

AIRPOLISHING

IN ORAL IMPLANTOLOGY

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Airpolishing in Oral Implantology

Airpolishing was developed in the early 1970's as a technique for fast and efficient removal of extrinsic stains, plaque and other soft deposits from the teeth [figs. 1-2]. It comprises a stream of pressurized air carrying specially graded particles of a mild soluble abrasive - usually sodium bicarbonate, mixed with a stream of water. This combination is directed at the tooth surface to be cleaned. The application of air polishing to implantology can be divided into two areas: **(A)** Routine maintenance of implants.

(B) Surface preparation in treating peri-implantitis..

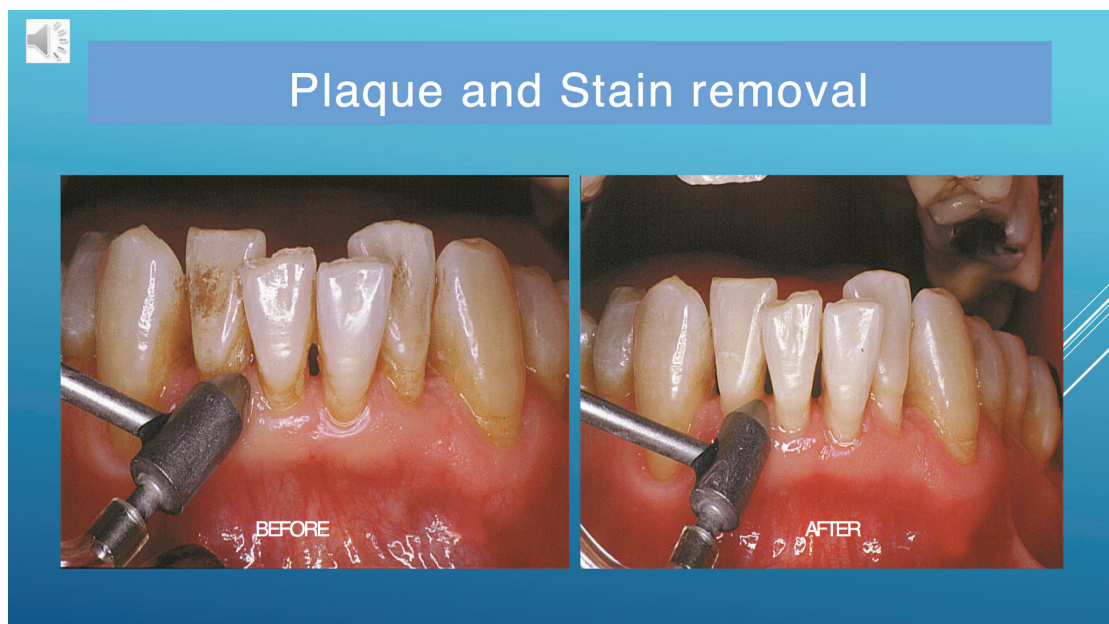


FIG 1- Extrinsic stain.

FIG 2 - Stain removal with Jetpolisher 2000™

Oral pathogenic bacteria involved in the progression of periodontitis around natural teeth have been implicated in periimplant infections.(1) Therefore, in line with the recommended procedure for the prevention of periodontitis, patients with implant restored prostheses must be scheduled regularly for routine prophylaxis and examinations in addition to maintaining their high level of home care. (2)

Implant Surface

Dental root form implants are manufactured from a high-grade titanium alloy, the surface of which consists of a micro layer of titanium oxide. The implant surface can also be treated by plasma spraying, acid etching, sandblasting or coated with HA. The removal of plaque and calculus deposits from these implant surfaces with instruments designed originally for cleaning natural tooth surfaces can result in major alterations to the delicate titanium oxide layer. Altering the surface topography by roughening the surface may enhance calculus and bacterial plaque accumulation.

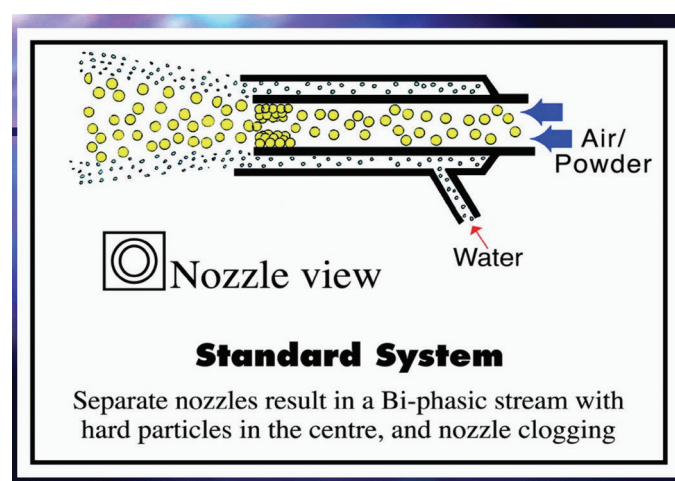
Resulting scratches, cuts or gouges may also reduce the corrosion resistancy of titanium, and corrosion and mechanical debris can accumulate in the surrounding tissue. The aim of procedures for debriding dental implants should be to remove microbial and other soft deposits, without altering the implant surface, and thereby adversely affect biocompatibility. Increased surface roughness can lead to an increase in bacterial accumulation and resultant soft tissue inflammation. Because of the critical nature of the implant/soft tissue relationship, metal ultrasonic scaler tips, hand scalers or curettes should not be used as they have been shown to significantly alter the titanium surface (3,4)

Instrumentation

Current methods for professional cleaning of implant or titanium transmucosal elements include the sets of plastic ultrasonic tips or hand instruments followed by the prophy cup polishing method or various types of floss and buffing strips. The design of the permanently cemented super-structure often does not allow adequate access for the prophy cup, especially in interproximal areas and plastic instruments are not very efficient for the removal of plaque or mineralized deposits. In addition, the prophy cup and paste method may leave residual paste at the implant/soft tissue interface area.

Airpolishing consists of directing, water, air and sodium bicarbonate towards the tooth or implant surface, resulting in efficient removal of bacterial plaque and soft mineralized deposits. The residual powder is biocompatible and being soluble, is not retained at the implant/ soft tissue interface.

Two airpolishing systems are currently available. One system, typically available on the Dentsply Prophjet™ and Cavijet,™ the EMS Airflow, and the Satelec units, delivers the air and powder, typically at 60-80 psi pressure through one nozzle and the water through a separate concentric nozzle. Some mixing of the streams takes place at the interface of the streams, but the centre of the stream consists essentially of dry powder. This “Biphasic” stream is directed at the tooth or implant surface [fig.3].



Several studies have investigated this system, and its effects on implant surfaces, and conclude that this system can result in significant changes to the implant surface.(3,4)

In contrast, a more recently developed system, Deldent's patented H.S.T.® polishing system, pre-mixes the water stream with the air and powder stream in a patented design spray head just prior to emission from the single nozzle [fig.4] to produce a single homogenous stream.

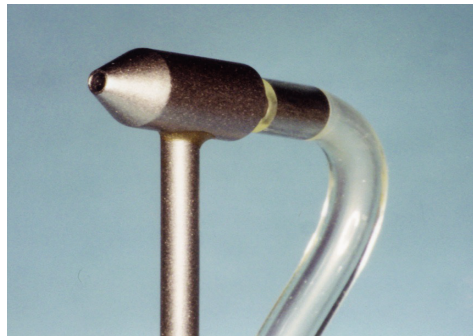


FIG 4 - Single aperture nozzle
(H.S.T.®.polishing system)

This unique homogenous stream [fig.5] results in softening of the surface of the powder particles. This feature, together with the low (35psi) pressure function of the unit, has been studied both in Europe and the USA, and has been shown to cause no damage to titanium implant surfaces or the transmucosal elements, yet results in efficient plaque and stain removal. (5,6).

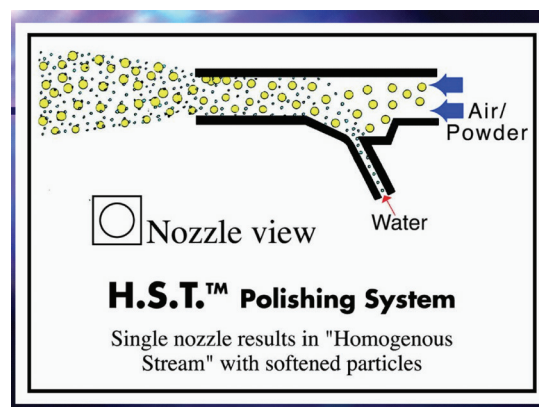


FIG 5

An analogy can be made between bombarding a surface with 'golf balls' as in the first system described, or with 'tennis balls' with a somewhat softer surface as described in the H.S.T polishing system [Fig 6.]



FIG. 6

The Jetpolisher 2000™ [fig.7] manufactured by Deldent Ltd. incorporates this gentle polishing stream that is capable of easily reaching areas, such as interproximally, and under pontics, which are normally difficult to access by other methods. Airpolishing has been shown to significantly reduce the time for thorough plaque and stain removal from natural teeth (7).

The Jetpolisher 2000™ connects directly to the dental high speed tubing like a dental hand piece and can be easily moved from one treatment area to another. It is small enough to fit in the palm of your hand. No electrical connections are necessary.



FIG 7. Jetpolisher 2000™

Treatment of Ailing Implants

If inflammation becomes established in the peri-implant tissues, pocketing and bone loss can develop, which if left untreated will result in the loss of the implant. Clinicians worldwide are advocating surgical regenerative procedures to restore or repair lost periimplant tissues.(8).

These techniques attempt to achieve the repair or regeneration of lost peri-implant tissues, and rely on making the implant surface biocompatible with the healing tissues. This implies a detoxification of the previously infected implant surface. [Fig 8a & Fig. 8b.]

Airpolishing has been shown to enhance cell adhesion to root surfaces in vitro indicating that factors inhibitory to fibroblast growth had been eliminated as compared to the control.(9) Certain protocols have been suggested and these have been summarized in [fig 12].

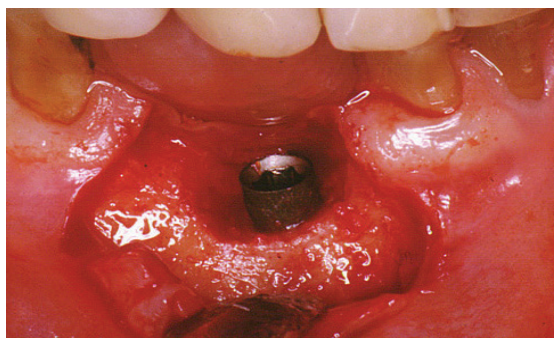


FIG.8a Periimplantitis. Surgical exposure of the implant surface howing peri-implant bone loss.

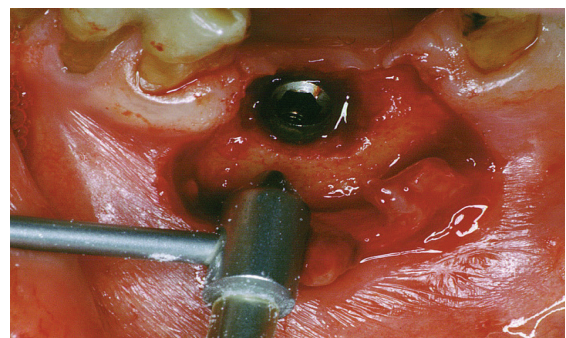


FIG.8b. Surface treatment with the H.S.T.® airpolishing system.

Implant Surface

Airpolishing with the H.S.T polishing system is an efficient and gentle means of debriding the implant surface [fig. 9] to aid the removal of bacteria and bacterial toxins. The unique H.S.T. polishing system has been shown to result in no damage to the surface of titanium implants or transmucosal elements. (3,4) [figs. 9, 10a & 10b]. An initial report has indicated that the HA coating

can be removed with the H.S.T. polishing system.(4) Removal of HA is sometimes indicated when the HA coating has been seriously compromised by the inflammatory process. Airpolishing with the H.S.T® polishing system may be a preferable and more controlled method for removing the HA coating than by grinding with rotary instruments or ultrasonic scaling, which would seriously modify the underlying titanium surface.

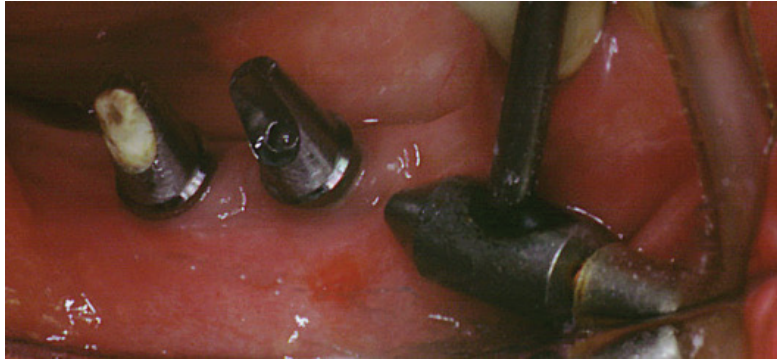


FIG.9 - Polishing the implant-supported abutments of a removable prosthesis.

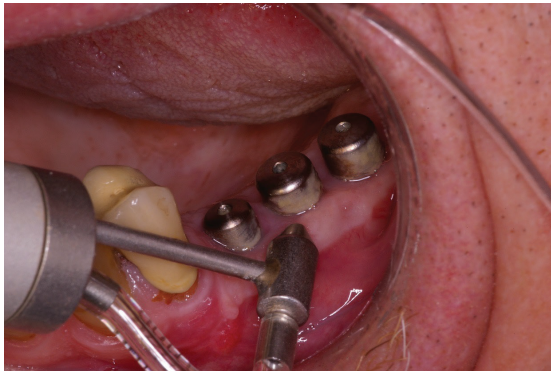


FIG.10a. Polishing implant abutments - Before

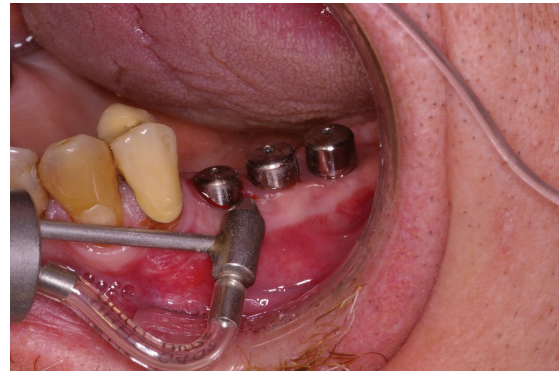


FIG.10b Polishing implant abutments - After

Soft Tissue

No discussion on the use of airpolishing around implants would be complete without consideration of the possible affect on the peri-implant soft tissues. Studies on the effects of airpolishing on the gingiva when used around natural teeth conclude that gingival abrasion and bleeding are the most common effects but that these are temporary, heal rapidly within 2-6 days and are of no clinical significance. (10,11) Extraction sites heal without complications following airpolishing. (12). [fig.11]



FIG.11 - Airpolishing around implant-supported restoration.

A case of subcutaneous facial emphysema has been reported with the use of a high pressure (60-100p.s.i.) airpolishing device during routine maintenance in a case of advanced periodontal bone loss (13). Care should be exercised to avoid directing the spray into the closed sulcus area, where deep pocketing exists. The evidence is sparse regarding the effects specifically on peri-implant soft tissues and further investigation is warranted.

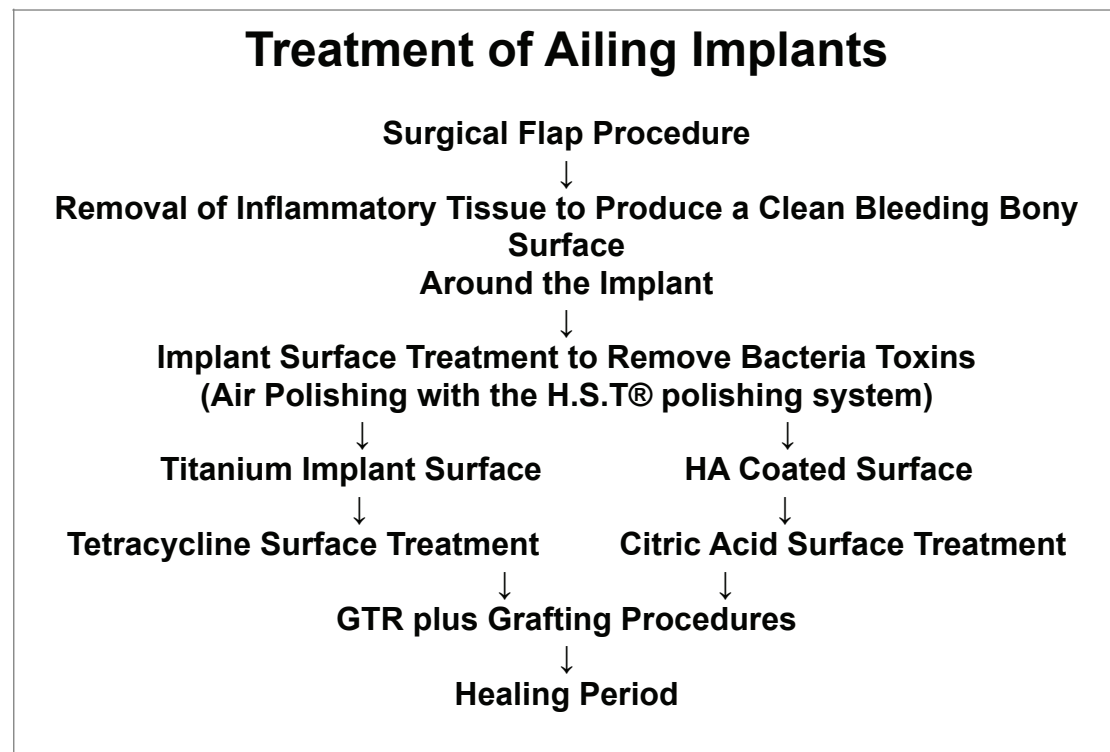


FIG 12. Treatment guidelines for peri-implantitis with loss of implant support

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