The following case study illustrates the effectiveness of a treatment concept for the decontamination of root surfaces colonized with subgingival biofilm using low-abrasive powder jet technology. The aim of this case study was to evaluate the clinical and microbiological results during periodontitis treatment using a low-abrasive subgingival air polishing system (AIR-N-GO PERIO®).

Influence of the AIR-N-GO PERIO® system on bacterial prevalence

In the AIR-N-GO PERIO® group, the intense air stream together with the fine abrasive powder (glycine) exerts its own detergent effect and removes subgingival biofilm, while the piezoelectric tip simultaneously stimulates the debris and subgingival bacterial masses withstitute and makes them more accessible for the air stream (Fig. 4). The air stream is accompanied by the air-borne particle system. The particle system consists of two components: the fluidization air and the fine abrasive powder. The fluidization air (approximately 90% of the air stream) is directed through the nozzle to the abradable surface, where it provokes turbulence and results in a fluidized layer. The fluidized layer contains the abrasive powder. The powder is conveyed with the fluidized air stream to the tooth surface, where it produces a surface-modifying effect (Fig. 5). After the air stream and the particle system have been removed, the surface of the tooth has a rougher texture and is therefore less susceptible to development of subgingival biofilm.

The primary objective of conservative periodontal therapy which is aimed at destroying infectious disease agents on the root surfaces is the decontamination of the root surfaces. This can be achieved by removing the subgingival biofilm and by inhibiting the bacteria from reattaching to the root surfaces. The decontamination of the root surfaces is an essential prerequisite for successful periodontal therapy, especially in the case of severe periodontal disease. The air stream of the AIR-N-GO PERIO® system removes the insulating subgingival biofilm powder with soluble inflammatory cells which is a less abrasive powder. Moreover, the clinical studies (reference literature at www.ergo-concept.com) could be demonstrated that the fine powder exerts no adverse effects on the surrounding soft tissue due to air polishing process. The AIR-N-GO PERIO® system, with its subgingival attachment and individual hand piece (Fig. 3) developed specifically for working only on the periodontal pocket, is the result of cutting-edge CFD technology (numerical fluid technology).

The adjacent anatomical structures are not irritated and thorough removal of the subgingival biofilm on the root surface reduces marginal inflammation. The initial results presented are part of a clinically and microbiologically controlled and randomized (allocation concealment) study. In the comparison of the treatment result of the AIR-N-GO PERIO® system with its subgingival attachment and individual hand piece (Fig. 3) developed specifically for working only on the periodontal pocket, the result of cutting-edge CFD technology (numerical fluid technology) for the treatment of patients with periodontal disease.

Material and method

15 patients who had basic hygiene and professional scaling and root planing. (Table 1) and re-examined over a period of three months. The clinical and microbiological parameters were recorded before starting, immediately after intervention (microbiological investigations only), after six weeks and after three months (Table 2).

Preparative treatment

All patients were involved in preparative treatment and following the initial examination the patients received oral hygiene instructions and professional subgingival debridgment as necessary (Table 1). The clinical and microbiological parameters were recorded before starting, immediately after intervention (microbiological investigations only), after six weeks and after three months (Table 2).

After the preparative treatment had been carried out successfully and the patients had been informed that they would be part of the study, the initial examination was carried out (Tab. 1). The patients should have had a PI of approximately 1 within this time frame. The preparative treatment included supragingival scaling and polishing of all tooth surfaces with the AIR-N-GO SUPER (Fig. 4). The air-polishing kit was used with a mixed jet of air and water, added to which is a cleansing powder that has been specially developed to be minimally traumatic to delicate mucosal tissue. The powder's rounded microstructure and the fineness of the calcium carbonate-based micro-beds protect the tooth enamel, retain a stable stable and effective cleaning of the tooth surfaces. The test was carried out using the CFD system. The clinical parameters were carried out using the CFD system. The microbiological parameters were determined and evaluated descriptively. The overall microbial test was used to compare the overall results with the findings after application of the low-abrasive, so-called air-polishing system. The clinical parameters were carried out using the CFD system. The microbiological parameters were determined and evaluated descriptively. The results were evaluated descriptively. The Wilcoxon signed-rank test was used to compare the overall results with the findings after application of the low-abrasive, so-called air-polishing system. The clinical parameters were carried out using the CFD system. The microbiological parameters were determined and evaluated descriptively. The Wilcoxon signed-rank test was used to compare the overall results with the findings after application of the low-abrasive, so-called air-polishing system. The clinical parameters were carried out using the CFD system. The microbiological parameters were determined and evaluated descriptively.

RESULTS

Demographic data

All the patients in the investigations (n = 15) remained in the study for the entire observation period of three months. There was no change in the number of patients. 56.6% of the patients were female and 43.4% were male. The male to female ratio was 1:1.5 and the mean age of the patients was 37.5%. All the patients were informed in accordance with the study protocol.

Clinical parameters

The AIR-N-GO PERIO® group showed an average gain in clinical attachment of six weeks post-operative of 0.30 ± 0.04 mm for all the periodontal teeth (mean reduction in the probing depth of 0.01 ± 0.02 mm) and for areas on the microbiological study tooth a gain of 0.7 ± 0.1 mm (mean reduction in the probing depth of 0.05 ± 0.06 mm). After three months, the AIR-N-GO PERIO® group showed an average gain in clinical attachment of six weeks post-operative of 0.30 ± 0.04 mm for all the periodontal teeth (mean reduction in the probing depth of 0.01 ± 0.02 mm) and for areas on the microbiological study tooth a gain of 0.7 ± 0.1 mm (mean reduction in the probing depth of 0.05 ± 0.06 mm).

Microbiological results

The ENGO group showed an average of the periodontal marker bacteria A. actinomycetemcomitans, P. gingivalis, T. denticola and F. nucleatum that had been significantly improved (p<0.01). The slight increase in the GR compared to the pre-operative data reflects the improved inflammatory situation of the patients after the AIR-N-GO PERIO® therapy.

The promising results for the periodontal marker bacteria A. actinomycetemcomitans, P. gingivalis, T. denticola and F. nucleatum that had been significantly improved (p<0.01).

The mean values and standard deviation of the PPD and CAL values for the base line tooth, six weeks post-operative and three months post-operative are given for the microbiological study tooth.

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Dental sealants have been recognized as an effective preventive method for protecting pits and fissure cavities in primary and permanent molars. However, there is still a debate about the correct procedure for use in public health settings. According to a recent study, air abrasion with sodium fluoride is effective for removing the debris prior to etching, and air polishing with sodium fluoride appears to be a substitute to acid etching and appears promising for use in public health settings.

Sealants can be repaired when the resin sealants are partially or completely antiseptic when even completely or partially lost. Retention rates for the second molars were comparable to the first ones. Sealants can be repaired, Fig. 1 a, b, by removing the superficial contaminated layer, acid etching, replacing the sealant material and light curing.

Fig. 1 a and b: Partially retained sealants. a) by removing the superficial plaque contaminated layer, acid etching, replacing the sealant material and light curing.

Fig. 2. Partially retained sealants. a) by removing the superficial plaque contaminated layer, acid etching, replacing the sealant material and light curing.

Suggesting that the resin sealants provide some antiseptic action even when completely or partially lost. Retention rates for the second molars were comparable to the first ones. Sealants can be repaired, Fig. 1 a, b, by removing the superficial contaminated layer, acid etching, replacing the sealant material and light curing.

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