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

By KAVO

Alternative, X-ray-free caries diagnostics instruments, such as DIAGNOcam, Vuxta-Cam, Soprolife – to name but a few - have been finding their way into dental practices for some years now. Up to now, however, I have not been personally convinced by any of these instruments. One reason was that integration in our existing practice systems seemed to be time consuming and expensive. However, the restricted diagnostic spectrum (simultaneous detection of occlusal and proximal lesions) also caused sterilization. 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, shows the diagnostic potential of DIAGNOcam, including possible applications in relation to prophylaxis.

Technologically advanced

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 an energy source. At places where there is a carious lesion which blocks light propagation, an energy disturbance is captured. 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 bone at root level. According to information from the manufacturer this enables the differentiation 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 detectable DIAGNOcam tip can be removed and sterilized. Different tips are available for the examination of deep proximal and occlusal carious lesions. The computer and KaVo’s KID program are started and the rubber-armed view 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 KID screen. Especially in the proximal zone, caries lesions are revealed by the DIAGNOcam, which probably would not have been identifiable by clear vision or which would not have showed up at all. By the same token, this means that I can offer my patients care that is earlier and hence more effective 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 progression).

With a little practice, it soon becomes a genuine pleasure to work with DIAGNOcam, which offers an additional diagnostic tool for use in dental treatments. The enclosed guide makes it easy to learn how to interpret the images. At present, however, active lesions are difficult to say when examining the bitewing image (Fig. 5) the patient is really suffering from active caries. Especially in the diagnosis of proximal caries, an improved correlation of the DIAGNOcam image with the clinical extent is apparent. Another major advantage is that proximal overhangs 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 recommendations (visual inspection, DIAGNOcam, X-ray image), a filling process is possible which can be verified by the DIAGNOcam, avoiding an unnecessary X-ray session.

Integration in dental prophylaxis

As mentioned above, our practice has been undergoing expansion and reorientation to a prophylactic concept. Even if this process is not yet complete, I would like to discuss my experience to date.

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

First step toward X-ray-free caries diagnostics

After performing dental cleaning, my dental hygiene personnel often reported torn fillings or unsettable fillings. This situation is often revealed 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 the entire treatment team contributes to the patient’s dental health with state-of-the-art diagnostic procedures. Any caries patients who were concerned about previous treatment are reassured and formerly, 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 opens up possibilities for my practice. No more than a few days, I can offer my patients the option of being treated at a fraction of the cost of conventional X-rays. Our dental hygienists are also the patient who feels well informed and thus remains in the practice. I have been able to determine in the test period to what extent this positively influences the calculation.

General conclusion

We Swabians have a reputation for being a rather understated lot. It is therefore not easy to say what an enormous gain this has been for my practice. No more than a few days, I can offer my patients the option of being treated at a fraction of the cost of conventional X-rays. I would like to see a trust-building effect from the patient’s perspective, so that not only the dentist, but the entire treatment team contributes to the patient’s dental health with state-of-the-art diagnostic procedures. Any caries patients who were concerned about previous treatment are reassured and formerly, 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 opens up possibilities for my practice. No more than a few days, I can offer my patients the option of being treated at a fraction of the cost of conventional X-rays. Our dental hygienists are also the patient who feels well informed and thus remains in the practice. I have been able to determine in the test period to what extent this positively influences the calculation.

Clinical case study

Case 1: proximal caries in an upper molar

Fig. 5: initial situation

The X-ray image (Fig. 6) was taken care of. X-ray images are always the gold standard. However, our dental hygienists are particularly concerned about the original price for professional dental hygiene treatment by €12 (comparable to BEMA). A short, conservative calculation makes it clear that the investment 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 for DIAGNOcam are around €4,000 plus sales tax. According to the above estimate, the investment pay off in the first year, without taking into account depreciation. The acceptance for an additional charge of €12 for the use DIAGNOcam (especially when included in the dental hygiene session) is very high. In addition, it can be seen that the the proportion of cases demanding treatment in adhesive filling therapy (with average time outlay) increases. This is least costly for patients that a hospital patient, usually with more expensive and extensive treatments. At the same time, the profitability for the dentist remains the same or may, depending on the practice structure, be increased, as fewer laboratory made prosthetics are needed, for example, and patience are generated thus remains in the practice. I have not been able to determine in the test period to what extent this positively influences the calculation.

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 zone can be seen which has already extended to the enamel-dentine boundary. The bitewing 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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