Opinion Paper

The Consequences of Restorative Cycles

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The replacement of failed restorations continues to make up a major portion of all operative procedures.[1-2,4-5] In addition, dental education, from dental school to subsequent continuing education, tends to focus more on the restorative process than on long-term outcomes. Therefore, any attempt to quantify the predicted life of a restoration should help dentists and patients make better decisions about restorative options.

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Possibly, the most significant consequence for the repair of dental defects and, indeed, for all operative interventions, is the need to replace failed restorations.[1-3] Therefore, the unintended consequence for all operative procedures is to place a patient's tooth and/or the tooth site into a "restorative cycle" that will continue throughout the life of the patient. This fundamental concept of a restorative cycle brings into focus the loss of tissue around existing restorations on a recurring basis.

All restorative techniques result in the loss of natural tooth structure and they fail at some point. Add to this the trend that the concept of a finite restoration lifetime has taken on less importance in the modern "cos-

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metic" culture of restorative dentistry and you have a situation where both tooth integrity and the financial cost to retain function are compromised.

This paper attempts to quantify the consequences of restorative dental therapy. The intent is to develop a decision process that takes into consideration restoration life expectancy in order to help dentists and patients make choices based on both health and longevity.

The restorative cycle consists of three major events, including loss of tooth structure due to trauma or the original disease process. Second, the loss of tooth structure due to the process of preparing a tooth to receive a restoration. Third is the eventual failure of the restoration and subsequent replacement, at which time the restorative cycle is repeated. Finally, the environment {patient}, the physical properties of the restorative material and the dentist's skill level combined determine how long a restoration will last before replacement is necessary.[4] All restorative options are subject to a restorative cycle.

This fundamental concept of a restorative cycle is possibly the most important determining factor for what restorative material will be the best to use in a particular restorative situation. For example, from a review of the literature[2,4] and through personal observations from 30 years of restorative practice, it is the understanding of the author that, in general, posterior composite restorations have a life expectancy of 6 to 10 years. Therefore, a restorative cycle of 6 to 10 years would be assigned to posterior composite restorations. Similarly, a restorative cycle of 15 to 20 years would be assigned to alloy restorations. Cast gold would have a restorative cycle of 30 to 40 years, and direct gold would have a restorative cycle of 45 to 55 years. In addition,

this is referring to first-generation restorations. Due to an increase in volume and the further undermining of natural tooth structure, second generation restorations would have restorative cycles with shorter lifetimes. By thinking about restorative material choices in this way, the dentist has an easier means of quantifying long-term outcomes void of other extraneous influences on restorative choices.

A further explanation of this concept is presented in the following case. The patient is 10 years old with virgin caries in the mesial pit of tooth #3; the caries is into the dentin (Figure 1). The following thought process occurs. If a restorative material with a restorative cycle (RC) of 10 or less years is used, the patient will have a high probability for loss of significant tooth structure at a relatively young age. The possibility of complete tooth loss is higher in this case, because of the environment (that of being a young patient) in which a restoration with a low RC is placed. In effect, the replacement rate of every 10 years starting at age 10 will translate into the loss of enough tooth structure to weaken the tooth beyond its ability to withstand the stress of occlusion, therefore, requiring full coverage or total tooth loss well before normal life expectancy.

If the restorative material has a restorative cycle of 15-20 years, the patient has a higher probability of keeping the tooth for the remainder of his/her lifetime. This is due to the likelihood that replacement restorations would be placed at longer intervals over the life of the patient. However, due to the environment and being a young patient, there would most likely be enough time to allow for sufficient tooth loss to require the placement of full coverage.

If, on the other hand, the restorative material of choice has a restorative cycle of 45 to 55 years, there is a high probability that the tooth will remain intact throughout the life of the patient (Figure 2).

Finally, if dentists would perform routine outcomes assessments for restorative work in their offices, documenting the time of placement and the time before replacement as a part of a recall examination, over time, this would allow for more accurate restorative cycles to be assigned within an individual practice. In addition, restorative cycles could potentially be classified by material, restoration size and configuration, generation of the replacement and patient risk factors.

It is the opinion of this author that having accurate information as to how long the various restorative options available will last within a particular office will give the dentist a better understanding of the choices available and their long-term impact. In addition, it is the responsibility of dentists to maintain proficiency in all restorative techniques, because no one restorative technique is appropriate for all situations.

Figure 1.

Figure 2.

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