Air abrasion: the key to painless dentistry?

TERESA DAY BRIEFLY SUMMARISES THE HISTORY OF AIR ABRASION IN DENTISTRY, BEFORE DISCUSSING AND ILLUSTRATING, VIA CASE STUDIES, SOME OF THE WAYS IN WHICH THE TECHNIQUE HAS BENEFITED HER PRACTICE

Air abrasion is currently a hot subject in dentistry, however it is hardly new! Dr Robert Black, in the 1940s, first described a device which delivered an abrasive material under high pressure, and which would cut through enamel and dentine. It was marketed as the Airdent by SS White. Once the Borden high-speed handpiece was available, the Airdent fell out of favour. Other factors, clearly, were the lack of suitable restorative materials.

While dentists got on with using the new drill, other uses were found for air abrasion. Semiconductor manufacturers use it to make microchips, medical companies use it to sharpen hypodermic needles, the aerospace industry uses it to repair electronic circuit boards on planes, spaceships and satellites, and museums use it for restoring priceless artefacts and preparing prehistoric fossils!



Teresa Day BDS LDS RCS, is in private practice in Binfield, Berkshire and Milton Keynes, Buckinghamshire

In the 1970s, Dr Tim Rainey, director of the Texas Institute of Advanced Dental Studies, started working with Dr Black, and in 1985 revived the concept as we know it today. Dr Rainey teaches courses on air abrasive microdentistry, and makes the following comment: 'It is a philosophy, not merely a mechanical system, technology or even a technique.

'While the cutting speed of microabrasion is comparable to that of rotary instrumentation, the atraumatic access to caries that can be provided has obvious advantages over traditional rotary instruments – advantages which are compounded many times over when the need for local anaesthesia is eliminated. It will become the standard of care.'

WHAT IS AIR ABRASION TODAY?

Air abrasion is the use of finely graded 27.5micron aluminium oxide powder, administered under compressed air through a very fine tip. It is an atraumatic alternative to the high speed drill and procedures can often be completed in less time, without the need for anaesthesia. The response of patients is very favourable – there is no pain, no vibration, no heat, no smell and no noise! We really do have the means now to get that other 50% of patients through the door!

HOW DO WE USE IT?

As with all new equipment and materials, there is a small learning curve. Unlike rotary instruments, it will only cut in the direction it is pointing, other than particles which ricochet off. Care must therefore be taken on adjacent teeth and when preparing in the depths of cavities. Rubber dam is not essential, and can be a problem if you do not want to use a local anaesthetic. If I am preparing an interstitial cavity, I like to use a ribbon of rubber dam to protect the adjacent tooth. The other difference is that you must hold the tip of the instrument about 2-4mm from the material being cut. This is to allow the particles to discharge their kinetic energy. If you hold it any closer, the particles bouncing back will impede the particles coming out of the handpiece, thus reducing cutting efficiency.

I use air abrasion for all virgin cavities, especially early fissure caries, minimal interproximal cavities and all cavities where I need to remove an old composite. I do not use it for amalgam removal. It cuts hard tissue faster than soft tissue and consequently it would take a long time to remove an amalgam, which is essentially a soft metal. It would also release a lot of free mercury. It is very good for removing old composites and old porcelain crowns.

The use of air abrasion allows for much smaller cavities to be restored, hence the term microdentistry, which has come to be used with it.

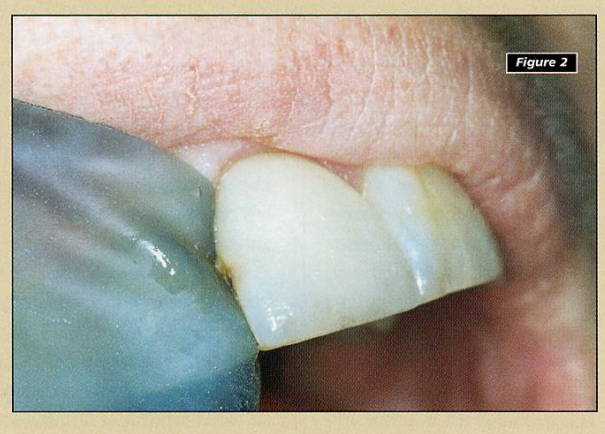
Air abrasion and microdentistry really come

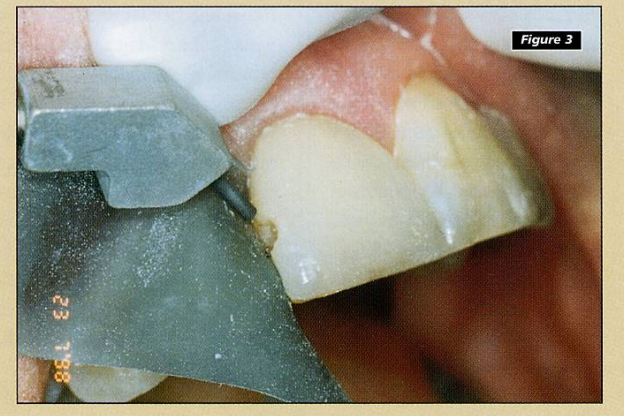
THIS ARTICLE IS REPRINTED FROM INDEPENDENT DENTISTRY MAY 1999 ISSUE

> ***It is a philosophy, not merely a mechanical system, technology or even a technique***

A CAVITY PREPARATION







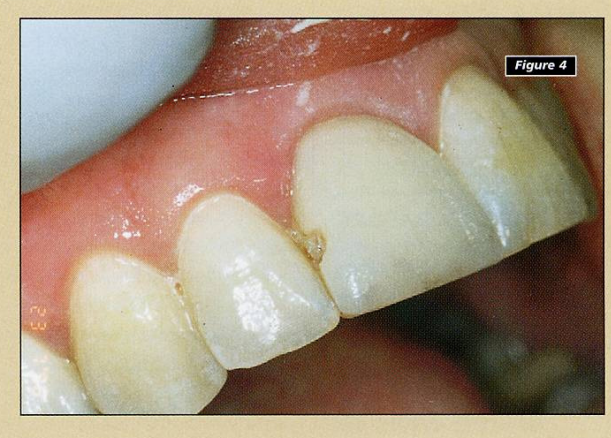




Figure 1: Distal cavity on the upper right central. Conventional treatment would result in a large restoration

Figure 2: The rubber dam ribbon is in place to protect the adjacent tooth from ricochet damage from the particles. Full rubber dam can be used, but patients sometimes need a local anaesthetic for the clamp. A 10mm wide strip of rubber dam is an excellent solution

Figure 3: The cavity preparation is under way. The dental nurse would be using high speed suction, but has just removed it in order for the photgraph to be taken. We also have an air filter to keep the surgery free from dust, but most of the powder is removed with the aspirator

Figure 4: The completed cavity preparation

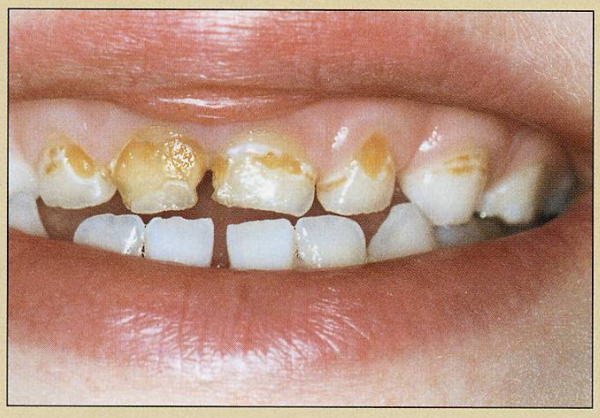
Figure 5: Restoration completed. The total chair time, including photographs, was 11 minutes

THIS ARTICLE IS REPRINTED FROM INDEPENDENT DENTISTRY MAY 1999 ISSUE

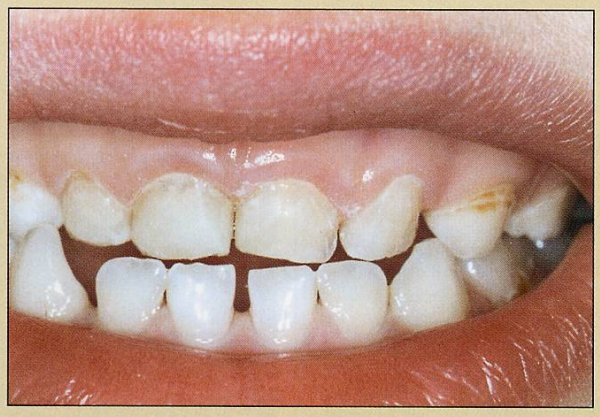
> ***The response of patients is very favourable - there is no pain, no vibration, no heat, no smell and no noise!***

CASE STUDY 1

I recently treated a four-year-old girl with baby bottle decay. The family travelled over 500 miles to see me, as no dentist locally would offer any treatment, except extractions! They obviously thought that she would be difficult to treat.

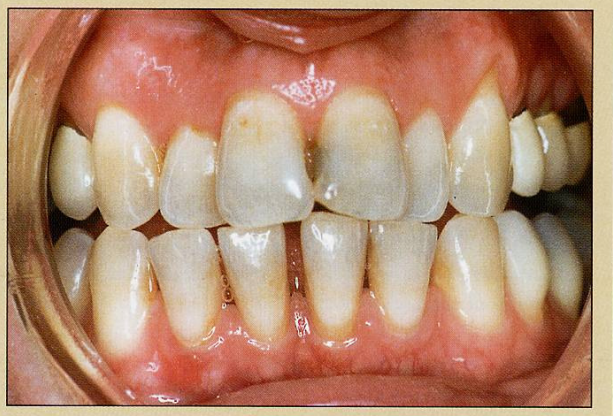


We used air abrasion to remove the hard decay and Carisolv to remove the soft decay. We then restored the teeth with Z100. We did not use any local anaesthetic or relaxants, yet Louise fell asleep during treatment



Louise and her mother were delighted with the result. The total chair time was 20 minutes, including photographs and wake up!

CASE STUDY 2



Another case treated with air abrasion, which involved the removal of leaking composites mesially on both upper central incisors and replacing them with new



The final result. Chair time was 15 minutes, with no local anaesthetic

together in the diagnosis and treatment of early pit and fissure caries. Before fluoride was routinely used in toothpastes and in water, occlusal decay was easy to detect. Now the enamel surface is much stronger, we are fooled into thinking the tooth is healthy when there may be significant decay in the dentine. These teeth may not even have a sticky fissure, or show on X-ray.

We have been programmed to 'watch' these teeth until there is a definitive cavity before providing treatment. There are two reasons for this. Firstly, using the tools available would cause removal of too much healthy tooth structure, and secondly, using the drill and an injection would cause fear in a young patient. With the techniques available now of air abrasion, caries indicator, Carisolv and flowable composites, we can literally just 'run out the fissure' and remove any decay underneath, without weakening the tooth.

Air abrasion gives us the edge when treating very young or nervous patients. In

THIS ARTICLE IS REPRINTED FROM INDEPENDENT DENTISTRY MAY 1999 ISSUE

HOW TO CHOOSE AN AIR ABRASION SYSTEM

There are a number of systems on the market, and a number of things to look out for.

• Manufacturer's warranty - The Crystal Mark by Abradent has a three year warranty. It is marketed by Brian Jackson at Dental Practice Systems.

• Particle size - units for use in the mouth should use 27.5micron, and this should be carefully graded. Larger particles will clog the tips and do not have as much abrasion potential. Larger particles also cause more pain

• Controlling powder flow - with some systems the powder flow is difficult to control and there is either not enough powder or you have a sandstorm

• There is no need for a compressor in the unit, just get your engineer to make a connection to your air line. Selling it with a compressor is just a device to make you spend more money. It is also noisier

• Ease of maintenance - the maintenance of the Crystal Mark machine is so simple my mother could do it!

• Spend time with a practitioner who is using it, to see just how it works and how to integrate it with other treatment modalities

The limitations of the instrument are determined by the skill of the operator. It is not a replacement for the dental handpiece, however, but merely an adjunct

addition, we are now finding that a number of needlephobic patients are beating a path to our door. Unfortunately, air abrasion does not do everything, but it is a very useful tool in our armamentarium. It allows us, in a lot of cases, to start treatment on nervous patients, leaving some of the more difficult work requiring a drill and local anaesthetic until we have gained their confidence.

We have integrated air abrasion into our practice and can often treat patients with large cavities without local anaesthetic. Initially we remove the old amalgam with the high-speed drill, taking care not to touch the tooth once the amalgam has been removed. We then switch to the air abrasion handpiece to complete the preparation. If there is any soft decay, we would then use the Carisolv to soften it and then remove it with hand instruments. We find that patients often find that placing and wedging the band into place is the most uncomfortable part of the procedure. I therefore use some surface anaesthetic applied around the gingival cuff, which I leave in place for at least a minute to reduce the sensation. For those patients with a true needle phobia, we find that this technique allows us to treat them with the minimum of discomfort and fear.

I truly believe that air abrasion will improve the way we practise dentistry, just as the introduction of the intraoral camera significantly improved our communication with patients. ID

REFERENCES

Farr C (May 1995) Re-engineering the dental practice. *Dentistry Today*

Feigenbaum N (April 1995) Adhesives and air abrasion. *Dentistry Today*

Goldstein R, Parkins F (1995) Using air abrasive technique to diagnose and restore pit and fissure caries. *Journal Am Dent Assoc* **1(26)**

McGehee WM (1956), *Textbook of operative dentistry* 4th edition.

Rosenberg S (September 1995) Air abrasive microdentistry, a new perspective on restorative dentistry. *Dental Economics*

Ross G (May 1996) Micro abrasion and microdentistry. *The Profitable Dentist*

Rosenberg S (May 1996) Microdentistry, the new standard of care. *The Profitable Dentist*

Further information about the Crystal Mark Air Abrasion Unit can be obtained by contacting Melanie Jackson at Dental Practice Systems:

6 Ayot House
Ayot St Lawrence,
Welwyn
Hertfordshire
AL6 9BP
Tel: 01438 820550
Fax: 01438 821425
E-mail:
dps@btinternet.com.

THIS ARTICLE IS REPRINTED FROM INDEPENDENT DENTISTRY MAY 1999 ISSUE