

Direct pulp capping as a conservative procedure to maintain pulp vitality

Dr Jenner Argueta, Guatemala



Fig. 1



Fig. 2



Fig. 3



Fig. 4

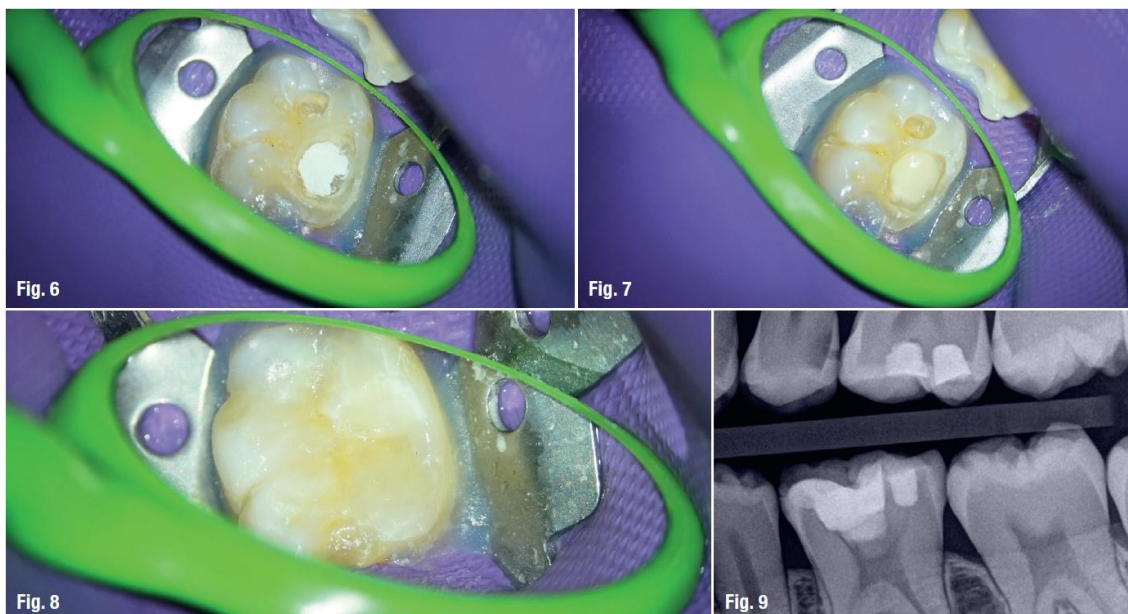


Fig. 5

From a completely optimistic point of view, the ultimate goal for every dentist performing a restorative and/or endodontic procedure should be to maintain the pulp vitality and functionality of the tooth without any discomfort for the patient. The pulp tissue is needed to provide nutrition, innervation and immunocompetence, with these acting as a defence mechanism and alerting to the presence of any external aggression.¹

The pulp tissue may be exposed to the oral environment as a result of dental caries or by mechanical means when performing restorative or prosthetic procedures. Two possible treatment options in these types of cases are root canal therapy and tooth extraction; the former procedure is a good choice, whereas the latter should be avoided at all costs in order to maintain the patient's oral health and natural function.²⁻⁴

A third alternative in the case of pulp exposure is to use conservative vital pulp therapy procedures, which include direct pulp capping, indirect pulp capping where



the pulp is not fully exposed, and partial or total pulp-tomies; this way, it is possible to maintain the vitality of the tooth, the nociceptive function and the body's self-defence system. Thanks to the points mentioned previously, among others, it has been shown that teeth with no root canal therapy survive longer than those that have been treated endodontically.^{2, 5, 6}

Next, we present two clinical cases in which the pulp tissue was exposed mechanically when carious tissue was removed. In both cases, it was managed to maintain the pulp vitality of the affected teeth by means of direct pulp capping. The vital pulp capping protocol suggested in this article is presented in the first case. The second case describes a treatment performed with long-term follow-up, where full formation of calcified tissue below the capping material could be observed by means of radiography. The treatment protocol was similar in both cases.

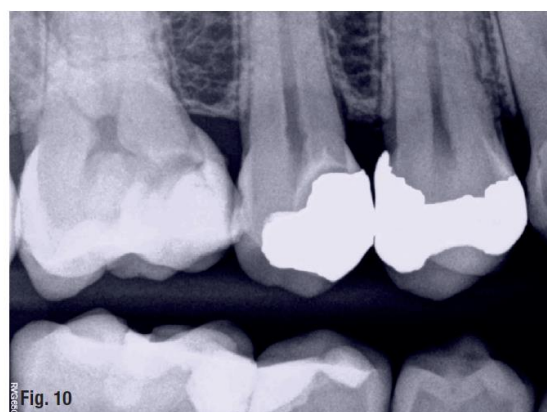
Clinical Case 1

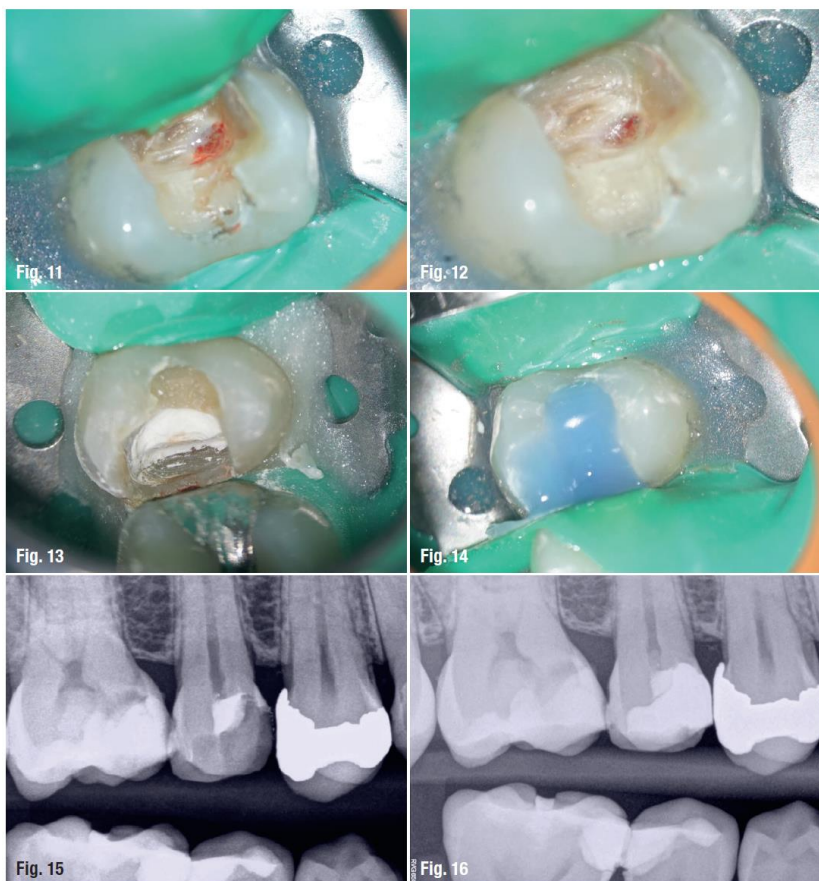
The 24-year-old patient attended the dental clinic with transient provoked pain in tooth #19 (Fig. 1). The diagnosis was reversible pulpitis. The carious tissue was removed under complete isolation, producing two incidences of pulp exposure, with minimal bleeding (Fig. 2). Bleeding was stopped by applying pressure for 10 seconds using a cotton swab dampened with a sterile saline solution. The cavity was disinfected with 2.5% sodium hypochlorite (Fig. 3), and then white mineral trioxide aggregate (MTA; Produits Dentaires) was placed as a direct pulp capping material (Fig. 4). To ensure that the MTA was placed accurately, the MAP System micro-applier for dental materials (Produits Dentaires) was used. This system allows the clinician to place the ma-

terial exactly on the exposure site, and this avoids staining the dentinal walls, which could over time show pigmentation due to the material used (Figs. 5 & 6). Once the MTA was placed on the sites of pulp exposure and the deep parts of the pulp chamber roof, a light-curing calcium hydroxide paste was applied. This was used to protect the material (Fig. 7) and to be able to proceed to the bonding procedure, to put the final restoration of the tooth in place during the same session (Figs. 8 & 9). Seven days after the procedure, the patient was completely asymptomatic and the tooth responded normally to sensitivity tests. In clinical situations like this, it is expected that there will be radiographic evidence of mineralised tissue formation below the cap between six and nine months after the procedure.⁷

Clinical Case 2

The 35-year-old patient attended the dental clinic with transient provoked pain in tooth #4. The diagnosis was





reversible pulpitis. The same vital pulp therapy protocol described in the first case (Figs. 10–12) was followed, except that in this case, the permanent restoration was not put in place during the same session. In its place, a temporary non-radiopaque restorative material was placed. This made it possible to ascertain the suitable thickness of the pulp capping material and its precise positioning at perforation level, while keeping the dental margin clear for a good bonding protocol (Figs. 13–15). It has been reported that the success rate of vital pulp therapy procedures may drop when the final restoration is put in place two days after the initial procedure.⁸ The MAP System is very useful for precise and stable placement of the capping material in direct procedures, indirect procedures, and partial and total pulpotomies. Here, the final restoration was placed 15 days after the initial procedure and the patient was completely asymptomatic. Nine months later, full formation of calcified tissue could be seen at the level of the pulp capping, the tooth remained vital and the patient was completely asymptomatic (Fig. 16).

Obtaining the right diagnosis is key to the success of conservative pulp therapy. An ideal case is a diagnosis of reversible pulpitis with no previous history of spontaneous

or prolonged dental pain.⁹ It is generally accepted that a history of spontaneous pain or pain at night is associated with the existence of an irreversible pulp inflammation process.^{10, 11} In these cases, the success of direct pulp capping may be questionable,¹² although there are studies indicating that vital pulp therapy can be successful even in these situations.^{2, 13–15}

When it comes to the long-term success of conservative pulp procedures, it is extremely important to provide a final permanent restoration for the tooth that ensures a suitable marginal seal. The reason is that this last factor, in conjunction with the absence of bacterial contamination during the procedure, is among the most important factors to consider in order to avoid subsequent pulp inflammation.^{4, 16} The success rate reported for vital pulp therapy procedures using MTA with a follow-up period of up to ten years is greater than 80%¹⁷—a fairly high percentage for a dental procedure within that functional period.

It appears that conservative pulp management is becoming more popular as time goes on. Here, considerations include the importance of the

pulp tissue, current advances related to protocols and appropriate materials for procedures to maintain pulp vitality, and economic factors that influence decision-making in many countries, causing many patients to tend towards the premature extraction of teeth owing to the cost of root canal therapy.^{2, 18}

Editorial note: A list of references is available from the publisher.

contact



Dr Jenner Argueta completed his DDS at the Universidad de San Carlos de Guatemala's dental school in Guatemala in 2011. He also earned a master's degree in endodontics from the same university in 2014. Dr Argueta is a senior lecturer in endodontics at the Universidad Mariano Gálvez de Guatemala in Guatemala.

He is president of the Academia de Endodoncia de Guatemala [Guatemalan academy of endodontics]. He has run a private clinical practice focusing on micro-endodontics and micro-restorative dentistry since 2011.