

Air abrasion: the overall impact

by Angel Sanchez-Figueras Jr, DDS

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Motivated by what he saw as a huge amount of misinformation and lack of knowledge about this treatment modality, the author dispels modern myths concerning about air abrasion procedures

Over the past decade, air abrasion has slowly made its way into the armaments of an increasingly large number of dentists. It is not without reason. Clinically, air abrasion offers numerous benefits in varied aspects of patient care. Multiple articles in the literature report on air abrasion's kindness to pulpal tissues and on its reduction of enamel without the inherent micro fracturing of the conventional rotary high-speed instrument. Its abrasive stream generates a cavity outline with rounded internal and external line angles; these reduce the possibility of creating stress risers within the cavity structure, as well as generating a cavosurface margin that is easy to restore to, particularly with the use of modern flowable composites. There is more.

The most attractive quality is its ability to prepare cavity outlines with a much-reduced need for anaesthesia. In the majority of cases, incipient to moderate carious lesions can be treated with a near zero need to anaesthetise the patient. The benefits - lowering patient stress, anxiety and fear - are obvious. It is pivotal to understand that all of these attributes, combined with judicious and professional in-office patient education, work synergistically to greatly enhance patient referral and the practice's public image. This enhancement to the overall practice image, together with increased production, makes for a win-win situation for both the dental practice and its patients.

AIR ABRASION MYTHS: NOT TRULY PAINLESS

Before I go on to explain the actual mechanism for practice implementation and the associated benefits, let me first clear the air of some of the prevalent myths and concerns I have encountered in my extended talks with colleagues. One of the myths has to do with the need for anaesthesia and patient sensitivity. Many dentists have expressed to me that the claims for air abrasion's lack of pain during treatment are not well grounded in reality; that these are nothing more than marketing gimmicks. To this I must reply in both affirmation, with an explanation, and in rebuttal.

Most dentists who have run into the 'sensitivity wall' don't realise there are two dominating parameters which govern the existence of this pain/no pain phenomenon. One pivotal parameter is the equipment's ability to reduce dentine at low air pressures; in other words, the equipment's capacity to reduce dentinal structure at pressures as low as 30-40psi. If your equipment lacks the capacity to do this, you will run into many sensitivity issues that cannot be resolved. In order to remove dentine deep in the tooth without sensitivity, your equipment must be able to reduce tooth structure at low air pressures. There is a direct relationship between the incidence of sensitivity and the air pressure used.

Secondly, the ability to change to smaller sized nozzles contributes greatly to the end goal of treating without anaesthesia. Many times, this simple step of decreasing nozzle diameter will allow the dentist to finish a procedure 4mm to 5mm into dentine. These two variables combined are critical in order for air abrasion to perform almost 100% anaesthetic-free operative dentistry procedures.

Figure 1 to 3: Maxillary molar occlusal restoration carried out with air abrasion and no anaesthesia. Note the conservative natures of the preparation evidenced by a very narrow width. Air abrasion excels in the conservation of sound tooth structure.

MYTH 2: WHAT A MESS

Another myth that continues to rear its head in defiance is the issue of powder mess in the surgery. Dentists routinely express to me their concern for what they have heard is a messy byproduct of the air abrasion procedure. In fact, many air abrasion users themselves complain of the same thing. Granted, it was once the case that a powder mess in the operatory was an accepted evil if you used air abrasion. The truth is that a properly designed air abrasion device dentists throughout the world, accurately meters only the absolute minimum quantity of powder necessary: the end result is minimal powder consumption and no powder mess. Powder volume use figures that range from 0.5gm/minute minimum to 6gm/minute at the maximum setting are what the modern dental air abrasion equipment should demonstrate.

The average dental procedure using this type of machine would generate an average total powder consumption figure of between 1gm to 2.5gm per procedure. When you consider that the majority (approximately 85-90%) of the powder is being eliminated via the high velocity chair-side suction, the quantity of remaining powder is almost insignificant. The accurate and efficient metering of abrasive is one of the parameters that test the true mettle of the modern air abrasion device. Efficient and consistent powder metering will be a key issue in the comparison of different air abrasion equipment in years to come. I feel it is a must that a machine be designed to utilise the minimum amount of powder necessary, while being capable of reducing tooth structure efficiently and consistently.

Figures 4 & 5: A very typical occlusal restoration carried out with air abrasion and no anaesthetic. Although placement of the rubber dam is highly recommended, small restorations particularly in the maxillary arch can be accomplished quickly without it.

MYTH 3: IT IS TOO DIFFICULT

The last of the myths I wish to uncover is that of the learning curve. When the modality made its resurgence in the late 1980s, most dentists were basically set loose on the world with minimal advice or training. Air abrasion's growing popularity is forcing manufacturers into the training arena. Properly written training manuals and clinical guides greatly enhance the shortening of your learning curve as a clinician. You will find that once the preliminary basics are mastered, the actual clinical application in restorative dentistry is very straightforward and easy to control. Air abrasion's cutting rate is about half that of the high-speed handpiece. Because of this, air abrasion's cutting rate is even more controllable than that of the high-speed rotary instrument. With air abrasion a momentary deviation away from the intended path will reduce very little tooth structure: try that with the high-speed turbine. Yes, there are dynamics unique to this modality. However, applied practice on extracted teeth or a couple of hours will hone your technique so that you feel comfortable with the modality when you treat your first patients. There really is nothing difficult about it.

INCORPORATION OF AIR ABRASION INTO PRACTICE: THE DOS

DOs : 1

Practice implementation of air abrasion should be prefaced by the establishment of a clear and simple practice goal/mission, centring on the role of air abrasion in the diagnosis and treatment of dental decay. A comprehensive in-office management session should be devoted to explaining to the treatment team the how and why of the modality. Once the treatment team is clear in its understanding of the use of air abrasion, an honest assessment of how to best present the technology to patients should be generated. The approach to patient education must be multi-pronged. It is critically important that the patient understands why you have adopted this new technology and the value to them in terms of treatment.

DOs : 2

Begin by explaining to the parent that in the interest of best serving them, your practice has incorporated into its clinical weaponry this latest in clinical technological innovation. In the past the dental profession had not had at its disposal the means to diagnose and treat decay as conservatively and as atraumatically as it now does. This new technology allows diagnosis and treatment of decay without the need to anaesthetise the patient in the vast majority of cases. Furthermore, this procedure is more kind to the pulp than the conventional drill. It makes for more conservative (and therefore stronger) preparations /restorations and more treatment can be accomplished per unit time. You will find this of tremendous interest to today's patients with their hectic lifestyle. The advantages to the office when the dentist maximises patient treatment per office visit in terms of cash flow are self-explanatory.

DIAGNOSTIC SEQUENCING

DOs : 3

It is of vital importance that air abrasion's diagnostic ability be demonstrated to the patient. An intraoral camera (IOC) facilitates the patient's understanding of how hidden or 'occult' decay is disclosed and uncovered by way of the air abrasive procedure. Use of the IOC helps communicate to the patient details of the entire procedure; intraoral cameras in short enhance the dentist's credibility. There is no denying the severity of decay when it is shown to you on a 19-inch monitor. Although not indispensable, the combined use of an intraoral camera and air abrasion ease case acceptance as well as imprint upon the patient the cutting edge image of the practice. Both of these tools work synergistically to achieve a higher level of patient care as well as an increased percentage of case acceptance. In fact, every once in a while, send them home with a print of their treatment, before and after; it will make a difference.

DOs : 4

The usual sequence of diagnostic events centres on the abrasive disclosing of teeth that are slated to be sealed or of teeth that you suspect from their anatomy, the patient's caries experience and related oral hygiene, and that are likely candidates for occlusal decay. Removal of the organic plug from the pit or fissure, followed by caries dye staining and then by intraoral camera exam is the standard and best known sequence of diagnostic protocol.

DOs : 5

Patient education regarding the use of air abrasion (before they are treated) is best done by combining audiovisual aids (patient education tapes, pamphlets, handouts, posters) with an informed staff, willing and able to answer any questions the patient might have. As we all know an informed patient is more willing to accept treatment once the dentist enters the room. This efficient use of the dentist's time, utilising them where they can be the most productive, that is, treating patients, is the end result of the patient education paradigm. Properly implemented, dentist time management will yield a surprisingly large amount of dentist production from air abrasion alone. One must realise that the treatment team is dealing with immediate treatment of the patient: there is no need to reschedule the patient or to wait for anaesthesia to be achieved. A good baseline figure that I have come to accept regarding the average number of extra restorations strictly attributable to air abrasion, hovers in the region of three to four days. I ask that you apply whatever fees you use in your area: this will give you a good estimate of what financial return you can expect from the implementation of air abrasion in your practice.

DOs : 6

We all know that there will be times when a conflict arises between the performed procedure, the available radiographic evidence of the carious lesion and the inevitable third party payment coordinator on the other end of the phone. It helps to have ready available documentation in the form of intraoral images (preferably with the caries disclosing dye in place) and/or a standard pre-printed practice/surgery form which informs both the patient and the insurance claim representative the nature of the modality, its role in diagnosis and the extent of the decay that was removed that day. Explain the procedure, quote from studies and show photographs: a benefits coordinator can't argue from a point of authority when confronted with this evidence in your hands. I stress that preemptively approaching third party payment bureaucracies with overwhelming documentation will reduce your staff's overall level of stress. You will also find that once patients understand the value of this new modality, their desire to begin treatment is heightened.

DOs : 7

Standardised in a practice should be the fee structuring for these air abrasion procedures. A good, time-tested philosophy for air abrasion treatment and fee structuring is what I call the 'wall-limited' philosophy. As the occlusal fissure is explored (organic plug removed) and decay pointed out to the patient, a continued and vigilant assessment is made of the depth of decay. My personal opinion based on my own clinical experience as well as that of many air abrasion clinicians, is that any enamel (minimal!) removed by air abrasive disclosure be restored with a flowable composite instead of a sealant. A properly adjusted and functioning air abrasive machine should be capable of removing the organic plug at low pressures and high powder flow volume, selectively over enamel. My personal reasons for selecting a flowable composite over a conventional sealant stems from the increased compressive strength and wear characteristics of these new flowable composites. The overall determinant as to how a fee is assessed is quite basically the depth of the preparation. If the defect/preparation extends short of the DEJ (the 'wall'), I would recommend the placement of a high-fill flowable composite and charging a sealant fee. I cannot justify charging more for this procedure. I feel much better about placing this flowable composite as a sealant and my confidence level is much higher knowing that the underlying fissure is clean.

Not surprisingly, many times the extent of decay will go to the DEJ and beyond (subject for another article...), yet the decay is not radiographically evident, nor does the patient show signs or symptoms of active dental caries. In these instances, it stands to reason that the resulting restoration would be charged as a proper treatment restoration. As previously alluded to, an intraoral camera is invaluable in documenting the extent of decay.

There are numerous studies that demonstrate the increasing difficulty in diagnosing occlusal pit and fissure carious lesion. Some point to fluoridated water supplies as a possible contributing factor in the increased difficulty in diagnosing this type of decay. Another significant article, by Dr Fusayama, suggests that decay migrates along the DEJ to other areas of the tooth. This makes the diagnosis of today's occlusal pit and fissure decay difficult and brings in air abrasion as one solution to the dilemma.

DOs: 8

Remember to inform the patient of the diagnostic nature of the technology. They must be reassured that the technology allows the treatment team to disclose, uncover and treat decay that previously we could not detect. It allows us to intercept the disease process much earlier along its course. Years ago, we would have placed this area in a 'watch in the future' category. This new technology really permits us to see, clinically, where we could not see before. By intercepting and treating earlier; the 'hole' we make in the tooth and the subsequent restoration is much smaller. In short, this technique makes dentistry much more conservative. The patient must be made aware of the treatment team's ultimate goal of making any restoration, if not unavoidable, as small as possible. By doing this, we increase the life of the tooth by conserving original tooth structure as much as possible. The end result is a much lower likelihood of that tooth ending up with a crown or root canal. That is conservative dentistry in my book; state that to your patients.

ADDITIONAL ADVANTAGES

Lastly, briefly I wish to cover some additional advantages that air abrasion brings to the dental office, many of which are not readily apparent. I will leave their in-depth coverage for a future article but their importance merits some exposure at this time. The dental use of air abrasion is not strictly limited to the treatment of incipient to moderate carious lesions in occlusal pits and fissure. Air abrasion is capable of carrying out class I through class VI cavity preparations, as well as selectively removing composite over tooth structure. It is truly a very flexible clinical modality.

This flexibility allows us to treat multiple quadrants in one visit, even when that dental appointment includes other disciplines of dentistry. A common example is as follows: the patient is treatment planned for one crown in the lower left quadrant and three operative restorations, one per remaining quadrant. Assuming the patient is informed of the capacity to carry out all of the treatment in one visit, and the patient agrees to treatment, the following is what can be routinely done. The patient is anaesthetised for the crown procedure in the upper left quadrant. Immediately after the injection, the treatment of the other three carious lesions can commence without anaesthetising the patient. While these procedures are being performed, anaesthesia is being obtained in the upper left quadrant. Upon completion of the operative restorations, the crown preparation can commence. Benefits? Maximised production of dental treatment. The patient only required one quadrant of anaesthesia. Even bite registration will most likely be more accurate due to the limitation of anaesthesia to one quadrant. The patient is happy and you have achieved your goal of reduced chair time for the patient and maximum production per unit time.

Another example of air abrasion's practicality and flexibility is its use in the preparation of class V and anterior incisal restorations in middle age and older individuals. I have placed many class V and anterior incisal restorations after carrying out the preparation of the cavity outline with air abrasion. I have found that it lends itself to a very aesthetically pleasing incisal transition between the restoration and the remaining tooth structure. Furthermore, the procedure is performed without anaesthesia, thereby saving tremendous amounts of time.

Incisal restorations in this same age group can be performed without anaesthesia; the time savings, as well as the reduced exposure to local anaesthetic and vasoconstricting agents, are in my book, two huge peripheral pluses for the modality. I have been extremely surprised to find the carious process extending along the DEJ in older patients, well into the lingual surface of maxillary and mandibular anteriors. Early intervention of this process, followed by restoration with composite, saves these teeth from the eventual delamination of the lingual enamel and the ensuing restorative dilemma.

These are just a few of the beneficial aspects of air abrasion. I hope that these practice benefits and implementation details have made their mark on you. Please feel free to utilise whatever wording I have used in this publication to better inform your patients and staff regarding air abrasion technology. I hope you can experience the exhilaration of routinely treating patients without the need to anaesthetise; you, your practice and your patients will be better off because of it.

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