enamel (scores A-B3) usually have an opaque presentation with loss of lustre, and feel rough when probing. Inactive lesions feel smooth when probing and the enamel is usually shiny. It is important to note that colour does not define activity. For dentine carious lesions, if the lesion feels soft or leathery on probing, it is considered active, regardless of its colour. If the cavitation into dentine (C) feels hard and is shiny, the lesion is considered inactive. Inactive carious lesions do not require any operative intervention unless there are aesthetic or functional concerns.³

4. Record taking

Make an accurate record of the tooth, surface, stage and activity of the carious lesion. For example, if a first permanent molar has an occlusal microcavitation into enamel, this can be recorded as B3. If in a follow-up appointment the dentist notes a cavitation into dentine, this can be recorded as C. This system allows

identification of carious lesion progression and might dictate which treatment is needed for each stage of the lesion.

Conclusion

Minimally invasive dentistry (MID) starts with the accurate clinical diagnosis of carious lesions. This enables the practitioner to intervene in the caries process when required and not unnecessarily condemn a tooth to the chronic restorative cycle. The use of the merged-ICDAS system is part of the CariesCare International guide, which consists of a 4D caries management system that is being adapted internationally as part of the MID delivery framework.⁴

References

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