**Roughness and loss of substance of tooth surfaces after biofilm removal with different processing methods**

By Michael Haas, Martin Koller, Behrouz Arefnia, Austria

**Aim**
To assess the roughness and loss of substance of tooth surfaces after instrumentation with AirFlow, ultrasonics, hand instruments and polishing methods or their different combinations. This was a pilot study.

**Materials and methods**
Post extraction, impacted 3rd molars were marked and stored teeth were then divided and subjected to the following treatments:

- **1A** – Airflow EMS PLUS powder at 2mm distance for 5 sec with a pressure of 1.8 bar at an angle of 45° with a wiping movement
- **1B** – Airflow EMS PLUS powder +conventional polishing with rubber cup and polishing paste of varying RDA 0.470/1.270/3.470
- **2A** – Ultrasonic EMS with PS instrument for 60 sec/surface, brush-stroke movements, pressure ~30p
- **2B** – Ultrasonic + Airflow EMS PLUS powder used as above
- **2C** – Ultrasonic + conventional polishing used as above
- **3A** – Hand scaler/ curette. On enamel scaler curved. On root Gracey curette from Deppeler blue, scaling movement per position one stroke
- **3B** – scaler/ curette + Airflow EMS PLUS powder as above
- **3C** – scaler + Airflow EMS PLUS powder +Conventional polishing as above
- **3D** – scaler + conventional polishing as above

Substance loss and roughness were assessed in 2 control groups: enamel untreated, cementum untreated.

**Results**

**On enamel:**
- **Group 1:** Airflow
  - There are no additional benefits in conventional polishing and Airflow in comparison to using AIRFLOW alone
- **Group 2:** Ultrasonic
  - In comparison to Air-Flow, all other instrumentations produced small roughness values. Additional conventional polishing does not alter the overall results.
- **Group 3:** Hand instrument
  - Hand instrument scaler also causes a loss of substance in the enamel. No additional improvement by additional instrumentation with Air-flow, conventional polishing or a combination of both.

**On cementum:**
- **Group 1:** AirFlow
  - Slight roughness due to additional conventional polishing.
- **Group 2:** Ultrasonic
  - Ultrasonic produces a smooth cementum surfaces with low roughness values, which are not significantly altered by combinations with Airflow or conventional polishing.
- **Group 3:** Hand instrument
  - Gracey curette: A smooth surface is produced of the processed cementum, addition of Air-Flow worsens the result, polishing measures as already described above lead to an apparently smoother surface.

**Conclusions**
- Airflow with PLUS powder produces the highest level of cleaning on enamel and cementum in comparison to ultrasonics or hand instrumentation.
- Repeated instrumentation, too high pressure and too long exposure times lead to high substance loss with all systems.
- Use of conventional instrumentation leads of unnecessary over instrumentation especially in use on ceramics or restorations.
- Airflow is the most efficient solution providing maximum tooth preservation
- Ultrasonic and hand instruments enable a stripe-shaped cleaning pattern through punctiform contact with the tooth surface. A planar pattern is achieved with Air-Flow. This makes it easier to achieve a homogeneous result on large surfaces. This is much more difficult with ultrasonics and hand instruments and quickly leads to grooves and furrows.

**Recommended treatment approach:**
- Assessment followed by disclosure for motivation
- Deep cleaning with AirFlow followed by ultrasonic if necessary
- Quality check for remaining stains, biofilm or calculus

---

**Tetric® N-Ceram Bulk Fill**

The nano-optimized 4-mm composite

**Discover the new time-saving composite**

**4 mm to success**
- Bulk filling is possible due to Ivocerin®, the patented light initiator
- Special filler technology ensures low shrinkage stress
- Esthetic results are achieved quickly and efficiently in the posterior region

**AD**

E.M.S. Electro Medical Systems S.A.
Ch. de la Vuarpillière 31
1260 Nyon - Switzerland
Tel: +41 22 994 26 60
Mob: +41 79 569 12 14
Web: http://www.ems-company.com
Web: http://www.ems-dent.com