

## Editorial



**Dr. Roberto Q. M. Alcântara**

Director President of Angelus

Dear reader,

We have renewed energies to start 2007!

We will participate in the largest event in the country – CIOSP – in full force.

The exhibit, as in all its previous issues, will show innovations and trends to make the dentist's day-to-day easier!

It will also allow our products to be seen and taken to other countries.

Brazilian dentistry has always had a very good name and now the dental product industry is also in the spotlight.

Foreign sales of the Brazilian dental industry grow nearly 20% a year, according to ABIMO (Brazilian Association of the Medical-Dental Industry).

Such increase is directly related to the different certifications that the dental industry has pursued. The care of having the company certified by international organizations, such as ISO and the European Community mark – CE, allows our products to be accepted by the most demanding markets.

The CE Mark is placed on all products and tells the consumer that they comply with the requirements of the European Guidelines, which are extremely strict, and assures to the user that the product has an excellence-level production process and thorough quality control.

Today Angelus is the Brazilian dental industry company with the largest number of products rated class II (medium risk) certified by the CE Mark, obtained in 2004, and is one of the few companies that have this mark in all its products.

Just as we “export” our dentists to the world, our production is also getting competitive, thus allowing us to participate in the global market.

I conclude this by sharing with the dental community this feeling of pride with the result of our efforts to benefit Dentistry in Brazil and throughout the world.

A good 2007 to all, and see you in the next issue!



## Clinical Cases

Coronal reconstruction of endodontically treated teeth: a step ahead.

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Restoring fragile roots.

*Andréa Brito Conceição*

*Ewerton Nocchi Conceição*

## ARSP

Characterization of the surface of intra-radicular retainers of glass-fiber submitted to microetching and acid conditioning: A SEM analysis.

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## Participation in International Meetings

In the first number of this News Channel (July 2005), we mentioned the participation of Angelus at the IDS (International Dental Show – 2005) in Germany. This was possible because some of our recent achievements such as the acquisition of the CE Mark, the ISO 9001:2000 and the ISO 13485:2004.

With the support of our staff, dealers and clients, Angelus is also now exporting to 45 countries and, in 2006, we were present in several great dental events in Europe, USA and Latin America.



Salón Dental Chile 2006 | Santiago de Chile - Chile



London Dental Showcase 2006 | Londres – UK



2006 Meeting Academy of Dental Materials - ADM | Sao Paulo - Brazil



FAMDENT Show 2006 | Mumbai – India



41° Congreso Odontológico Nacional | Isla Margarita - Venezuela



Expo Dental | Medellín - Colombia

In 2006 we also had fundamental support from universities of 17 countries, which, through ARSP (Angelus Research Support Program), were involved in research with our line of products. This partnership resulted in more than 300 theses, monographs, articles (published in national and international journals), and poster presentations in dental meetings in Brazil and other countries.

The plan for 2007 is to keep participating in renowned events throughout the world. Check our schedule of events from January to March 2007:

## Schedule of Events - January to March - 2007

January							February							March						
S	T	Q	Q	S	S	D	S	T	Q	Q	S	S	D	S	T	Q	Q	S	S	D
1	2	3	4	5	6	7				1	2	3	4				1	2	3	4
8	9	10	11	12	13	14	5	6	7	8	9	10	11	5	6	7	8	9	10	11
15	16	17	18	19	20	21	12	13	14	15	16	17	18	12	13	14	15	16	17	18
22	23	24	25	26	27	28	19	20	21	22	23	24	25	19	20	21	22	23	24	25
29	30	31					26	27	28					26	27	28	29	30	31	

<b>JANUARY</b>	27 to 31 – 25 <sup>th</sup> International Dental Meeting CIOSP - APCD Venue: Anhembi Exhibition Center - São Paulo - Brazil
<b>FEBRUARY</b>	22 to 25 – 142 <sup>nd</sup> Midwinter Meeting Chicago Dental Society Venue: McCormick Place Lakeside Center - Chicago - USA
<b>MARCH</b>	08 to 10 – Meeting of the Academy of International Dentistry AIOI Venue: Ibarra - Ecuador
	20 to 24 – 32 <sup>nd</sup> International Dental Show - IDS Association of German Dental Manufacturers (VDI) Venue: Koelnmesse / Cologne - Alemania

## Coronal reconstruction in endodontically treated teeth: a step ahead.

**Lygia Madi**

Angelus Scientific Consultant

Prefabricated glass fiber posts are increasingly becoming the first option regarding the restoration of endodontically treated teeth.

The benefits presented with the use of this technique are countless and some are mentioned here: preservation of the tooth structure, posts' modulus of elasticity similar to that of dentin and the esthetic result.

Due to these factors and also to the higher circulation of information about this material, the prefabricated post technique is a well accepted treatment form and is no longer a novelty.

However, the treatment with prefabricated posts has limitations. To receive a direct fiber post, a tooth should have some remaining coronal structure and the build-up is fabricated with a composite resin as the material of choice.

With the launching of a new product in glass fiber for the coronal build-up, which is REFORCORE /Angelus, the limitations for this type of reconstruction decreased and now there is a broader indication for the use of prefabricated glass fiber posts.

The case presented below shows a clinical sequence of this innovative solution created by Angelus.



Fig. 1 – Pre-op view: porcelain fused to metal crowns that will be removed.



Fig. 2 – Right after removal of crowns, beginning of preparation of remaining tooth structure.



Fig. 3 – After initial preps, root canals are prepared for the insertion of prefabricated glass fiber posts (EXACTO – ANGELUS). This post system provides a specific drill that perfectly matches each size of post.

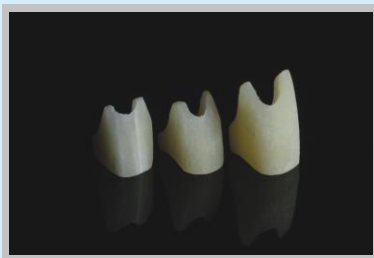


Fig. 4 – Selection of the most suitable size of REFORCORE. This product is presented in a kit with three sizes for anterior teeth and three sizes for premolars.

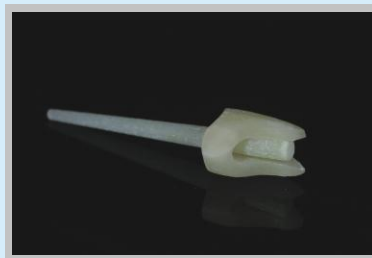


Fig. 5 – REFORCORE should be tested in the root canal together with the post for an adequate adjustment.



Fig. 6 – Adjustment of REFORCORE according to remaining tooth structure. Cutting is performed with high speed diamond burs and water cooling.



Fig. 7 – REFORCORE can be cemented together with post. NOTE: Post and REFORCORE should be cleaned with alcohol, silanated and treated with an adhesive system before cementation.



Fig. 8 – Tooth preparations after cementation.



Fig. 9 – After complete polymerization of the cement, finishing of coronal structure preparation is performed.



Fig. 10 – View of the finished preparations and REFORCORE.

### Conclusion

Glass fiber, a material that has been approved through its use in several dental techniques, is now represented by one more item. Reforcure adds another possibility regarding the coronal reconstruction of endodontically treated teeth. This product strongly contributes to metal free dentistry.



ARSP-Angelus' Research Support Program completed 2006 with a record in researchers served, since it was created. There were over 90 approved research projects, from all regions in Brazil and from other countries, such as Mexico, Italy, Canada, Argentina, England, Netherlands, France, Iran, India and Venezuela. Once again, Angelus has proved that Science is the main step of its mission.

The program serves Brazilian and foreign researchers, by providing them with material from the Angelus line, as well as providing technical support and references from its scientific library.

In order to participate in the Program, just visit our website: [www.angelus.ind.br](http://www.angelus.ind.br), click on the PAAP link, and then fill in the form and attach your research project to be assessed by the company's scientific department.

For further information on the Program, please contact our international scientific department:

[customer@angelus.ind.br](mailto:customer@angelus.ind.br)

We look forward to hearing from you. Let's foster science together!

## Characterization of the surface of intra-radicular retainers of glass-fiber submitted to microetching and acid conditioning: A SEM analysis.

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### Introduction and Literature Review

The teeth endodontically treated generally present doubtful prognostics due to the fragility, less quantity and quality of the remaining tooth, among other factors that could interfere in the functional and aesthetical success of the restoration<sup>1</sup>. Then the association of intra-radicular retainers would be convenient in order to add the retention of the reconstruction material and increase the fracture strength of restorations<sup>2</sup>. There are many studies which prove that the strength in oblique form generates a bigger effort when compared to the strength that is directed to the long axis of the tooth<sup>3,4,5,6</sup>.

Nowadays, the professionals have a wide range of options of intra-radicular retainers, either pre-fabricated or molded and smeltered afterwards. In the category of pre-fabricated, there are fiber-glass posts, carbon fiber-posts, or zirconium posts.<sup>7,8</sup> Their advantages lies in the fact that they present hardness and module of elasticity closer to the dental structure, which decrease the risk of fracture due to a stronger pressure<sup>3</sup>.

Some treatments have been proposed to optimize the adhesion between the resinous agents for cementation and the surface of fiber-glass posts. The most used is hydrofluoridric acid in variable concentrations and application times.<sup>9</sup> Nevertheless, there is not still a consensus in literature in relation to the ideal pattern of conditioning, in order to guarantee the integrity of the fibers and better mechanical behavior. One alternative method would be the etching with micro particles of Al<sub>2</sub>O<sub>3</sub>, making possible a better uniformity of surface. Additional studies are necessary to

establish the ideal distance between the tip of the jet and the surface of the post with the purpose of presenting a more uniform pattern.

The Scanning Electron Microscopy (SEM) is one extremely useful tool for the evaluation of the surface topography of intra-radicular retainers submitted to different treatments, allowing a more accurate visualization of the pattern of the micro-retention created.<sup>10,11,12,79,13</sup>

### Proposition

This experiment has as its objective to evaluate by SEM (Scanning Electron Microscopy) the surface of fiber-glass intra-radicular retainers submitted at two different surface treatments: acid conditioning with HF and microetching with Al<sub>2</sub>O<sub>3</sub> particles.

### Material and Methods

Group	Proposed Treatment
Control Group (CG)	No surface treatment
Group 1 (G1)	Acid conditioning HF, gel, 10%, 30s
Group 2 (G2)	Acid conditioning HF, gel, 10%, 1 min
Group 3 (G3)	Acid conditioning HF, gel, 10%, 3 min
Group 4 (G4)	Acid conditioning HF, gel, 10%, 5 min
Group 5 (G5)	Microetching Al <sub>2</sub> O <sub>3</sub> , d*=1,0 cm, 5s
Group 6 (G6)	Microetching Al <sub>2</sub> O <sub>3</sub> , d*=1,0 cm, 10s
Group 7 (G7)	Microetching Al <sub>2</sub> O <sub>3</sub> , d*=3,0 cm, 5s
Group 8 (G8)	Microetching Al <sub>2</sub> O <sub>3</sub> , d*=3,0 cm, 10s

\*d= post-jet distance

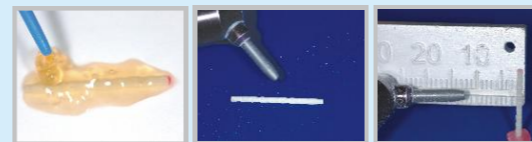


Fig. 1: Post conditioning with HF

Fig. 2: Device for microetching

Fig. 3: Standardization of post-jet distance

### Results

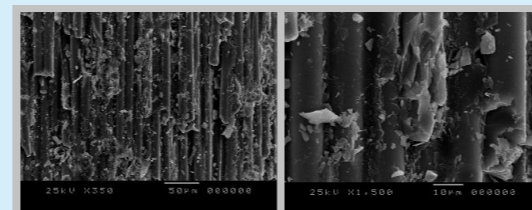


Fig. 4 - Control Group

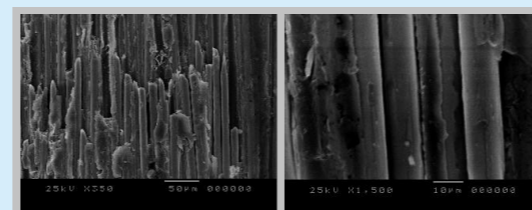


Fig. 5 - HF conditioning - 30s

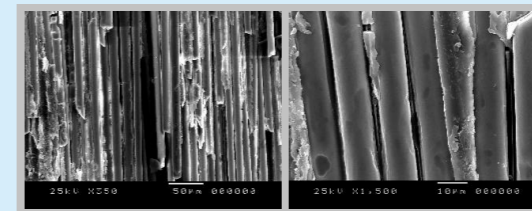


Fig. 6 - HF conditioning - 1 min

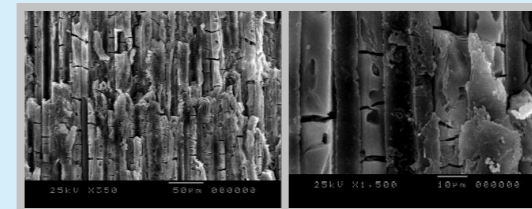


Fig. 7 - HF conditioning - 3 min

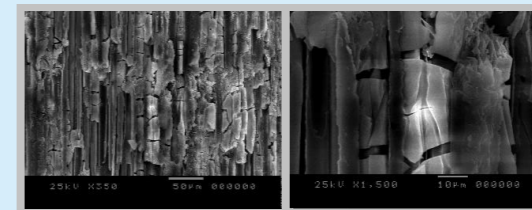


Fig. 8 - HF conditioning - 5 min

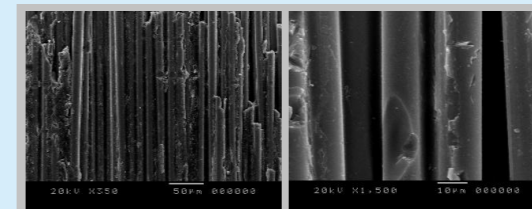


Fig. 9 - Al<sub>2</sub>O<sub>3</sub> microetching - 1,0 cm - 5s

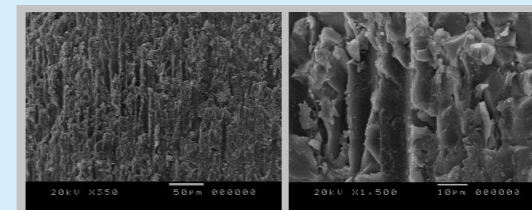


Fig. 10 - Al<sub>2</sub>O<sub>3</sub> microetching - 1,0 cm - 10s

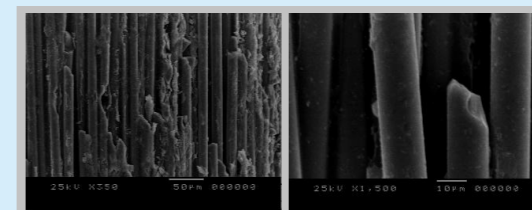


Fig. 11 - Al<sub>2</sub>O<sub>3</sub> microetching - 3,0 cm - 5s

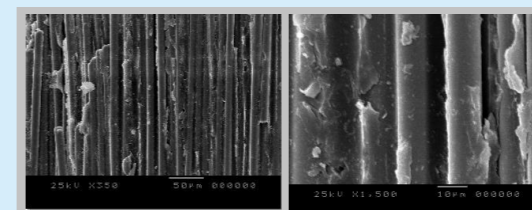


Fig. 12 - Al<sub>2</sub>O<sub>3</sub> microetching - 3,0 cm - 10s

### Conclusions

1. The treatments for fiber-glass intra-radicular retainers proposed in this study showed themselves useful in the modification of their surface topography, making favorable in adhesion to the cementation agents.
2. The time of 30s or 1min showed efficacy in promoting a more favorable conditioning pattern with HF.
3. The microetching with particles of Al<sub>2</sub>O<sub>3</sub> (50m of size) with restrictions of time may be indicated as a method of surface treatment for fiber-glass intra-radicular retainers, independently from the post-jet distance (1,0 or 3,0cm).

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## Restoring fragile roots.

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**Ewerton Nocchi Conceição**

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Andréa Brito Conceição



Ewerton Nocchi

The use of glass fiber posts for the restoration of endodontically treated teeth has become very popular in the last few years. Their mechanical behavior, similar to that of dentin, and the possibility of an adhesive cementation (once they are constituted in part by a resinous matrix) allow outstanding results regarding esthetics (most of them present a clear or translucent color), cost-effectiveness and resistance to fracture. Prefabricated glass fiber posts are easy to use and very practical, being available in several diameters that match most root canals. All these factors lead to a simpler and predictable restorative technique. Glass fiber posts also allow greater preservation of the remaining tooth structure.

A challenge for the prefabricated posts technique consists on the restoration of wide canals due to extensive carious lesions, invasive endodontic preparations and young teeth still going through formation of the apex. In these situations, the dentin walls are very thin and fragile, and it is impossible to obtain a good adaptation of the post in the root canal. Such inadequate fit will result in a very thick layer of cement between post and root canal walls.

The first option for these cases consisted on the fabrication of indirect cast metal posts due to the possibility of taking the impression of the canal. The

great problem of this technique, detected in several clinical and in vitro studies, was the high percentage of root fractures, which often led to irreversible loss of teeth.

With the purpose of allowing the use of prefabricated glass fiber posts even in very wide canals, Angelus launched Reforpin 2 years ago. This product consists of smaller glass fiber posts which were designed to be used around a main, larger post. The wide root will receive a greater amount of fiber glass and the pellicle of the cementing agent will be much thinner. This is highly desirable, because there is an association of the simplicity of the technique with the safety of a root very well filled by glass fibers.

Through a laboratory study we were able to determine that the association of the accessory posts (Reforpin) with a main glass fiber post (Reforpost) resulted in roots that were more resistant to fracture. Comparison groups did not receive Reforpin and consisted of: 1) one main post cemented with dual-cured composite resin and 2) cast metal post cemented with composite resin. Group 2 presented the worst results.

The following clinical cases describe the sequences of the use of accessory posts, showing the excellent filling provided by Reforpin in wide canals and the very satisfactory results reached.



Fig. 1 - Very fragile tooth with total loss of coronal structure;

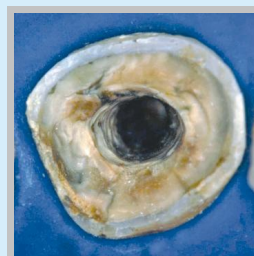


Fig. 2 - Close view showing wide space after partial removal of gutta-percha filling;

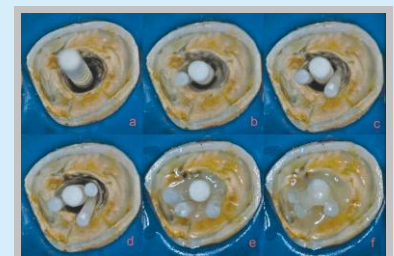


Fig. 3 - Positioning of the 1,5 mm Reforpost (a); insertion of numbers 1, 2 and 3 Reforpin accessory posts (b, c and d); Insertion of resinous cement on root canal and around posts (e);(f).

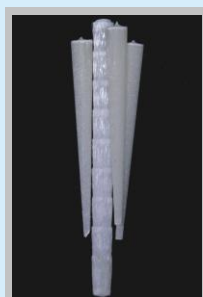


Fig. 4 - View of posts together;



Fig. 5 - Schematic position of posts in the canal;



Fig. 6 - Confection of porcelain crowns.

# Metal-ceramic or all-ceramic crowns?

## André Mallmann

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André Mallmann

Metal-ceramic restorations are the traditional option to treat large dental destructions and missing teeth. In most of the times, they meet the patient's functional and esthetic needs and are the type of indirect restoration that is most requested at dental laboratories. However it has been observed that the esthetic results in the long term may be jeopardized by the darkening of the margins caused by the metal. And the impossibility of light transmission, also due to the presence of metal, leads to a non-natural aspect of the crown.

The all-ceramic or metal free restorations have now been discussed for some years. They gained even more visibility due to an intense exposing in the media. However it has been observed that, either due to a lack of information or interest on the part of the dentist, the search for metal free restorations often does not take into consideration the kind of ceramic that will be used, which makes both inlay/onlay and full crown reconstructions to be performed with traditional feldspathic porcelain. This has caused a high rate of failures and, therefore, discredited metal free indirect restorations.

In the search of esthetic excellence, an issue widely discussed in meetings and in the dental literature, the manufacturers of ceramic dental systems have developed metal free ceramic systems with a resistance to fracture that may exceed 10 times that of the traditional feldspathic porcelain. This is possible by compacting and including crystalline material in the existing porcelains or creating infrastructures based on alumina, zirconia or other materials that allow an increase in resistance, sometimes very close or superior to the metal alloy used for the fabrication of metal-ceramic restorations. Nowadays there are countless reinforced ceramics available that allow performing indirect restorations free of metal with great resistance. We can name many existing trademarks known in the Brazilian dental market which are found in some dental laboratories, such as the IPS Empress and Empress 2 (Ivoclar-Vivadent), CEREC (SIRONA), In-Ceram (VITA), Procera AllCeram (Nobel Biocare) systems and, more recently, a

Brazilian system for the fabrication of alumina copings for single crowns and frameworks for bridges, called Vitro-Ceram and developed by Angelus.

One of the main reasons to choose metal free ceramic restorations, when compared to those with a metal coping or framework, is that they present optical properties that are more similar to those of the dental structure. An almost natural light transmission takes place, which optimizes the esthetic qualities of the dental work.

It does not mean that metal-ceramic restorations will be forgotten. There are very specific indications for this type of work, e.g., abutment teeth with less than ideal clinical crown heights, wide edentulous spaces and fixed bridges that are associated with removable prostheses. These last two are even contraindications for metal free restorations.

Something that has been very questioned in classes, courses and meetings is the cost of the reinforced metal free restorations to the dentist. I believe that the cost-benefit relationship between a metal-ceramic work and a metal free reinforced ceramic restoration will soon disappear, because of the new systems available. The imported systems may also lower their prices because of the local competition.

However there are still doubts whether the search for metal free indirect restorations is still behind metal-ceramic restorations due to lack of information on the new ceramic systems, costs, fear of some professionals regarding the change or simply because it is preferable to go with the routine procedures.

I believe that the diversity of options presented by the ceramic materials has enabled us to choose ceramic systems with more specific and efficient indications. However we cannot forget that the interaction between the dentist and the dental lab technician has to be very close, especially at the beginning of the change of technique. Such new techniques will facilitate our professional work. We will perform restorations that will be more esthetic, durable and satisfying to our patients.

# Mineral Trioxide Aggregate:

Safety on endodontics treatment.

### John Whitworth

PhD, BChD, FDS RCS Ed, FDS RCS (Rest Dent),  
Senior Lecturer, Consultant in Restorative Dentistry (Endodontics)  
University of Newcastle



John Whitworth

Portland cements are some of the most versatile and widely utilized materials in building construction, but are relatively new to dentistry. Released in the 1990's as a type 1 Portland cement for surgical root-end filling, MTA has surprised the dental community by its unprecedented biocompatibility, sealing ability, antimicrobial properties and capacity to set in a moist environment. These properties have firmly established MTA, not just as a surgical root-end restorative, but as the first choice material for applications ranging from direct pulp caps and pulpotomy wound dressings to the single-visit closure of perforations and immature root apices. Clinical and laboratory research continues to reinforce the position of MTA as an essential component of the specialist's and generalist's armamentarium. Practitioners may choose with confidence from the commercially available grey and white versions presented by Angelus (Londrina, Brazil) and Dentsply (Tulsa, USA). All have good clinical track records and are licensed for use in human subjects.

Persistent barriers to the use of MTA include the perceived cost and difficulties in manipulation.

### Presentation and storage

All current formulations of MTA are supplied as a powder and liquid, the powder typically presented in a 1g vial or sachet. This is far too much for a single application, and it is wise to store the powder in a small air-tight vessel to ensure that it does not deteriorate on exposure to moist air. Typically, 1g is sufficient for up to 7 applications; a great cost saving.

### Mixing

MTAs set by a complex hydration reaction, and it is important that the powder particles are fully wetted before use. This must be balanced with the need to carry and pack the material with control and to ensure optimal physical properties.

- Always shake the powder well before use to ensure that the particles are evenly distributed.
- Assess the size of the defect to be repaired and dispense a suitable amount of powder to a dappen dish or mixing slab.

• A drop of water is then gradually incorporated with a spatula, ensuring full wetting of the powder; this can take 30 seconds.

• A clay-like consistency is usually the most straightforward to carry and pack, and MTA appears to be forgiving. If the material is too crumbly and dry, add a little more water; if it is too wet, wick some fluid out with a cotton wool roll, taking care not to incorporate fibres within the material.

• Moisture quickly evaporates from freshly mixed MTA, rendering it crumbly and difficult to manage. This can be minimized by overlaying the mixed material with a moist gauze square, though if unacceptable drying still takes place, more water can again be added.

### Preparing the repair site

MTA is forgiving of some moisture, but the site should not be welling up with blood or tissue fluid. Neither should the repair site communicate extensively with the oral cavity, where saliva may wash out the material before it is fully cured.

### Carriage and compaction

A range of guns and pellet-forming moulds are available to carry MTA neatly to the repair site. The material should be gently compacted with hand pluggers, and settling can be encouraged by the careful application of sonic or ultrasonic vibration. Techniques have been described for the use of matrices to prevent material over-extension in open apex and perforation sites. Inverted paper points are often helpful for final compaction and to wick out excess moisture.

### Overlay

Commercial MTAs are claimed to develop an initial set within 15 minutes (MTA Angelus) to 4 hours (ProRoot MTA, Dentsply). During this time, the material must remain hydrated, and it has been customary to overlay the material with moist cotton wool before securely sealing the tooth. This has then been followed by re-entry at least 24 hours later to check the repair before proceeding with the next restorative phase. The need for these steps for a well mixed preparation of MTA has, however, been questioned.