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Microseal Technique

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At the end of the 70's the techniques of canal obturation which were considered correct and therefore able to seal the apex together with the whole endodontic system, were substantially two: warm vertical compaction and cold lateral condensation of the gutta-percha. Two techniques had created two different "schools" based on different biological principles: the school of warm vertical compaction which was in favour of the radical elimination of the organic content of the endodontic system and its substitution with an obturation that sealed the system, the school of cold lateral condensation which was in favour of the organism's ability to positively manage the terminal millimeter or millimeters (apical portion of the canal and lateral canals) of the endodontic system.

Corollary to this different approach was (and is) the different interpretation of an incidental overextension beyond the apex of the obturation: not a serious accident if accompanied by a seal for the vertical supporters,[1-4] "a grave error", always considered serious by the lateral supporters.[5-9]

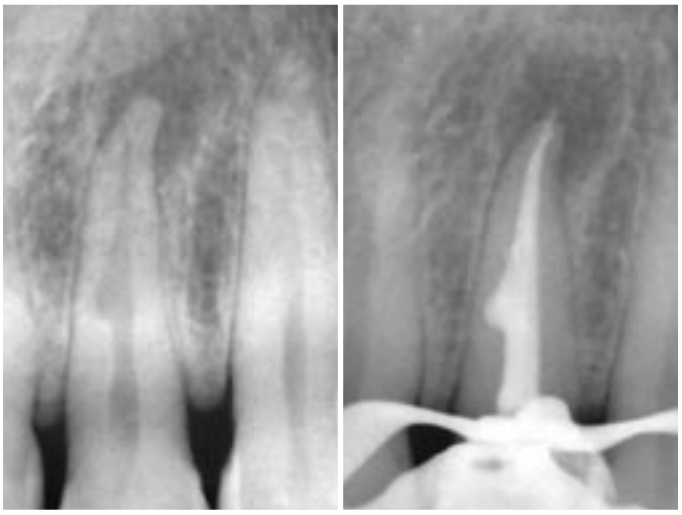
In this context (at the end of the 70's) a new obturation technique emerged called thermo-mechanical compaction or (with the name of the inventor) the "McSpadden technique". This technique depended entirely on the use of a new instrument which could condense the gutta-percha: the McSpadden compactor. This instrument had the design of an inverted Hedstrom file, that is, with the blades turned towards the tip instead of towards the shaft. The compactor mounted on a 1:1 contra-angled handpiece, was inserted in the canal next to a gutta-percha cone and made to rotate at 20,000 rpm.

The heat generated as a result of the rotational friction of the instrument caused the softening of the gutta-percha, which thanks to the blades of the instrument, was pushed towards the apex. This allowed the adaptation of the obturation material to the canal anatomy, and the three dimensional filling and seal of the endodontic system with gutta-percha.[10-14] This technique made no reference to either of the two above mentioned biological "philosophies" since it didn't require an "absolute" choice in this sense, even if it was a fact, that the efficient vertical and lateral thrust of the heated gutta-percha brought about a filling of all the available endodontic spaces.

Maintaining the basic concept unaltered, that is the concept of utilising a rotating instrument inside the canal to introduce and condense the thermo plasticized gutta-percha, the successive evolution of the thermo-mechanical compaction technique utilized the technical advances achieved in the endodontic field: the use of NiTi alloy and the new knowledge regarding the physico-chemical properties together with the resulting new methods of gutta-percha production.

The Multi Phase Technique[15,16] is a technique that in the early 90's combined the principle of thermo-mechanical compaction with the new materials; in fact it foresees the use of an instrument similar in design to the McSpadden compactor, but made out of Nickel Titanium with differing tip diameters and conicity, and of a particular gutta-percha defined as "Alpha Phase" which is pre-plasticized and then introduced into the canal with the rotating instrument. The distinctive characteristics of this type of gutta-percha by comparison to the traditional ones are: a lower point of fusion, a longer working time, less contraction during cooling down, adherence to the tooth surfaces.[17-20]

The most important clinical characteristic is however, represented by the higher fluidity: so if on the one hand it allows a better adaptation of the material to the endodontic irreguliarities with even the possibility to easily fill complex canal systems,[16] on the other hand it brings about a difficult vertical control of the obturation (Figs. 27.1-27.2).



A **B**

Fig. 27.1. Multiphase obturation technique. Canal obturation of an upper lateral incisor. **A**. The pre-operative radiograph shows the presence of internal root resorption. **B**. Post operative radiograph; canal obturation carried out with multiphase technique, which has allowed one to obtain an effective filling of the endodontic system with a single introduction of thermoplastic gutta-percha in a few seconds.

THE MICROSEAL TECHNIQUE

To utilize the advantages of a more fluid gutta-percha and reducing the risk of overfilling, an evolution of the multi phase technique has been proposed, which maintains unaltered the advantages of this obturation method, but in which the vertical control has been improved by the use of a master cone, which acts as an apical "cork" and which is positioned and condensed inside the canal before the introduction of the thermo-plasticized gutta-percha. This method is called the "microseal technique".

This technique utilizes cones of gutta-percha and pre -plasticised gutta-percha, both made with new generation high plasticity gutta-percha, as well as spreaders and thermo-mechanical condensers in NiTi capable of working in all the canal pathways. The presence of a master cone which engages the apex and whose physico-chemical characteristics allow integration with pre-heated gutta-percha enables a complete, but controlled filling of the endodontic space.

A **B** **C** **D**

Fig. 27.2. Multiphase obturation technique. **A**. Canal obturation of a lower second premolar; one notes the filling of a complex apical system with multiple exits. **B**. Canal obturation of a lower second premolar; the presence of a bifurcation at the level of the apical third of the canal is highlighted. **C**. Canal obturation of a lower second molar; one notes the obturation of a large lateral canal corresponding to a lateral lesion. **D**. Canal obturation of an upper second molar which presents buccal canals converging at the apex. The overfilling of the palatal canal highlights the difficulty of obturation depth control with the multiphase technique.