



New update series for the entire team

In view of the multitude of new scientific papers and rapid technical advancement, it is costly and time-consuming for both dentists and the practice team to keep their relevant specialist knowledge up to date.

Here the PnC editorial team would like to help you keep abreast:
We will publish "Updates" on relevant and current topics in the Team section of PnC at irregular intervals.



Update: Airflow technology

Airflow technology has undergone various stages of development. New powders have been developed, new devices and attachments launched. This paved the way to steadily expand the applicability of this technology and raise its effectiveness. The method has been scientifically scrutinized in numerous studies at the same time. Read about the current state of knowledge here.

Since the studies of Petersilka et al. in 2003 [1,2] on the subgingival application of Airflow technology (AF) with low-abrasive powders, this technique has attained a high status in daily routine in the practice. The devices and powders used in Airflow technology have been continuously developed. Today, the number of scientific papers has reached such a level that it is hard to keep up. Therefore, a summary of the latest studies is presented as follows.

Systematic review articles on Airflow technology

The systematic reviews [3,4,5] on the topic illustrate that Airflow (AF) with low-abrasive powders is a highly efficient treatment approach for supragingival and subgingival biofilm management that is gentle on the tooth substance and comfortable for patients and prevention staff. There is improvement in the clinical and microbiological parameters with the use of AF, indicating the effectiveness of the method – that are at least as good as conventional treatment. The advantages lie in enhanced patient comfort, safety and time efficiency.

Teeth cleaning: Airflow versus classic rubber cup polishing (RCP)

A whole range of studies compares the two methods, AF and RCP, with regard to effectiveness in tooth cleaning and also looks into other questions related to the use of these aids. Arefnia et al [6], in their in vitro study, compared hand instruments (HI), Piezon-ultrasonic scaler (PUS), AF with erythritol powder (AFEP), rubber cup polishing (RCP), and the combination of applied aids in the treatment of enamel and cementum surfaces in terms of substance loss, mean roughness depth, and mean roughness value, and found the best hard tissue preservation (enamel and cement) with AFEP. Frankenhauser [7], in her dissertation, compared RCP with EPAF with regard to effectiveness of supragingival biofilm removal. The cleaning index values obtained after RCP cleaning (Cleanic polishing paste) and EPAF differed significantly. EPAF achieved a better result in this study too, both for anterior and posterior teeth. Two studies investigated not only the effectiveness, but also the time required and the suitable procedure for biofilm removal using AF and RCP: the role of disclosing and the sequence of instrument use.

Fu et al [8], for example, compared AF and RCP with and without disclosing prior to treatment in a double-blind, randomized split-mouth study in 88 patients with a biofilm index ≥ 60 . The average biofilm index after treatment and the time required:

- for AF with disclosing, biofilm index: 21.7%, time: 325 sec.
- for AF without disclosing, biofilm index: 33.5%, time: 325 sec.
- for RCP with disclosing, biofilm index: 25.5%, time: 411 sec.
- for RCP without disclosing, biofilm index: 34.5%, time: 402 sec.

The researchers found that after disclosing the biofilm prior to prevention, significantly more biofilm was removed with each technique than without disclosing. More biofilm is removed (efficiency) with AF and disclosing than with RCP and disclosing. It was found that the treatment time required was significantly shorter in the AF group with disclosing. In addition, far higher practitioner and patient satisfaction was ascertained in the AF group with disclosing.

Noh et al [9] compared the effectiveness of biofilm removal between AF and RCP and investigated in which sequence the procedure is more effective: Is it more favorable to remove the hard deposits (dental calculus) first and then the biofilm - or the other way round? The following groups were formed:

- Group I:** Scaling, then RCP (SR).
- Group II:** Scaling, then Airflow (SA).
- Group III:** Airflow, then scaling (AS).

The SA group (II) achieved better cleaning than the SR group (I) with less time required and higher practitioner satisfaction. The AS group (III) achieved the same cleaning as the SA group (II), but the treatment time was much reduced. Conclusion: The use of Airflow first and then scaling (in group III) is the most effective method with the lowest time required and the highest practitioner and patient comfort.



Perio: Airflow and non-surgical therapy

AF can also be used as an adjuvant to debridement in subgingival instrumentation, as the second stage of periodontitis treatment.

Several studies are also available on this application. Flechsig et al [10] compared scaling and root planing (SRP) with and without EPPF (erythritol powder Perioflow handpiece/nozzle) as an adjuvant to subgingival instrumentation in periodontitis therapy (pockets ≥ 5 mm). In the EPPF group, the number of pockets ≥ 5 mm, *T. forsythia* and *T. denticola*, and MMP-8 levels were significantly lower than in the SRP group. The authors concluded that the use of EPPF could reduce the need for periodontal surgery.

Bungart et al [11] compared non-surgical periodontitis therapy using hand instruments (HI) with HI using AF as an adjuvant, in terms of probing depths (PD), bleeding on probing (BOP), and microbiology. After 3 months and 6 months, they found a tendency towards better results for AF in terms of PD, BOP, and microbiological scores.

Cardaropoli et al [12] investigated the sequence of the procedure; they performed non-surgical periodontal therapy exclusively with Piezon-ultrasonic scaler (PUS) and erythritol powder Airflow (EPAF). In each case, four pockets (4 to 10 mm) were treated, first PUS then EPAF, or first EPAF then PUS. After 12 months, both procedures showed significantly improved scores for PD and clinical attachment level (CAL). There were no differences between the groups, hence the conclusion: "Both procedures represent a pleasant causally-based periodontal therapy."

Mensi et al [13] investigated a new, gentle method for non-surgical periodontal therapy in patients suffering from generalized aggressive periodontitis (AgP). The research group showed that their concept of "Full-mouth erythritol powder air-polishing therapy (FM-EPAPT)" can be successfully implemented. Under antibiotic protection and after disclosing, the biofilm was first removed supragingivally and subgingivally using Airflow/Perioflow, then the dental calculus was removed supragingivally and subgingivally using PIEZON NO PAIN PS (EMS, Switzerland). Essentially the same procedure is used in supportive periodontal therapy (SPT). The clinical and microbiological parameters in 11 patients demonstrated that the procedure is effective.

Surgical periodontitis therapy: Airflow and root furcations

Cosgarea et al [14] in their study compared wound healing with EPPF versus SRP (Scaling and Root Planing, HI, ultrasound/US) in surgical periodontitis therapy. In 27 patients with residual pockets larger than 6 mm, following non-surgical periodontal therapy, surgical (open) periodontal therapy was performed on residual pockets only with EPPF or SRP (HI/US). The clinical scores were equally good in both groups (CAL, PD). The authors found that EPPF can be a valuable minimally invasive adjuvant aid in surgical therapy of residual pockets after completing non-surgical periodontal therapy, provided that the root surfaces are free of dental calculus.

Airflow in supportive periodontal therapy (SPT).

AF also proves successful in biofilm management in SPT. Supra- and subgingival dental calculus should be removed as gently as possible (PUS/US) in SPT. Hand instruments, which may injure tooth substance, should only be used in exceptional situations.

Ulvik et al [15] treated 20 patients in maintenance therapy with Grade II root furcations on mandibular molars. They compared the therapy of EPPF with HI/PUS. The following parameters were evaluated: pocket depth (PD), clinical attachment level (CAL), bleeding on probing (BOP), microbiology, visual analog scale (VAS). The clinical parameters improved in both groups. There were no differences in microbiological scores. For the root furcations, CAL values were better in the HI/PUS group than for EPPF. EPPF was rated significantly better with regard to patient comfort (VAS).

Petersilka et al [16] conducted a long-term comparative study of 263/264 patients who were in SPT for an average of 5.3 years. The classic method (SRP [HI, Airscaler/S, RCP]) was compared with AF (only supragingival scaling with HI, AS). The same results were obtained for PD in both groups.

Lu et al [17] conducted a randomized split-mouth study with 22 participants over 12 weeks. Supragingival AF was carried out in the test group. US and RCP were used in the control group. Results at 2, 4, 6, 8, and 12 weeks showed improvements in clinical parameters (biofilm index, bleeding index, BOP, and ST) in both groups, without significant differences. There were also no significant differences in microbial parameters (*P. gingivalis*, *T. forsythia*, *T. denticola* and *F. nucleatum*). If SPT with AF is carried out, patient acceptance is far better. Sekino et al [18] conducted a comparative study in patients with chronic periodontitis in SPT.

Group 1: AF every 30 days, Group 2: AF every 90 days, Group 3: only water rinse every 30 days. AF every 30 days shows significant improvements in clinical parameters in patients in SPT.

Summary

The update of the work predominantly published in 2020 and 2021 shows that Airflow technology with low abrasive powders like erythritol achieves better results in biofilm management than conventional techniques (HI, US, PUS). Airflow with low-abrasive powders is an adjuvant in non-surgical and surgical periodontal therapy that helps improve treatment outcomes. The advantages of Airflow technology are particularly evident in SPT.

Airflow technology provides the dentist and his/her team with an effective, patient-friendly and practitioner-friendly method that is gentle on tooth substance; it has now become the current technical standard and with outstanding scientific validation. ■

Literature references at www.pnc-aktuell.de/literaturlisten

Conflict of interests

In the interests of transparency, I would like to declare that I, Dr. Klaus-Dieter Bastendorf, act as an advisor for E.M.S. Electro Medical Systems S.A., 1260 Nyon – Switzerland.



Dr. Nadine Strafela-Bastendorf

Dr. Klaus-Dieter Bastendorf

Family dental practice
Gairenstaße 6
73054 Eisligen
info@bastendorf.de

© Foto: Stefan Kranefeld

**ALZHEIMER NIMMT
JEDEN TAG EIN STÜCK ERINNERUNG.**

Helfen Sie diese Krankheit zu besiegen:
alzheimer-forschung.de/erinnerung

 Alzheimer Forschung
Initiative e.V.

Update Airflow-Technologie

PnC 3/2021 (15), 165-167

Dr. Nadine Strafela-Bastendorf

Dr. Klaus-Dieter Bastendorf

1. Petersilka GJ, Tunkel J, Barakos K, Heinecke A, Häberlein I, Flemmig TF (2003a): Subgingival plaque removal at interdental sites using a low abrasive air polishing powder. *Journal of Periodontology* 2003; 74: 307-311
2. Petersilka GJ, Steinmann D, Häberlein I, Heinecke A, Flemmig TF (2003b): Subgingival plaque removal in buccal and lingual sites using a novel low abrasive air-polishing powder. *Journal of Clinical Periodontology* 2003; 30: 328-333
3. Bühler J, Amato M, Weiger R, Walter C. A systematic review on the effects of air polishing devices on oral tissues. *Int J Dent Hyg.* 2016 Feb;14(1):15-28. doi: 10.1111/idh.12120. Epub 2015 Feb 17. PMID: 25690301
4. Sultan DA, Hill RG, Gillam DG: Air-Polishing in Subgingival Root Debridement: A Critical Literature Review. *Journal of Dentistry and Oral Biology* 2017; 10(2): Article 1065
5. Ng E, Byun R, Spahr A, Divnic-Resnik T. The efficacy of air polishing devices in supportive periodontal therapy: A systematic review and meta-analysis. *Quintessence Int.* 2018;49(6):453-467. doi: 10.3290/j.qi.a40341. PMID: 29700503.
6. Arefnia B, Koller M, Wimmer G, Lussi A, Haas M: In Vitro Study of Surface Changes Induced on Enamel and Cementum by different Scaling and Polishing Techniques. *Oral Health Prev Dent* 2021; 19(1):85-92. DOI: 10.3290/j.ohpd.b927695
7. Frankenhauser A: Semiquantitative plaque assessment after the application of two different tooth-polishing methods. A split mouth randomized controlled clinical. Dissertation Universität Krems 2020
8. Fu JHF, Wong LB, Tong HJ, Sim FS: Conventional versus comprehensive dental prophylaxis: comparing the clinical outcomes between rubber cup and air polishing and the importance of plaque disclosure. *Quintessence International* 2021, 52: 264-274
9. Noh H, Kim MJ, Park JH, Park BY, Jung JH: Comparison of the Efficiency on Biofilm Removal between AIRFLOW and Rubber Cup Polishing. Topic: Efficiency of Professional Biofilm Removal using AIRFLOW before and after Ultrasonic Calculus Removal. *Int J Dent Hygiene.* 2020; 00: 1–7. DOI: 10.1111/idh.12481
10. Flechsig C, Eick S, Kette B, Jentsch H: Subgingivale Instrumentierung mit adjuvantem Erythritol-Pulvereinsatz. DP PARO Jahrestagung 2020 Stuttgart Poster 2
11. Bungart C, Bucur C, Sanding KR, Schwanebeck U, Hofmann T: Effizienz einer subgingivalen niedrig abrasiven Glycin-Pulverstrahlbehandlung im Rahmen der nichtchirurgischen Parodontitistherapie - eine prospektive, randomisierte, klinisch kontrollierte, einfach verblindete Multicenterstudie. DG-PARO 2020 Stuttgart, Kurzvorträge
12. Cardaropoli D, Albano M, Tamagnone L, Gaveglio L: Infection control in adult periodontal patients using ultrasonics and erythritol powder: A randomized

controlled splith-mouth clinical study. Manuscript has been accepted for publication at International Journal of periodontics and restorative dentistry

13. Mensi M, Scotti E, Sordillo A, Garzetti G, Calza S: Full-Mouth-Erythritol-Pulver-Air-Polishing-Therapie (FM-EPAPT) –ein Paradigmenwechsel. Ein neues Konzept zum Biofilmmanagement prophylaxeimpuls 2017; 21: 70-79
14. Cosgarea R, Jepsen S, Fimmers R, Bodea A, Eick S, Sculean A. Clinical outcomes following periodontal surgery and root surface decontamination by erythritol-based air polishing. A randomized, controlled, clinical pilot study. *Clin Oral Investig.* 2021 Feb;25(2):627-635. doi: 10.1007/s00784-020-03533-9. Epub 2020 Aug 24. PMID: 32839833; PMCID: PMC7820077.
15. Ulvik IM, Sæthre T, Bunæs DF, Lie SA, Enersen M, Leknes KN. A 12-month randomized controlled trial evaluating erythritol air-polishing versus curette/ultrasonic debridement of mandibular furcations in supportive periodontal therapy. *BMC Oral Health.* 2021 Jan 21;21(1):38. doi: 10.1186/s12903-021-01397-3. PMID: 33478480; PMCID: PMC7819243.
16. Petersilka G, Koch R, Vomhof A, Joda T, Harks I, Arweiler N, Ehmke B: Retrospective analysis of the long-term effect of subgingival air polishing in supportive periodontal therapy. *J Periodontol.* 2020; 00:1-9. DOI: 10.1111/jcpe.13392
17. Lu Ho, Lu He, Zhao Y, Meng H: The effect of supragingival glycine air polishing on periodontitis during maintenance therapy: a randomized controlled trial. *Peer J* 2018; 6: e4371; DOI 10.7717/peerj.4371
18. Sekino S, Ogawa T, Murakashi E, Ito H, Numabe Y. Clinical and microbiological effect of frequent subgingival air polishing on periodontal conditions: a split-mouth randomized controlled trial. *Odontology.* 2020 Oct;108(4):688-696. doi: 10.1007/s10266-020-00493-0. Epub 2020 Feb 18. PMID: 32072344.