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Vital Pulp Therapy: A Paradigm Shift in the management of Deep Caries and Exposed Pulp in Adult Permanent Teeth

Asha Thapa[1]

[1]Department of Dentistry, Pokhara Academy of Health Sciences, Pokhara

Correspondence :

Asha Thapa. Email: drashaendo@gmail.com

Dental caries is the leading cause of pulpal disease and remains one of the most common indications for root canal treatment (RCT). Traditionally, RCT has been considered the definitive treatment for mature permanent teeth with pulpal involvement. However, emerging evidence suggests that inflammation associated with carious pulp exposure is often localized rather than diffuse. The increase in intrapulpal pressure is confined to the site of irritation and does not necessarily involve the entire pulp. This evolving understanding has shifted the clinical goal from routine pulp extirpation to preservation of pulp vitality whenever biologically feasible.

Vital Pulp Therapy (VPT) encompasses a range of minimally invasive biological procedures aimed at preserving all or part of the pulp's vitality while managing deep (caries extending into the inner quarter of dentin) and extremely deep carious lesions (caries penetrating the full thickness of dentin).[1] Compared with conventional RCT, VPT offers several advantages, including preservation of the pulp's immunological and reparative functions, maintenance of structural integrity of the tooth, reduced postoperative discomfort, simplified treatment procedures, and lower treatment costs.

VPT comprises indirect pulp treatment, direct pulp capping, partial pulpotomy, and full pulpotomy. The choice of treatment depends on the extent of patient's symptoms, clinical and radiographic findings and the ability to achieve adequate hemostasis. . Recent international guidelines provide evidence-based recommendations to assist clinicians in appropriate case selection and treatment planning. [1-3]

A long-term cohort study involving more than 1,200 VPT-treated teeth demonstrated over 90% clinical success and 99% tooth survival, supporting VPT as a predictable treatment option for carious pulp exposure in adult permanent teeth.[4] Likewise, a recent systematic review and meta-analysis concluded that all VPT modalities achieve high success rates in teeth with normal pulp or reversible pulpitis, while full pulpotomy is an effective option for selected teeth with symptomatic irreversible pulpitis.[5]

In conclusion, advances in the understanding of the pathogenesis of dental caries, the regenerative capacity of the dental pulp, and the development of bioactive pulp-capping materials have transformed the management of deep carious lesions. Vital pulp therapy has emerged as a predictable, biologically

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based treatment that preserves pulp vitality while reducing the need for more invasive procedures. Despite its growing acceptance, challenges remain in its widespread implementation. Continued clinical research, professional education, and updated evidence-based guidelines are essential to facilitate broader adoption and ensure the consistent application of VPT in routine clinical practice.

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