Margins of error
The importance of monitoring previously placed crowns and bridges

Crowns and bridgework is responsible for the largest number of cases involving claims against dentists. Along with endodontics, the next most frequent source of claims, accounts for a significant proportion of the total cost of claims made against the dental profession.

There has been a progressive increase in the number of teeth restored with crowns. Standing alone or serving as bridge abutments, crowns are being provided in greater numbers than ever before. Advances in materials and technology have given more and more dentists the confidence to treat cases of increasing size and complexity. When these trends are matched by an increased life expectancy of our patients, we may find that these complex restorations are now as prevalent in the older age groups, as once were complete dentures.

An aspect of crown and bridgework that is often overlooked is the dentist's obligation to monitor the integrity of these restorations, especially their marginal fit. In addition we need to review the patient's ability to effectively clean them, the health of the adjacent periodontal tissues and the vitality of the teeth in question. There is ample evidence to suggest that a significant proportion of crowned teeth are likely to lose their vitality.

A superficial examination of most crowns and bridges can create a false confidence, which deflects the clinician from looking more closely. A methodical evaluation of any fixed restorations present in the patient's mouth is just as important as the time spent assessing natural teeth or the integrity of existing fillings.

Marginal fit
Horizontal defects take the form of ledges (the restoration is wider than the prepared margin of the tooth), or steps (the crown margin sits within the outer aspect of the tooth). Some ledges are associated with a generalised overbuild of the cervical aspect of the restoration. The most common kind of vertical defect is a gap between the fitted crown margin, and the tooth surface. These are easier to detect when they arise on the buccal (labial) or palatal (lingual) aspect of the tooth or on a mesial or distal surface where there is no adjacent tooth. A poorly fitting margin on the interproximal aspect of a posterior tooth is the one most likely to be overlooked. This fact alone makes it all the more important to prevent such defects arising in the first place.

Avoiding problems with marginal fit is the product of consistently accurate tooth preparation, attention to detail in impression techniques and a critical evaluation of the completed impression. A close working relationship with the laboratory technician allows potential problems to be identified at an early stage and therefore avoided. It is usually quicker and more cost effective to repeat a stage, than to proceed on the basis of an impression that leaves room for doubt as to the intended margin of the restoration(s).

Practical checklist

Probing
Identifying a problem margin at the time of fitting can be achieved through a combination of visual examination and probing with either a conventional probe, or a ball-ended (e.g. CPTN/BPE) probe, which is particularly useful in detecting ledges. The use of dental floss or tape prior to fitting can be another useful aid, and is invaluable in checking for any residual cement. These same routines also form the basis of periodic monitoring of the margin of existing crowns.

X-rays
Bite-wing x-rays at appropriate intervals can help reveal failing margins of posterior restorations, and may even display ledges or other problems undetected at the time of fitting.

Signs and symptoms

Signs and symptoms of possible marginal leakage might include sensitivity, and possibly "a bad taste" reported by the patient. Later, the patient may report a sense of slight movement of the restoration. Any symptoms of this nature indicate the need for a very close examination, the details of which should be recorded in the patient's clinical notes.

Plaque control and diet
Whenever fitting fixed restorations, it is important to ensure that the patient understands the importance of maintaining a high standard of plaque control. Techniques that are appropriate both to the clinical situation and to the patient's ability and manual dexterity should be explained and demonstrated. Check to ensure that the patient is capable of carrying out these techniques to an acceptable standard. The patient's ability (and willingness) to maintain a satisfactory level of plaque control is not static, and it should be monitored in the years following the fitting of crown and bridge restorations. Elderly patients with extensive crown and bridge restorations may find it more difficult to maintain adequate plaque control. Failing eyesight, arthritis and similar problems only serve to make matters worse. If a patient's diet becomes more cariogenic (classically, the smoker who gives up cigarettes and turns to peppermints), the clinician needs to be alert to the danger of caries in those parts of the mouth where plaque might be retained. A detectable margin in such an area may be followed by a rapid and unseen destruction of the under-lying tooth structure. This typically occurs when a bridge becomes uncemented on one retainer, but is held in place by the other retainer(s).

Periodontal health
When the margins of restorations are subgingival, the 'blanching' of the adjacent gingival tissues on fitting can be an indicator of a possible ledge, or over-built emergence profile of the restoration. In the months and years after fitting, the health of the adjacent periodontal tissues can be a useful indicator of the status of the margins of any restorations. Bleeding points and inflammatory changes should always be noted, investigated and appropriate treatment provided. One common problem, which can arise when anterior restorations are being fitted, is making a correct assessment of the cervical margin on the interproximal aspect of the restoration.
placed, is that of gingival recession occurring after crowns have been placed.

This is particularly common when less-than-optimal crown margins have been placed at or below the gingival margin, where recession can reveal crown margins and root surface. If the tooth is non-vital, an added complication is the visible darkened tooth structure, which may be aesthetically unacceptable.

**Aesthetics**

One of the advantages of modern dental materials, compared with some of the materials used for crowns and bridges in previous years, is that there is little or no colour change over time. On the other hand, adjacent natural tooth tissue can and does discolour and this can present problems of a different kind. Wear, which is accentuated when dissimilar materials oppose each other in occlusal function, can reveal underlying metal in porcelain/metal bonded restoration.

This can be anticipated and sometimes avoided by regular monitoring of the occlusal relationship.

**Occlusion**

One aspect of existing crown and bridgework that tends to be checked least often is the occlusal relationship of these restorations. Early porcelain fractures are frustrating for patients and clinicians alike and are a common cause of patient dissatisfaction.

Less obvious is the need to consider the implications of treatment carried out in other parts of the mouth, which might result in additional occlusal loading being placed upon previously inserted crowns and bridges. The loss of one or more posterior teeth, or perhaps the patient’s re-lucence to wear a partial denture, may suddenly place anterior teeth under excessive occlusal loading and additional risks. Particularly vulnerable are post crowns in upper lateral incisors and such restorations should always have their occlusal contacts checked regularly. The clinical records should contain a clear note that these investigations have been carried out, and any subsequent adjustment of the occlusion should be similarly noted.

**Summary**

Existing crowns and bridges along with other fixed restorations require exactly the same detailed periodic clinical examination as the natural dentition. This should include a systematic surface-by-surface examination of each tooth in turn, as well as a review of the occlusion. Every crown should be checked for movement and any sign of wear or other damage. Patients should be asked specifically whether they have noticed any bleeding, bad taste or sense of movement around any existing restorations, and their responses recorded. In the years ahead, many of us will be treating a steadily increasing number of patients with multiple fixed restorations in situ.

We may or may not have placed these restorations ourselves, and where we have not done so, the patient should be asked if they can confirm when the restorations were placed. Monitoring the continued health and integrity of these restorations will present us with new and different challenges and it is important to remember that we have the same duty of care to the patient to carry out this monitoring process, irrespective of whether or not we placed the original restorations ourselves. Any patient’s clinical record should be capable of demonstrating that we have regularly monitored all crown and bridgework, thereby avoiding the allegation that we have failed to diagnose the failure of those restorations or that a delayed diagnosis has worsened the prognosis for corrective treatment.

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