Bridge design, part nine: the 'Periodontal Prosthesis' or Lindhe/Nyman bridge

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In the latest part of his series on bridgework, Paul Tipton examines an extensive form of bridgework for patients with few remaining teeth

Nyman and Lindhe's work on periodontally terminal dentitions (1979) showed that it is possible to achieve excellent long-term results with extensive fixed-fixed bridgework, even when the abutment teeth are periodontally involved and mobile, if attention is paid to oral hygiene, margin placement, retention and occlusion. In these cases, where there was grade II and III mobility of individual teeth, it was found that the whole of the bridge moved when loading was applied. The increased mobility was regarded as a physiologic adaptation of the periodontal ligament and surrounding bone to the occlusal forces. Nyman (1975) showed that the mobility of the bridgework did not change over a two to six year period, indicating increased but not increasing mobility. This small increased mobility allowed occlusal stresses to dissipate in the periodontal ligament thus placing less strain on the individual cement lutes. Because of this, cementation failure in one or more of the abutment retainers was less frequent than in teeth of normal mobility, as in a healthy dentition.

Over this two to six year period there was a success rate of 94% and the small failure rates were due to cement washout, fracture of the bridge or tooth fracture. In response to this, they changed the designs of their bridges. The height of the various components was increased in the loading direction (crowns, pontics and soldered joints) and retention of individual abutments was increased by preparing grooves and boxes in the tooth abutments and making prepared surfaces of teeth parallel to each other. Cementation could also be better delivered by venting of the bridge allowing better seating. The failures that occurred due to cementation occurred where partial crowns were prepared and fitted as retainers rather than full crowns and their continued use was not recommended.

Tooth fracture occurred more often on terminal end abutments that were root filled. There is an obvious question mark as to whether these teeth should be used or extracted and additional pontics added onto the bridge.

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TYPES OF BRIDGE

Owall (1991) has described twelve unit bridges using two lower canines as the only abutments and has followed these for twenty years showing excellent success rates. He followed eleven patients who had only two remaining natural teeth, vital mandibular canines, who were treated using experimental 12-unit bridges and complete maxillary dentures. After 15 years, seven patients had bridges that were still functional, two had bridge failures, one lost the bridge following oral cancer and one patient died. Nine of the 22 abutments required endodontic treatment.

The lower canines are the last teeth statistically to be lost in the mouth, have excellent bone support, a large periodontal ligament with increased amount of proprioception and are relatively large thus making them ideal bridge abutments for this type of bridge. One of the alternatives is root-filling the canines and turning them into over-denture abutments. This, however, leads to a decrease in their longevity and the longevity of the restoration by increasing the chances of periodontal disease and caries causing their failure. This failure due to caries can be reduced, however, by the daily application of a chlorhexidine and fluoride gel into the recess in the denture (Budtz-Jorgensen, 1995).

MATERIALS

Lindhe and Nyman's work involved using acrylic and gold as the occlusal materials with acrylic also as the veneering material (Figures 1 to 6). Acrylic has a shock absorbance effect during dynamic loading whilst porcelain has a stress reduction effect to the abutments during static loading as with bruxing or clenching (Davis, 1998).