

Co-ordinated by Geoffrey M Knight
Guest article by Mark Knapp



The 'Terminated Tunnel' restoration

Visiting lecturers often refer to Australia as the home of the Tunnel Restoration. When Geoff Knight described this new type of restoration in 1984, it represented the first significant departure from the principles laid out by GV Black almost 80 years earlier.

Black's rules for restoring carious teeth had formed a cornerstone of twentieth century dentistry, but they were based on two assumptions: firstly, that caries would invariably invade fissures and, secondly, that materials could not bond to tooth substance. Cavities were undercut and extended radically. In this post-fluoridation era, when an aging population forms the patient base of many practices, the profession is now observing the implications of such aggressive preparation. While cavities were 'extended for prevention' they certainly were not designed to prevent cusp fracture or Cracked Tooth Syndrome!

The Tunnel Restoration was more benign, but it has been accepted more in theory than day-to-day practice. This is probably due to the entrenchment of the Black philosophy

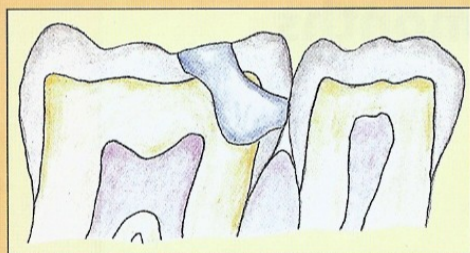


Fig 1. A conventional Tunnel Preparation.

and to the clinical difficulty of a conservative preparation.

The restoration is not without some limitations, however. When caries is close to the occlusal plane it sometimes proves impossible to preserve the interproximal ridge. Despite the refinement of the 'T' shaped cavity, access to interproximal decay can be troublesome and demand a route diagonal to the occlusal surface, approaching slightly closer to pulp horns than the traditional Class II preparation. Unless performed carefully, a tunnel preparation can be more conservative *mechanically* than *biologically*, at least in the short term.

The time may soon be approaching for the next evolution of the Tunnel Restoration. In 1990, PR Hunt proposed a variation, whereby the preparation did not extend through the interproximal wall, but rather left carious enamel intact in the assumption that remineralization could occur with the release of fluoride from a GIC restoration and effective microsealing.

More recently, Geoff Knight has described the use of silver fluoride in remineralizing the soft affected layer of carious dentine and its promise in reducing the depth of preparations. The silver component

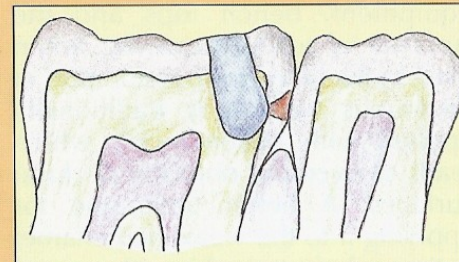


Fig 2. Terminated Tunnel Preparation.

kills bacteria and, in a 40 per cent solution, the fluoride promotes substantial mineral uptake.

It would appear that silver fluoride has great potential in remineralizing carious interproximal enamel, where cavitation is yet to occur. It may well represent a reliable means of making the Tunnel Restoration even more conservative still, by allowing preparation to stop short of penetrating the interproximal wall. ▶

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Silver fluoride is messy stuff, of course. It readily stains dental equipment, bench tops and the surfaces of teeth. However, when used in the atraumatic restoration of deciduous teeth it is traditionally applied with cotton wool, which leads to overflow onto the occlusal surfaces. A better technique for applying it to the weakened enamel at the end of a tunnel is with a metal applicator, similar to what one would use in placing a lining material.

The Terminated Tunnel approaches dentinal caries in a slightly more axial direction than usual and the access cavity is ovoid rather than 'T' shaped. It extends through the carious dentino-enamel junction but leaves the enamel wall intact.

After applying AgF, the cavity is restored with a co-cured sandwich restoration.

The advantages of this restoration are multiple. The need to prepare away enamel is reduced, matrices are not required and restorative material does not interface with oral tissues and fluid interproximally. Moreover, the strength of the ridge is not compromised. Close future monitoring is needed, but this is true of many restorations.

The concept of not removing decayed enamel is a rather challenging one. The caries is not simply 'being left' though – it is being treated medicinally rather than surgically and fluoride has a proven track record of stimulating recalcification. Furthermore, it should be borne in mind that enamel caries rarely presents a problem of itself; unless it has changed tooth morphology, it is only as a precursor to *dentinal* caries that it usually signifies a threat to a patient's dental health. □

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