X-ray-free caries diagnostics in the everyday dental practice routine

By KA VO

The DIAGNOcam basically relies on a tried & tested technology that is used today in many practices: transillumination. In contrast to conventional technology with an interden- tal light source, DIAGNOcam practically uses the entire tooth as the source of light. At places where there is a carious lesion which blocks light propagation, this area will be underlit. This is captured by an integrated video camera that relays the images in real time to the computer screen. The light is introduced via the gingiva and bones at root level. According to information from the manufacturer this enables the presentation of proximal and occlusal lesions. Cracks and secondary caries under fillings also show up, provided that the fillings do not exceed a certain size. The detachable DIAGNOcam tip can be replaced by a disposable one. Different tips are available for the milk and adult teeth. File sizes vary with manufacturer recommendations. The acceptance for an additional diagnostic method is high. With the desire to re-equip my practice for a more extensive prophylactic care concept in caries diagnostics, I had an opportunity to test a new diagnostic procedure (DIAGNOcam, KaVo, Biberach/Riss) more extensively.

The following article briefly examines the underlying technology and, on the basis of specific cases, demonstrates the diagnostic potential of DIAGNOcam, including possible applications in relation to prophylaxis.

The DIAGNOcam program is started and the appropriate arm of the DIAGNOcam slide over the proximal zone of the teeth. After adjustment of the camera position, above all in the vertical axis and in its inclination to the tooth axis, a crisp image is obtained. It should be noted that a learning phase is required for proper handling of the Ps-screen. Especially in the proximal zone, caries lesions are revealed by the DIAGNOcam, which probably would not have been possible to identify clearly by sight or which would not have showed up at all. By the same token, this means that I can offer guidance to patients earlier and hence more effec- tive treatment. It should be noted, however, that the DIAGNOcam cannot distinguish between active and inactive caries. Consequently, active caries can only be differentiated from inactive caries by means of a time progression (screening and corresponding progress- tion).

With a little practice, it soon becomes a genuine pleasure to work with DIAGNOcam, which offers an additional diagnostic tool for use in dental examinations. The enclosed guide makes it easy to learn how to interpret the images. At present, I am involved in ascen- sions against basing diagnoses solely on the DIAGNOcam, in- cluding the fact that the camera be used as an auxiliary diagnostic instrument. Notwithstanding this, I have not during the test phase identified any incorrect diagnoses compared with standard diagnostic procedures. Especially in the diagnosis of proximal caries, an improved correlation of the DIAGNOcam image with the clinical extent is apparent. Another major ad- vantage is that proximal overlays which frequently hinder diagnosis with X-ray images, do not occur with the DIAGNOcam due to the nature of the system. In a workflow in accordance with manufacturer recommen- dations (visual inspection, DIAGNOcam, X-ray image), a fil- e size of two megapixels can be verified by the DIAGNOcam, avoiding an unnecessary X-ray session.

There are extensive editing options available for the automatically saved images.

First step toward X-ray-free caries diagnostics

The computer and KaVo's X-ray program are started and the upper right arm is moved over the proximal zone of the tooth, with the tip of the arm going over the proximal carious lesion. The computer and the assistant start working together. This usually results in further X-ray investigations with waiting times, at the expense of my time spent treating the patient. This situation has now changed: the problem is discussed beforehand with the patient and the dental hygienist and visually presented with the DIAGNOcam. This significantly raises the hygienist's status in the patient's eyes. At the same time, I can see a trust-building effect from the patient's perspective, so that not only the dentist, but also the entire treatment team contributes to the patient's dental health with state-of-the-art diagnostic procedures. My caries patients now become more critical, especially those who have undergone the treatment, since I can confirm the situation or take another look with the DIAGNOcam or get an X-ray taken.

All my patients benefit from X-ray radiation-free diagnostics. Especially children, pregnant women and women who are fearful of X-rays. Especially with regard to child prophylaxis, simple screening makes an enormous and very welcome contribution to keep the teeth of young children healthy.

Cost-effectiveness presentation of this diagnostic method: With the introduction of the DIAGNOcam as an integral part of the treatment, I have raised the original price for professional dental hygiene treatment by €12 (comparable rö2 BEMA). A short, conservative calculation makes it clear that the invest- ment in the device pays off in a very short time. The additional time expenditure in prophylaxis is low and acceptable. A flat-rate allowance for running costs for the DIAGNOcam of 1,000/year is integrated in the below calculation.

Calculation of DIAGNOcam in prophylaxis

The procurement costs of a DIAGNOcam are around €4,900 plus sales tax. According to the above estimate, the investment pays off in the course of the first year, without taking into account depreciation. The acceptance for an additional charge of €12 for the use of DIAGNOcam (especially when included in the dental hygiene session) is very high.

In addition, it can be seen that I make an enormous gain this has been for my practice. No more than I can claim the opposite. First and foremost, the increase in the quality of caries diagnostics should be mentioned. I identify more and can therefore treat my patients at an early stage. This not only gives me, as a practitioner, a good feeling but also the patient who feels well taken care of. X-ray images are expensive and uncertain (still) considered to be the gold standard. However, our dental hygienists are very happy to be able to inter- grate the DIAGNOcam in their treatment. Summing up, in my opinion the introduction of the DIAGNOcam has significantly enhanced our practice, both financially and in terms of intangible values.

Clinical case study

Case 1: proximal caries in an upper molar

This case concerns a young patient who was brought to me by a dental hygienist. The clinical investigation of an upper molar does not provide any evidence of carious processes in the mesial contact zone (Fig. 5). In contrast, in the DIAGNOcam image (Fig. 4) a broad shadow can be seen which has already extended to the enamel-dentine boundary. The highwax image (Fig. 5) only reveals a extremely faint lightness of this area. After opening a carious process was revealed (Fig. 6), which was treated after excavation and preparation with the SONICiLL system (Fig. 7).

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Fig. 1: DIAGNOcam with USB connection

Fig. 2: Use of the DIAGNOcam by dental hygienist

Fig. 3: DIAGNOcam showing a broad shadow

Fig. 4: DIAGNOcam image (Fig. 3)

Fig. 5: X-ray image

Fig. 6: cavity prepared

Fig. 7: filling with SONICiLL system

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