The ability of pulpal cells to form hard tissue is not limited to the odontoblastic layer. Fibrodentin accumulations also occur centrally in the form of **denticles** within the pulpal tissues in both erupted and nonerupted deciduous and permanent teeth, as well as both young and old teeth. With increasing age, more formation of intrapulpal dentin occurs, and subsequently the root canal becomes increasingly narrow. Such hard tissue formation is usually the consequence of an inflammatory process.

Fifty percent of teeth exhibiting crown fractures also exhibit such mineralizations, including lamella denticles as well as **diffuse accumulations**; inflammatory cells can be observed in 25%.

Healthy teeth in 10–20-year-olds exhibit pupal mineralizations in only 8% of patients; carious teeth from the same age group have an incidence of 36%. In the age group 45–63 years, 90% of examined teeth exhibit calcifications. Such calcifications become visible in a radiograph only when they exceed a size of 200µm.

Teeth with **degenerative calcifications** are usually symptom-free. Endodontic treatment for such teeth is extremely difficult, time-consuming, and expensive; the decision to treat must be seriously considered! In most cases, a "wait-and-see" attitude is the best approach; in rare cases, an immediate surgical procedure may be necessary. If the canal orifices cannot be detected, the cavity is rinsed and stained with methylene blue. This is often not helpful, however, because only organic tissues are stained. If the clinician suspects or knows the position of the canal orifices, they are identified by probing and opened using an **ultrasonic spreader** (with a diamond-coated tip). Because the use of ultrasonic files usually leads to a false opening, they are not indicated in cases of root canal obstructions.

EDTA can increase dentin permeability and therefore favorably influence debridement of the root canal. Because of the slow-acting effect of this hard tissue-demineralizing agent, decalcification of dentin during canal instrumentation is unlikely. For the ultimate opening of obliterated root canals, the tip of a K file is coated with a small amount of RC Prep and then inserted into the root canal using small rotatory movements. To overcome obstructions, considerable time will be required. After removal of the file from the canal, it must be carefully cleaned using sterile gauze. Then the cavity is thoroughly rinsed with NaOCl solution. This elevates dentin permeability, increases the release of oxygen, and neutralizes the EDTA.

During root canal instrumentation, unexpected and unplanned iatrogenic canal **blockage** can occur. The causes include an accumulation of dentin chips that are not successfully removed, compression of pulpal tissue debris or apical ledge formation with accumulation of hard and soft tissues. If pulpal tissues have been compressed, a lubricant must be used, even in the depth of the root canal. Only through the use of a Hedström file, size 15, with slight rotatory movements, can such tissue accumulations be successfully penetrated. The file must be repeatedly cleaned and resterilized.

If a loss of working length occurs during instrumentation, any **forceful** deeper preparation to break through the obstruction must be avoided completely.

Case Presentation

A Tooth 25 exhibits an inadequate root canal filling and a periapical radiolucency. Tooth 24 exhibits only a post build-up without canal filling; the root canal is partially obliterated.

B After chemical softening, the gutta percha is removed.

C Initial situation following trepanation of tooth 25, with apparently only one canal.

D Under the surgical microscope, two root canals are detected and subsequently instrumented.

E The post build-up on tooth 24 was loosened using ultrasonics, and the cavity was then filled with an EDTA lubricant.

F Following ultrasonic preparation, the obstruction was removed using an H file. Rinsing with citric acid followed.

G Final radiograph of the root canal fillings.