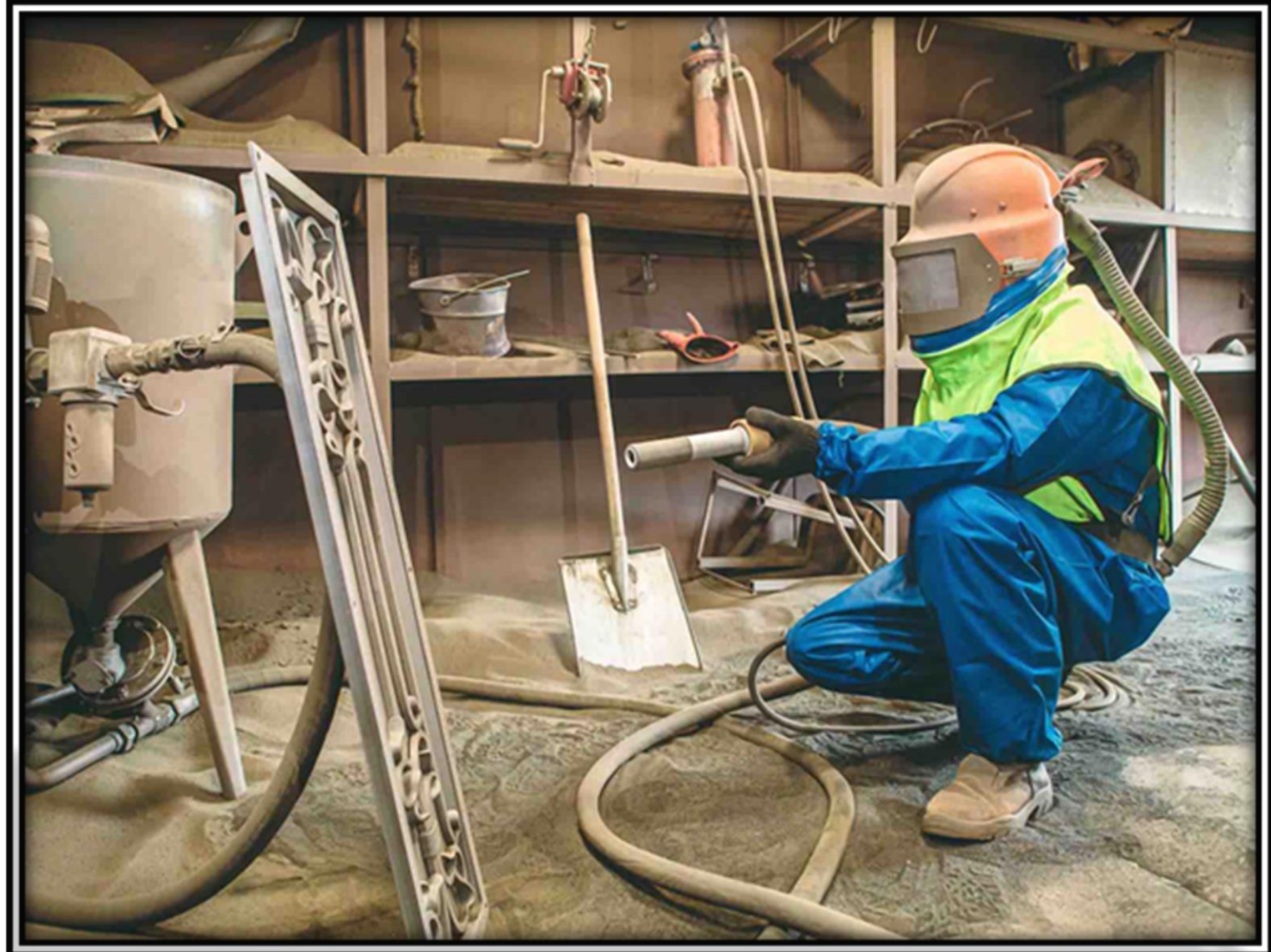


Air Abrasion In Orthodontics



Air Abrasion In Orthodontics

History

- **1870, when Benjamin Tilghman invented a machine for paint and rust removal.**
- **Thomas Pangborn added compressed air in 1904.**
- **1918, when the first enclosure was built containing a clear screen for sandblasters to surround the worksite and prevent dust from hitting workers' faces.**
- **The idea of air polishing was born in 1941 by Dr. Robert Black to create a painless procedure during cavity preparation.**
- **In 1945 Dr. Robert invented the Air Dent, abrasive particles (dolomite, crushed walnut shells, and aluminum oxide) compressed air, water.**
- **Dr. Black noticed the removal of stains adjacent to the prepared cavity.**
- **In the late 1960's and early 1970's, sodium bicarbonate.**
- **First air polishing device, the Prophy Jet Marck IV™, was marketed by Dentron, Incorporated (Corpus Christi, Texas).**

Air Abrasion In Orthodontics

Air Abrasion:

Abrasive particles are used to **remove** or **alter** tooth structure

Air Polishing:

To **remove extrinsic stain and plaque** mainly supragingivally by the use of a system that releases controlled jets of air, water, and abrasive powder without affecting the tooth structure.

Sandblasting:

Surface is impacted with hard particles at high velocities **eroding the substrate** and producing a roughened surface with expected higher wettability

Air Abrasion In Orthodontics

Powder types:

Powders Used in Air Polishing:

1. Sodium Bicarbonate–Based Powders (NaHCO_3)
2. Calcium Sodium Phosphosilicate Powder (CaNaO_6PSi)
3. Calcium Carbonate (CaCO_3)
4. Aluminum Trihydroxide ($\text{Al}(\text{OH})_3$)
5. Glycine

- ☐ hardness
- ☐ size of abrasive particles

Material	Mohs hardness scale	Particle size
Flour of pumice	6-7	250-297 μm
Sodium Bicarbonate	2.5	74-250 μm
Aluminum Trihydroxide	2.5 – 3.5	80-325 μm .
Glycine	2	20-63 μm
Calcium Carbonate	3	45 μm
Calcium Sodium Phosphosilicate	6	25-120 μm

Air Abrasion In Orthodontics

Devices:

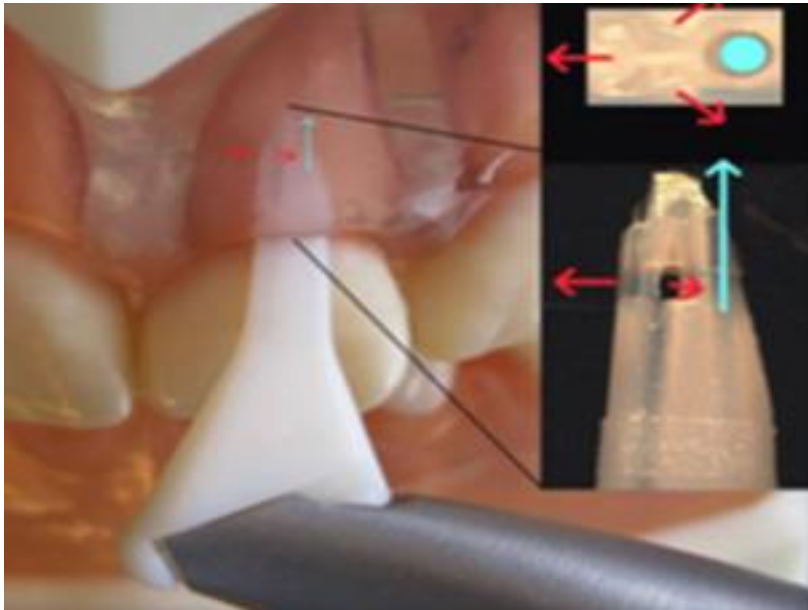
1- Airdent machines



Air Abrasion In Orthodontics

Devices:

2- Air-Flow Masters, EMS



Air Abrasion In Orthodontics

Devices:

3- Aquacare



Air Abrasion In Orthodontics

Devices:

4- Airprophy



Air Abrasion In Orthodontics

Advantages of Air Powder Polishing Over Conventional Polishing:

- 1-The time needed for stain and plaque removal is less with less hypersensitivity.
- 2-Efficient, more comfortable for both the patient and the operator.
- 3-According to the (Mohs hardness scale) less abrasive than traditional polishing.
- 4-Less heat.
- 5-Less traumatic.
- 6- More preferable to use in patients with orthodontic appliance.
- 7- More efficient especially in crowded teeth; pits and fissures.
- 8-Easy access to area of the roots resulting in more smooth surface of the cementum with 100% of bacterial endotoxins removal.

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Devices:

5- Sandblaster (lab):
Aluminum oxide



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Devices:

5- Intraoral microetcher (sandblaster)



Air Abrasion In Orthodontics

Applications of Air Abrasion in Orthodontics:

1. Prior to Bracket Placement.



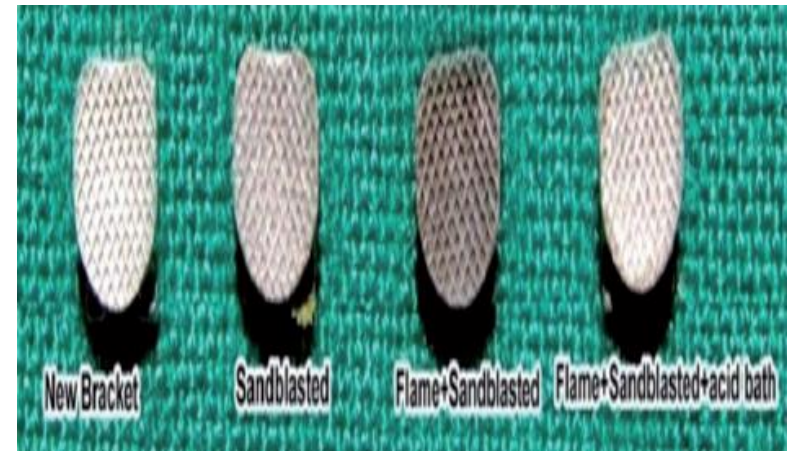
2. Cleaning around Fixed Appliances.



Air Abrasion In Orthodontics

Applications of Air Abrasion in Orthodontics:

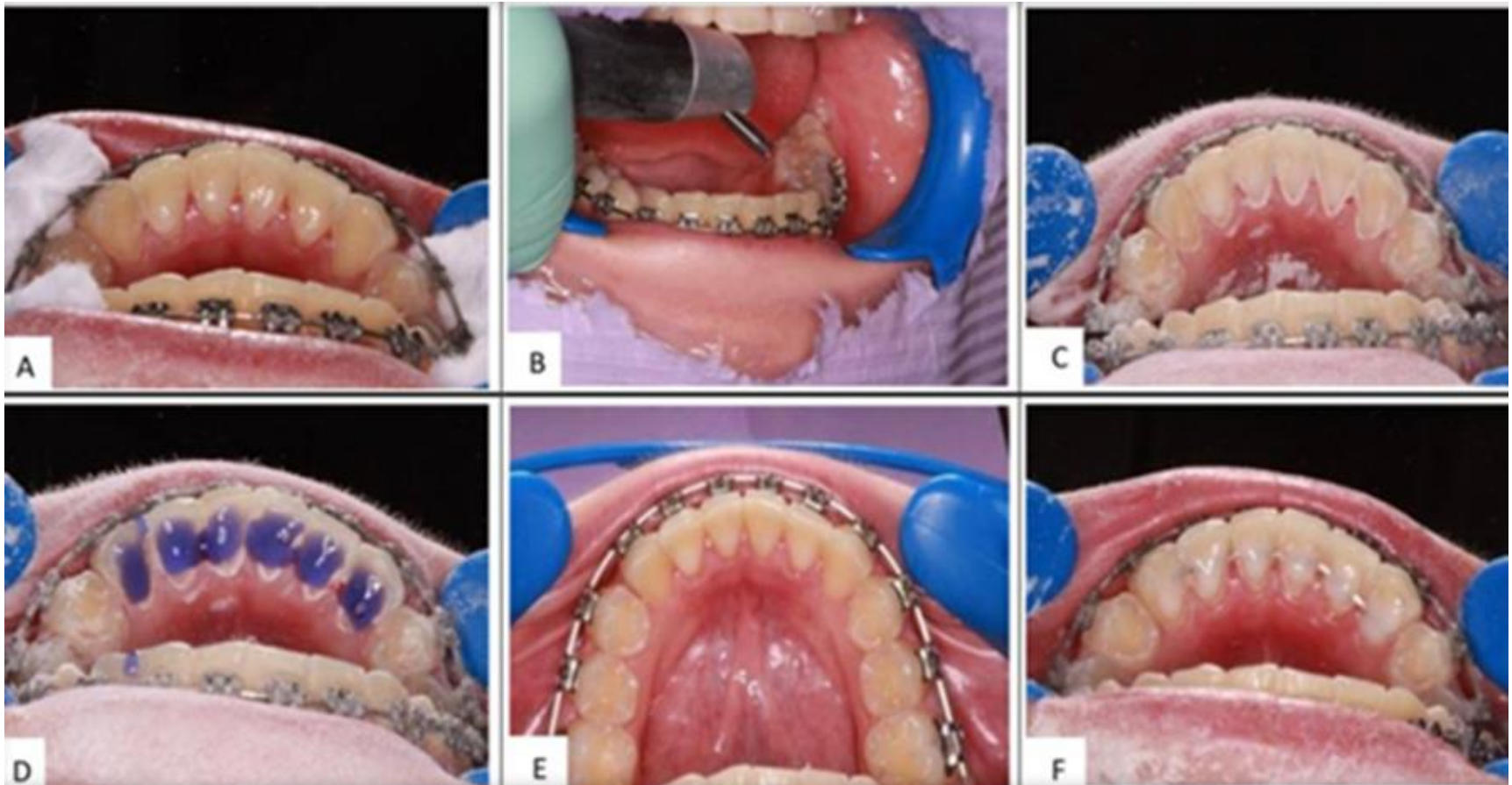
3. Pretreatment of non-enamel surfaces (restorations) prior to bonding of orthodontic attachments.
4. Removal of superficial enamel defects (Use the combination of sandblasting followed by acid etching produces higher bond strengths on fluorosed enamel surfaces than acid etching alone) .
5. Cleaning of detached orthodontic attachments Before rebonding.



Air Abrasion In Orthodontics

Applications of Air Abrasion in Orthodontics:

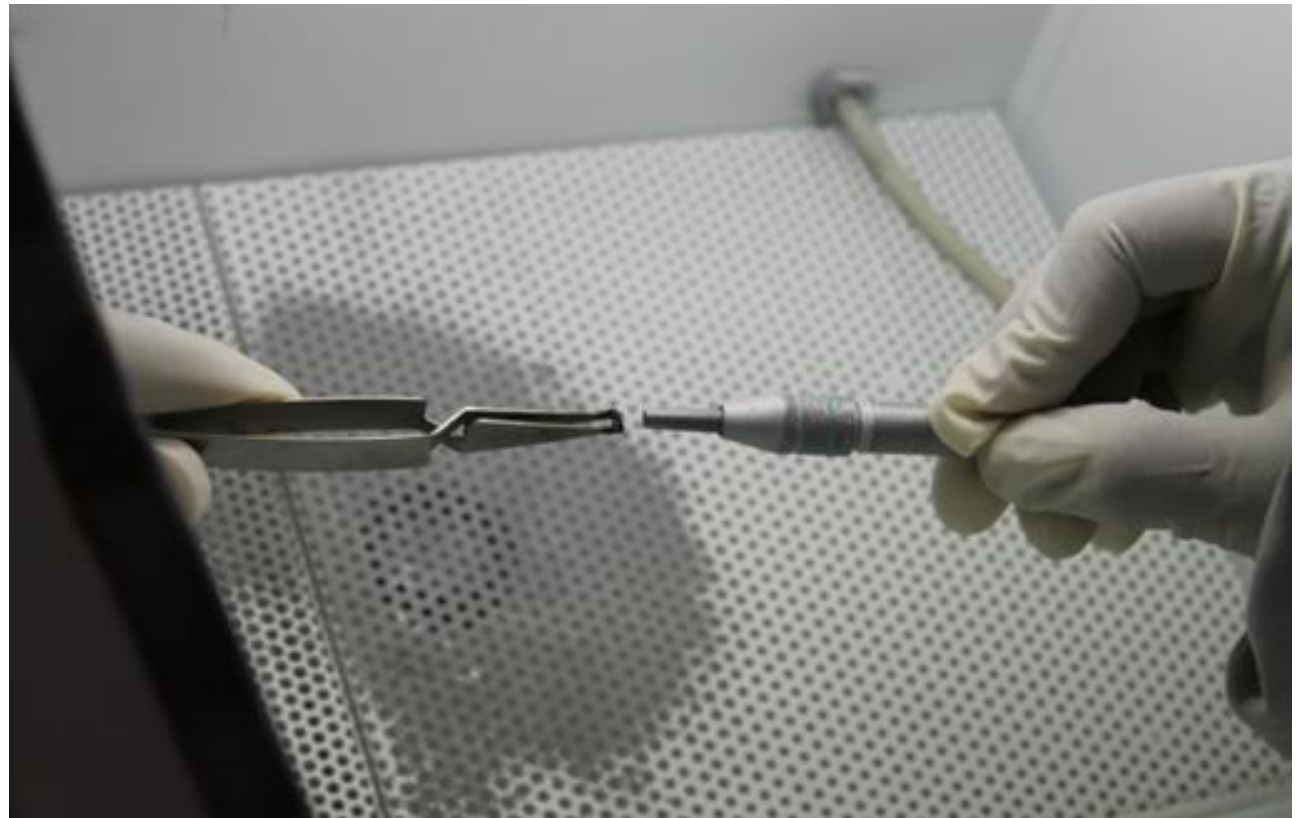
6. Creating micromechanical retention for bonded retainers.



Air Abrasion In Orthodontics

Applications of Air Abrasion in Orthodontics:

7. Sandblasting of new attachment base to increase mechanical retention.



Air Abrasion In Orthodontics

Applications of Air Abrasion in Orthodontics:

8. Sandblasting of orthodontic bands.

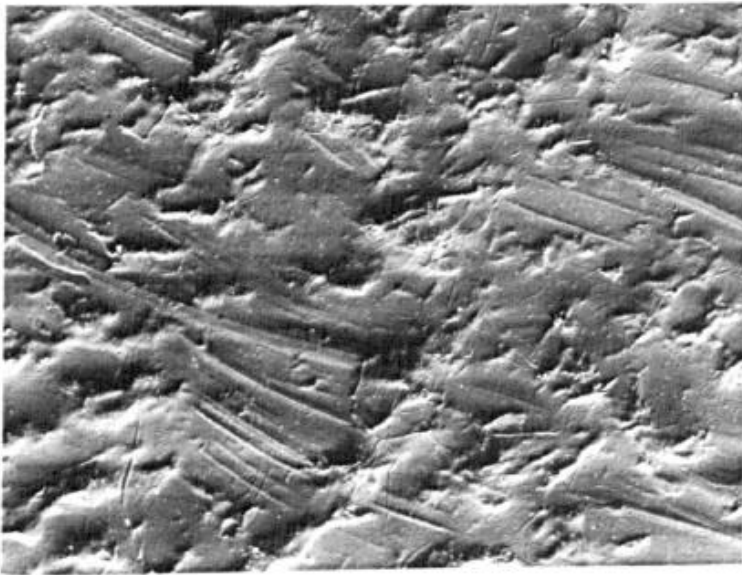


FIG. 1 S.E.M. detail of the fitting surface of an untreated band.

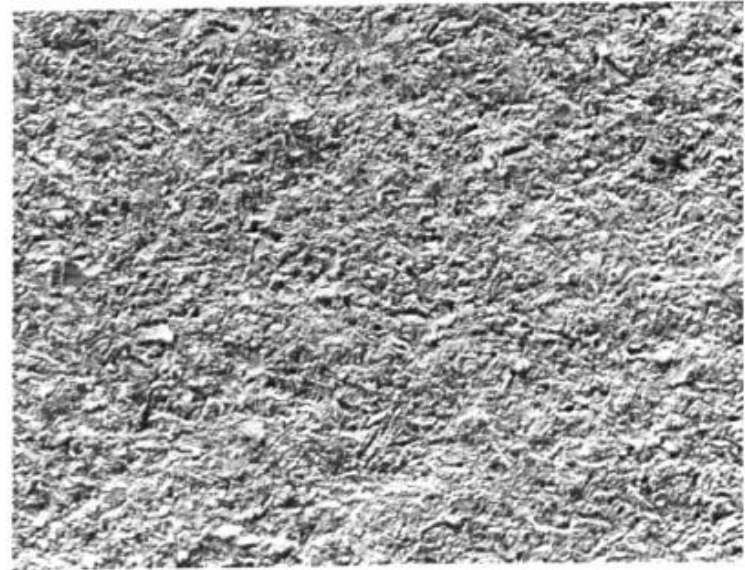


FIG. 2 S.E.M. detail of the fitting surface of a band sandblasted for 6–8 seconds at a distance of 10 mm.

9. Sandblasting selected area of retainer wires.

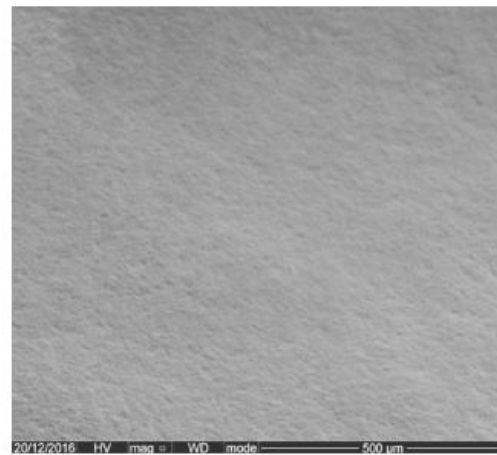
10. Sandblasting of orthodontic miniscrews (increased removal torque significantly).

Air Abrasion In Orthodontics

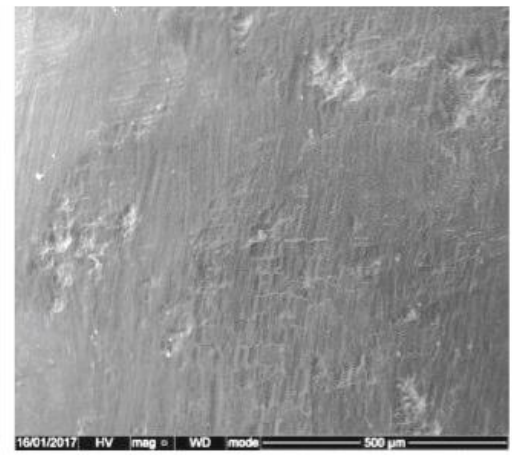
Applications of Air Abrasion in Orthodontics:

11. Orthodontic adhesive remnant removal .

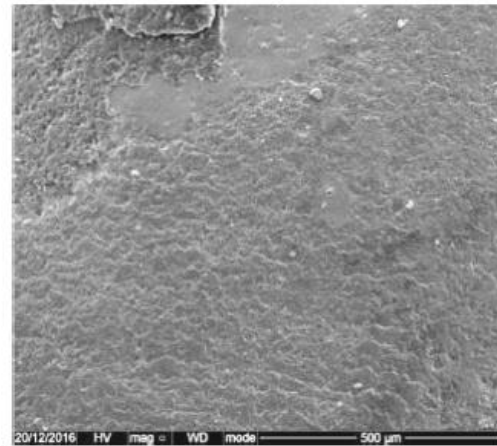
Representative SEM images ($\times 250$ magnification) of the enamel surface. (a) Before bracket bonding. (b) After clean-up using the TC bur. (c) After clean-up using 45S5(Sylc™)-air-abrasion. (d) After clean-up using QMAT3-air-abrasion



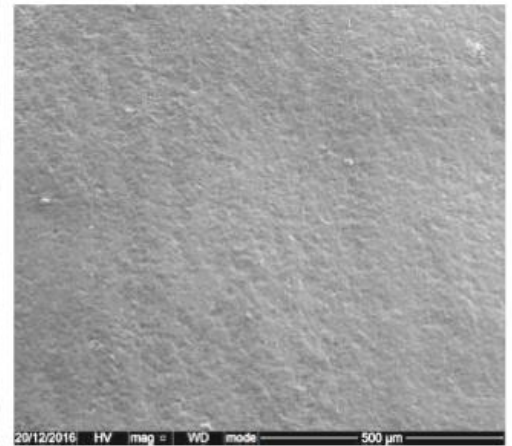
a)



b)



c)

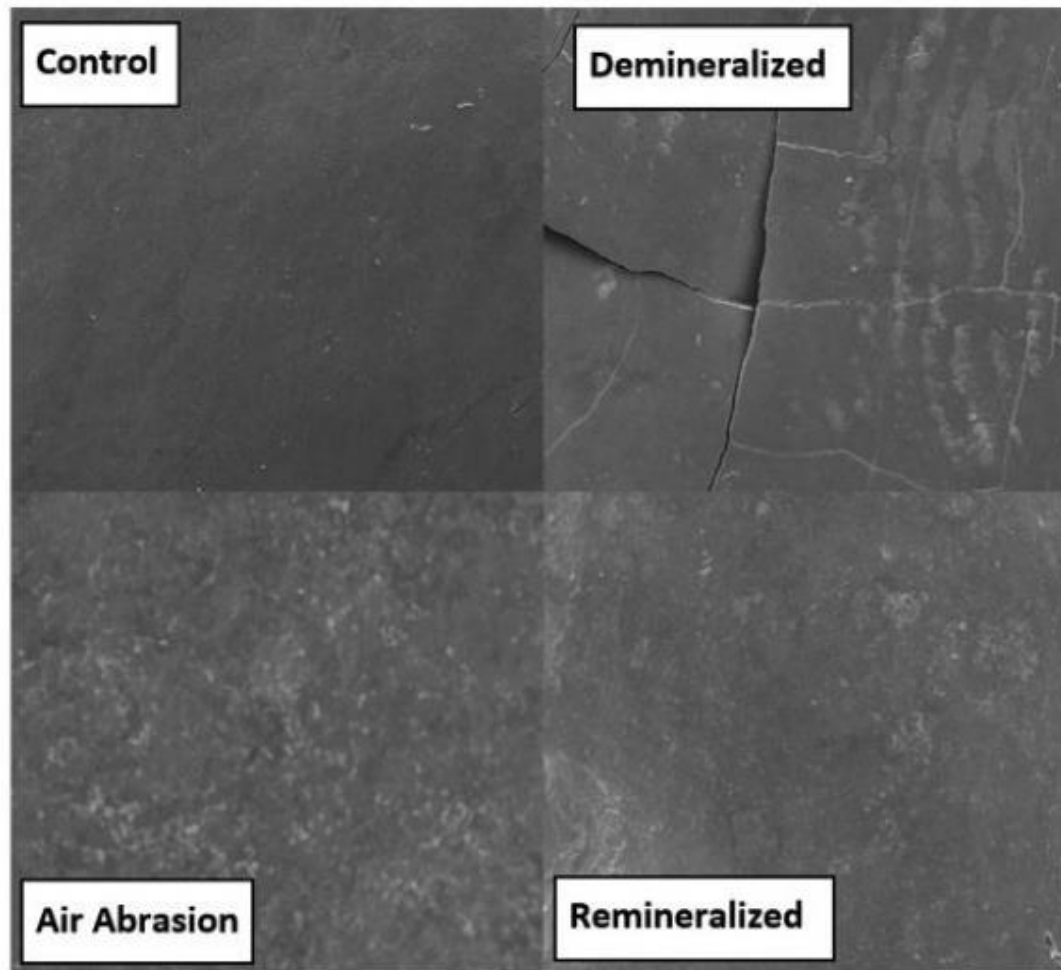


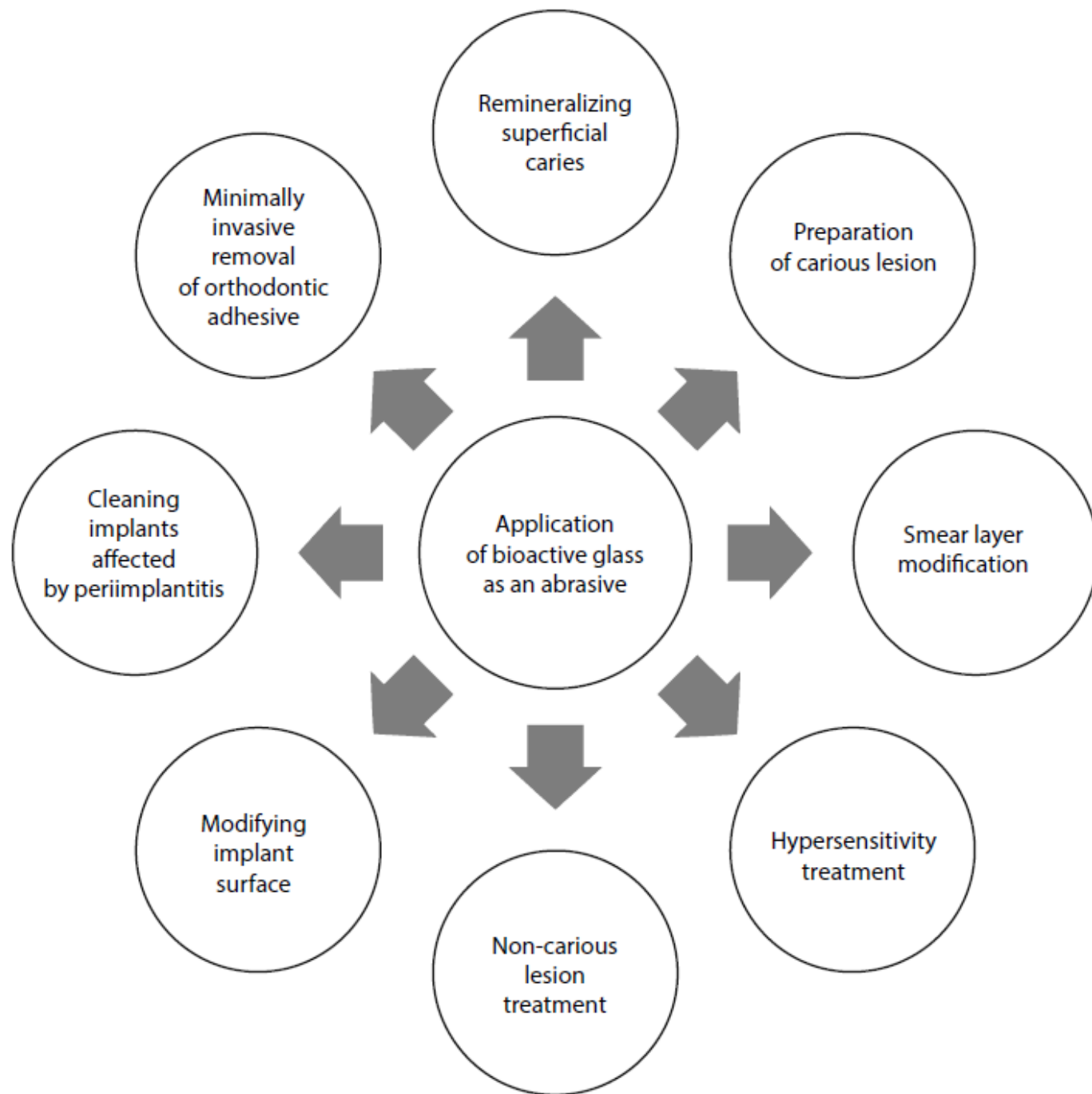
d)

Air Abrasion In Orthodontics

Applications of Air Abrasion in Orthodontics:

12. Remineralizing of white spot lesion by air abrasion (BAGs).





Air Abrasion In Orthodontics

Keep in mind:

1. Soft tissue:

not more than 5-10 seconds

not continuous

2. Hard tissue:

safe on enamel even more safer than rubber-cup polishing while special attentions for its use on the cementum and dentin because it can lead to significant damage.

3. Attachments:

- Remove plaque

- significant increase in friction due to the removal of the polished (glazed) surface area, leaving it rougher. Preferable to leave the arch wire in place during polishing or closure the gate of self-ligated brackets after the arch wire removal with abundant washing with water.

Thank You