

A number of bioactive materials have been considered for use in these procedures. The present chapter concentrates on bioactive glass for these roles, but it should be noted in passing that other materials (hydroxyapatite and other synthetic calcium phosphate ceramics) have also been used with some success. However, bioactive glass is a key material in these applications and its versatility and ease of use has led to considerable clinical success. This will be explored in the remainder of the present chapter.

A further potential complication in periodontology is the occurrence of furcation defects. These are the result of periodontal disease developing in multi-rooted teeth at the points where the roots of the tooth branch (Wærhaug, 1980). If left untreated, such furcation defects lead to the loss of alveolar bone at the branching point of the tooth root. Once this has begun, there typically follows considerable destruction of the bone as plaque, tartar, and bacteria occupy the space created at the furcation. Eliminating or reducing plaque in this region becomes impossible, so that the infection remains in place, causing the disease to progress and substantial bone loss to occur.

These furcation defects can occur in various teeth of an adult, but are most common in the first molar of the mandible (Larato, 1970). Treatment can be difficult, not only because access to the diseased area is difficult for the dentist to achieve, but also because the anatomy makes it problematic to gain visual access to the affected region. Specially shaped scalers can be used to scrape clean root surfaces around furcation defects. Ultrasonic scalers can also be used to loosen debris and biofilm components, which can then be flushed away by a jet of water. Antimicrobial compounds can be employed to maintain sterile conditions in the area in question, while the furcations stabilize. Further treatment can then involve bioactive materials, such as Bioglass, which can be applied to the affected region in an appropriate carrier to stimulate bone deposition around the affected tooth.

### 9.3 NONGLASS MATERIALS USED IN PERIODONTAL THERAPY

Before going on to describe the role of bioactive glasses in periodontology, it is appropriate to consider the alternatives that are available to clinicians. In all cases, these materials need to have the ability to promote regeneration of the periodontal tissues that have been affected by periodontal disease. In this way, the various materials are helpful in correcting defects caused by this disease. The term regeneration means the complete reestablishment of the tissues supporting the teeth, including the alveolar bone, periodontal ligament, and cementum (Cortellini and Tonetti, 2000). Indeed, it can be stated that the main goal of periodontal regeneration is to develop the complete structure of new cementum with fibers of periodontal ligament connected to fully formed alveolar bone (Polimeni et al., 2008; Sculean et al., 2008). The newly formed periodontal ligament fibers should be correctly oriented with respect to the