Bridge design, part two: fixed-movable bridgework

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In the second part of his series on bridge design, Paul Tipton looks at fixed-movable bridgework

There is much evidence in the literature to support the use of fixed-movable designs (Figure 1). As early as 1949 Chayes stated that rigid splinting of teeth was damaging, whilst Morrant (1956) concluded that fixed-fixed bridgework failed more often than fixed-movable bridges in posterior parts of the mouth. Reuter (1980), in a retrospective study, found that longer span bridgework failed more often than short span.

Figure 1: An example of successful crown and bridgework more than five years after placement

RATIONALE FOR USE

Physiological tooth movement, arch position of the abutments and the retentive capacity of the retainers often make a rigid, fixed-fixed bridge a less than ideal plan of treatment (Shillingburg, 1981). Studies in periodontometry have shown that bucco-lingual tooth movement ranges from 56 microns to 108 microns (Rudd, 1964) and intrusion by 29 microns (Parfitt, 1960) and in different directions (Chayes, 1949). This is obviously increased when teeth have lost bone support and have periodontal disease. The movement of an anterior tooth in a labio-lingual direction occurs at nearly 90° to the bucco-lingual movement of a molar tooth, due to the curvature of the arch (Figure 2). Because of these movements and the problems with cementation failure when secondary abutments are used, the use of some form of non-rigid connector has become the first choice of design in many types of bridge.

The non-rigid connector allows a stress breaking connection between retainer and pontic, instead of the usual rigid solder or cast joint. In spite of an apparently accurate fit, the movement of this type of connector is enough to permit individual movement between bridge abutments, thus allowing the stress of any flexing movement on the pontic to be taken up by the periodontal ligament and not the cement lute. The clinician must decide in each case how much movement is allowed between the male and female parts of the joint, and how much strain is therefore taken up by the periodontal ligament of the major retainer. This is accomplished by adjustment of the base of the male attachment (Figure 3). In effect, whilst the male is not contacting the base of the female the bridge is acting as a cantilever, but when the male moves further and contacts the base of the female it then starts to act as a fixed-fixed bridge.

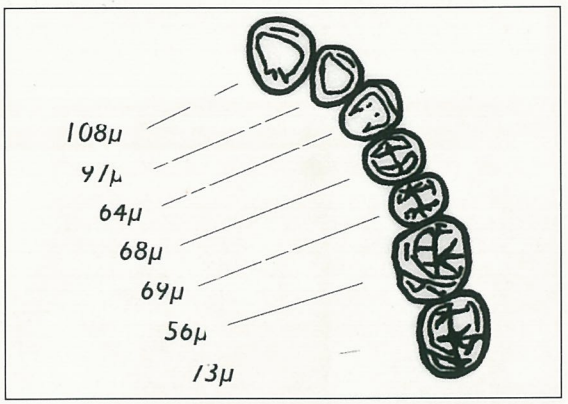

Figure 2: The movement of an anterior tooth in a labio-lingual direction occurs at nearly 90° to the bucco-lingual movement of a molar tooth, due to the curvature of the arch

The use of fixed-movable bridgework should usually be restricted to short span bridges (Markley, 1951), generally replacing one tooth (Figure 4), as the magnification of movement created by an increased span can be too destructive to the abutment tooth under a soldered retainer (Shillingburg, 1981). In certain situations when there are tilted abutments or when posts are incorporated into the bridgework the pontic span may be increased (Figure 5).

The fixed-movable bridge is the ideal bridge design for posterior bridgework except in situations where the abutments are mobile, or there is a long span when the choice is usually fixed-fixed. In cases where the posterior abutment

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