

## Importance of “Time” on “Haemostasis” in Vital Pulp Therapy

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### Dear Editor,

Nowadays, and in the modern age of dentistry, preservation of pulp vitality using biological-based approaches is of great importance, and Vital Pulp Therapy (VPT) is at the core management in the conservation of healthy pulpal tissue in extremely deep caries and carious pulp exposures (1). Therefore, steps taken in VPT are of great significance, and should be carefully studied/ followed by practising clinicians. In VPT, as an ultra-conservative treatment modality (2), different perceptions are well-deliberated; from the concepts of direct pulp capping and indirect pulp capping to the notions of miniature, partial and full coronal pulpotomy (3). In such approaches, achievement of haemostasis is referred to as a constituent in reaching successful outcome of VPT.

Recently, Time, needed for haemostasis, has been considered as an essential indicator in VPT. A related recent study has introduced 2 minutes as the decisive time for the determination of “reversible and irreversible pulpitis” (4). Nevertheless, the following studies related to VPT have not yet confirmed the precise allocation of time to gain haemostasis and thus, they seem to have established a relatively opposing idea.

In research conducted by Taha et al., it was shown that gaining haemostasis may play an important role in the high success rate of complete pulpotomy, and 10 to 15 minutes were required to achieve haemostasis in a couple of studied cases (5). In other related research, Alqaderi et al. reported bleeding as a major factor in the determination of treatment, which should stop within few minutes. However, no further discussions were made (6). In another retrospective study on the pulpotomy in vital permanent teeth with carious pulp exposure by Linsuwanont et al., the effect of “time to stop bleeding” was investigated. The study concluded that “time to stop bleeding” may not be an important factor in distinguishing irreversible pulpitis from the reversible one. Moreover, the study demonstrated that “time to stop bleeding” had no effect on the results of the treatments, and the association between “time to stop bleeding” and degree of the inflammation in the pulpal tissue had never been thoroughly investigated (7). Bogen et al. studied direct pulp capping with MTA, and showed that the amount of time needed for haemostasis was from 1 to 10 minutes (8). In another study by Chailertvanitkul, it was demonstrated that haemostasis could be controlled within 1–2 minutes (9). Similar results, concerning the importance of time in the achievement of haemostasis, were reported by Asgary et al. who investigated the 5-year outcomes of pulpotomy in permanent teeth with irreversible pulpitis (10). Furthermore, Zanini et al., in their recent systematic review, emphasised that the element of “Time” did not play an important role in the determination of dental pulp status and “Time” for haemostasis varied in different studies; from 1–2 minutes up to 10 minutes (11). Therefore, immediate haemostasis does not seem necessary in the success of VPT. On the contrary, high blood flow could be regarded as a sign indicating immense pulpal blood supply and a necessity for pulp vitality and repair/regeneration. High blood supply can be seen in different circumstances; e.g. in permanent teeth with hyperplastic pulpitis. In such cases, pulp may be tamponed using biomaterial; as was reported by Asgary et al. (12). However, VPT can be still considered for the treatment if bleeding is prolonged.

In VPT, the application of haemostatic agents to stop bleeding is recommended; nevertheless, some agents have to be further studied. Sodium hypochlorite (NaOCl) at a concentration of 5% can be applied for 30 seconds to stop bleeding as shown by Dammaschke et al. (13) and Asgary et al. (14). In addition, NaOCl demonstrated moderate/high rate of pulp survival. Casas et al. used ferric sulphate as a pulpotomy medicament to achieve haemostasis in primary teeth (15), although

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ferric sulphate has been used as a haemostatic agent for years with no strong evidence (16). Future investigations are necessary to evaluate the effects of the different haemostatic agents on the reparative capacity of the pulp.

As per discussion above, we would like to shed light on the relationship between "Time" and "Haemostasis", and declare that taking the stated research into account until now, there does not seem to be a significant association between the elements of "Time" and "Haemostasis" in VPT. Nonetheless, duration/intensity of bleeding, application of different biomaterials/other haemostatic agents in VPT need to be investigated further in well-designed randomised clinical trials with sufficient number of patients and long-term follow-ups.

#### Disclosures

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