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# The compromised tooth: conservative treatment or extraction?

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In everyday practice, the dentist is not seldom faced with the dilemma of assessing teeth troubled by a combination of endodontic, periodontal, and reconstructive problems. As attempts to saving such teeth may carry risks for failure in the mid and long term, a multidisciplinary team approach to a treatment decision is required. Recent advancement of implantology techniques has brought about a useful option to treacherous tooth-saving efforts in that severly compromised teeth, following extraction, may be replaced by implants. Such an opportunity, however, involves the inherent risk for overuse to the detriment of the basic thrust of dental care to conserve the natural dentition when damaged or diseased. By referring to a variety of clinical treatment scenarios, this article discusses the factors that may assist the clinician to weigh maintenance against extraction of teeth with guarded prognosis.

## Introduction

In spite of an increasing awareness of the value of preventive measures to maintain oral health, the effects of caries and periodontal disease are not always dealt with in a timely manner. The presence of pain to alert the individual of a pending dental problem is, in addition, rather the exception than the rule (1). Therefore, the dentist may not seldom be confronted with badly compromised teeth, which require massive treatment efforts for salvage, and that may carry uncertain mid- or long-term prognosis for survival.

In terms of endodontically treated teeth, all present with needs for reconstructive work. While some are easily repaired, others are more challenging because of great losses of tooth structure. This is especially true in cases with subgingival caries or crown fracture. In order to meet the requirements of proper access and canal instrumentation, healthy tooth substance has to be sacrificed as well. In order to ensure long-term tooth maintenance in such cases, crown therapy may be the only reasonable restorative option (2, 3). Nevertheless, the long-term prognosis may be impaired by a variety of factors including the need to place a post where length, width, form, and material type are critical considerations, besides the position of the tooth in the dental arch, the location of the tooth in a complex prosthetic restoration, and the quantity of residual tooth structure. The significance of such factors has been assessed in both *in vitro* and in clinical follow-up studies (4–11). In fact, endodontically treated teeth are more often lost because of reconstructive failure than because of failure to meet the treatment objectives of endodontics (12, 13).

A treatment decision may also be complicated by the presence of periodontal disease. Maintenance of the dentition depends here, among many factors, on how successfully the patient can be motivated to effective oral hygiene measures (see article by Wennström & Tomasi in this volume of *Endodontic Topics*). In multirooted teeth, one also has to consider the

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problem with an exposed furcation, which, if not properly managed, may result in infectious sequels and progressive loss of periodontal tissue support.

Earlier, tooth extraction was a common remedy for teeth gravely affected by caries and/or periodontal disease and reconstructive opportunities were limited to bridgeworks and removable dentures. Today, with the advent of implantology techniques, a new, valuable option has been introduced to dentistry to replace lost teeth or teeth that have a hopeless prognosis. From being exclusively a treatment to be carried out by specially trained dentists (surgeons and prosthodontists), implant dentistry has now become widely adopted in the general practice of dentistry. However, such a development has been viewed with concern, as there are risks for abuse in that perfectly restorable teeth are extracted and replaced by implants for mere lethargy and pecuniary reasons. While an uncritical and indiscriminate use of implants should be discouraged, there is an obvious need to discuss under which circumstances one is better off to propose extraction to the patient than to engage in a conservative monitoring of teeth with doubtful prognosis. Hence, it has long been advised that a multidisciplinary team approach be used when single-tooth elements are seriously compromised by loss of tooth substance and with endodontic or periodontal pathology or both. The collaboration between dental specialists in these situations brings about the standard of excellence in operative dentistry.

By referring to a variety of clinical treatment scenarios, this article discusses factors that may assist the clinician to weigh maintenance against extraction of severely compromised teeth. Specifically, this article addresses the conditions of significance for the establishment of a proper treatment plan and describes cases in which extraction may be the preferred treatment of choice.

## Formulating a treatment plan

### Evaluating the potentials of endodontics

Critical to the selection of cases for conservative treatment is many times the assessment of the potential to conduct a successful endodontic treatment. On consulting the endodontic literature, one will find numerous clinical follow-up studies, commencing with the one by Strindberg (14), that have evaluated both the outcome and the most significant treatment factors that may determine outcome (15–18). Even based on very stringent criteria (absence of postoperative signs of apical periodontitis at recall), these studies have reported very high success rates of endodontics and in the range of 90% with somewhat less successful outcomes for teeth with primary root canal infections. Thus, it is important to keep in mind that the success rates vary, depending on the status of the pulp (vital, necrotic, infected necrosis with apical periodontitis) before the endodontic treatment. Sjögren (18) reported for example that all 30 roots observed with a vital pulp condition were without apical periodontitis at the 8–10-year follow-up, whereas in teeth with necrotic pulps and apical periodontitis, lesions resolved in 86% of the analyzed cases. This observation reflects why occasionally it is not possible to eliminate completely an endodontic infection to the extent that apical periodontitis is resolved. Interestingly, the success rate for orthograde retreatment of previously root-filled teeth plunged to 62% when a periapical lesion had been present at the outset. It should be pointed out that reduced success rates for teeth with apical periodontitis do not imply that such teeth necessarily are candidates for extraction. In fact, if tooth survival is used as a measure for success of endodontics, there will be very few failures. Salehrabi & Rotstein (19) estimated from a survey of nearly 1.5 million teeth, endodontically treated within a dental insurance plan, that 97% were fully functional 8 years after initial non-surgical treatment.

The data on endodontic success rates that emerge from the cited literature must be interpreted with caution. Often, longitudinal follow-up studies have been based on treatment effected by or supervised by endodontic specialists. The picture changes radically when cross-sectional epidemiological studies are taken into consideration. Cohorts of individuals with endodontic treatments carried out by general dental practitioners have now been examined in many countries (e.g. (20–32)). Often, such studies have been conducted on the basis of full sets of radiographs with assessments of prevalences and quality of endodontic treatments conducted as well as of presence or absence of periapical radiolucencies. These studies have consistently demonstrated that more than half of the teeth are inadequately treated and approximately 30–50% show radiographic signs of apical periodontitis. A recent longitudinal follow-up of endodontically treated

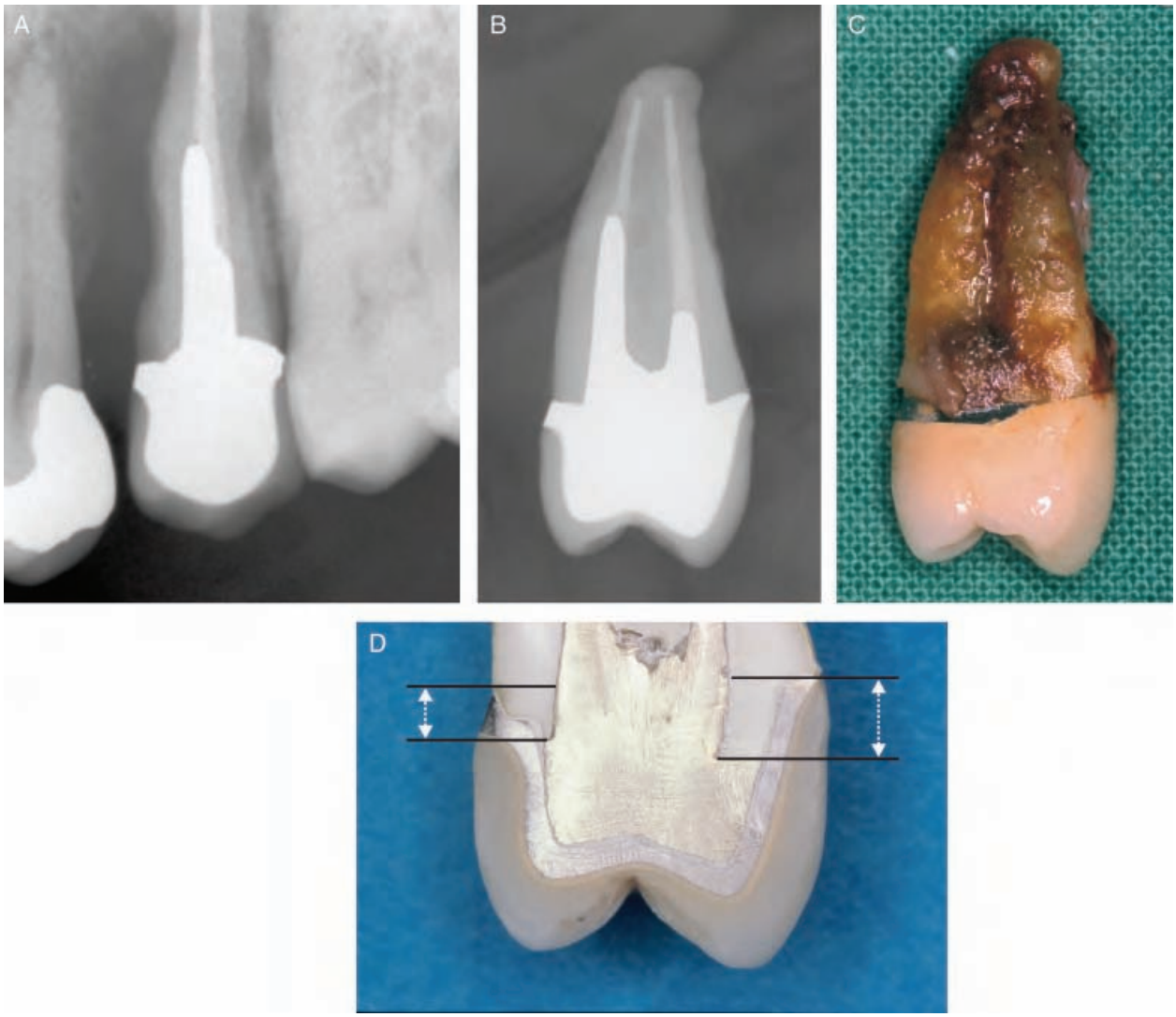



**Fig. 1. The maxillary second premolar of a 50-year-old patient had been treated endodontically ca. 10 years before, and restored with a cast post and a ceramo-metallic crown. The patient did not return to the clinic for any follow-ups until 10 years later when an abscess had emerged in the area. A radiograph demonstrated severe periodontal tissue destruction and the tooth was deemed non-treatable (A). Radiograph of the tooth after extraction (B) indicates that all treatments performed were carried out properly: an endodontic treatment with an adequately tapered canal preparation and dense root filling to the correct apical level; a cast post of adequate length, extending mainly in the palatal canal; good precision of the crown, and correct profiles. The mesial view of the tooth shows calculus and plaque covering the entire root surface to the apex (C). In order to examine the different components of the restoration, the extracted tooth was ground down in a bucco-lingual plan (D). The crown ends buccally on a 90° shoulder, and on a bevelled shoulder lingually, grabbing a sufficient quantity of residual tooth substance satisfying the ferrule effect. Consequently, this tooth was not lost because of endodontic or reconstructive failure, but for periodontal disease.**

teeth by practitioners in Denmark (33) demonstrated that the periapical status assessed in cross-sectional studies is not necessarily a stable condition. While apical bone lesions in some root-filled teeth may be in the process of healing, others may develop radiographic signs of apical periodontitis over time. For example, of endodontically treated teeth without apical periodontitis, 6 years earlier, 20% had developed apical periodontitis. The risk for deteriorated apical status seems higher for teeth with fillings of substandard quality (34).

From these data, important considerations emerge for a dental treatment plan. Firstly, high-quality endodontics represents a fundamental step in the multidisciplinary treatment of the gravely compromised tooth, whose value cannot be overemphasized.


**Fig. 2. The patient is a 25-year-old man with insufficient endodontic and reconstructive treatments on teeth 14, 15, and 16. A periapical radiolucency is seen on tooth 15 (A). The treatment plan included endodontic retreatment of the teeth, followed by coronal restorations with cast posts and ceramo-metallic crowns. A follow-up radiograph taken after 4 years shows healing of the lesion and good precision of the restorations (B). After 5 years, the patient presented with loss of the crown on tooth #15 (C, D). The post remained cemented to the crown (E). These images demonstrate the insufficient retention obtained in the presence of a short and conic post, and complete absence of a ferrule. Under these circumstances, the post and the crown may be recemented. Prognosis does not seem good, considering that occlusal forces may decement the restoration over again. Also, they may have induced undetected cracks in the root dentine. In conclusion, a conservative approach with high-quality endodontics resolved the periapical pathology, but the absence of ferrule effect most likely caused the restorative failure.**

Secondly, the clinical competency plays an important role in the treatment outcome. Thus, inexperienced dentists ought to consider the possibility of referring for specialist treatment, especially teeth that are crucial to the success of a comprehensive treatment plan. Thirdly, even in the hands of an endodontic specialist, there exists a margin for failure, which is greater in the presence of apical periodontitis.

## Evaluating the quantity of residual tooth substance

In the deliberation of whether or not to maintain a compromised tooth, the amount of remaining tooth structure is critical. As already stated, reconstruction of a severely broken down tooth with a full crown may more often than not be necessary to ensure long-term maintenance. Then, a post and core often has to be placed. At the same time, there should be coronal dentine remaining to obtain the so-called ferrule effect. A ferrule is a metal ring or cap intended to embrace the tooth structure cervically to achieve root strengthening and prevent shattering of the root ((35), see also the article by Kishen in this volume of *Endodontic Topics*).

Rosen (36) was the first to propose the concept of extra coronal reinforcement in 1961. To be efficient, the ferrule must be uniform around the cervical circumference of the tooth (Fig. 1). In clinical practice,

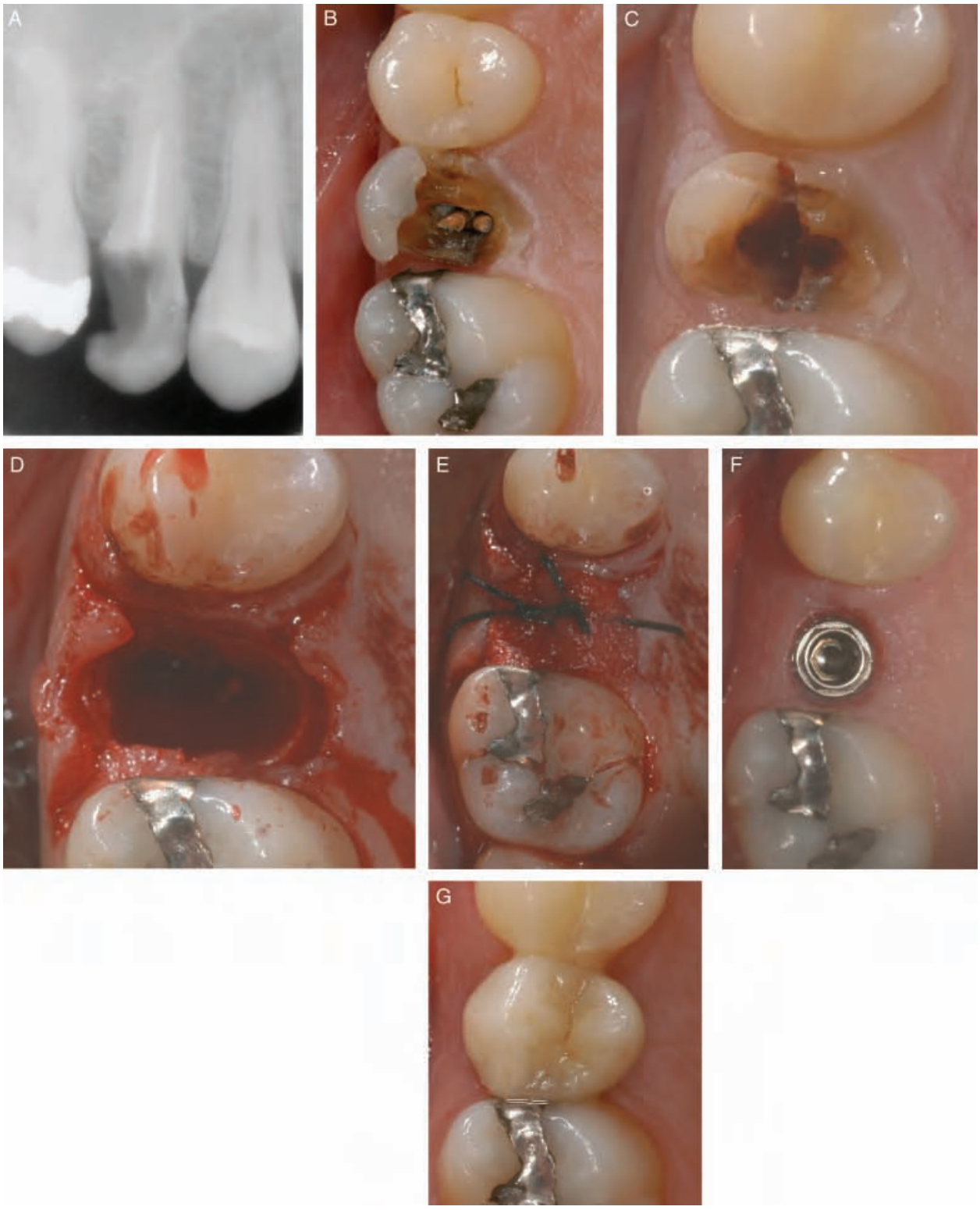



**Fig. 3. The maxillary second premolar was in a 26-year-old man who had received endondontic treatment of this tooth several years before. The root filling is incomplete but there is no periapical lesion (A). The crown is destroyed by recurrent caries, which extended apically to the gingival margin (B). A treatment plan including crown lengthening, endodontic retreatment, and a restoration with cast post and a ceramo-metallic crown was rejected as attaining a circumferential ferrule would require substantial alveolar bone removal to the detriment of neighboring teeth. An immediate post-extraction implant was carried out. The root was removed after careful sectioning (C, D). After preparing the apical seat, a self-tapping implant was inserted, and the gap was filled with hemocollagene (E). After 3 months of tissue healing (F), the implant was loaded (G).**

this may sometimes be hard to achieve. While *in vivo* studies supporting the concept is scarce (35), it has indeed been demonstrated *in vitro* that teeth restored with a fused post and core and a crown with a uniform ferrule of 2 mm are more resistant to fracture than teeth restored with a non-uniform height of ferrule, varying from 0.5 to 2 mm (37). Both groups of teeth in that study, with uniform and non-uniform ferrules, were more resistant to fracture compared with teeth without a ferrule.

Fracture is not the only complication that may occur after a restorative procedure. In the absence of a ferrule, when the crown relies on a post only for its retention, it is not unusual for a post and core to decement (Fig. 2). Based on the results of *in vitro* experiments, Sorensen & Engelman (38) demonstrated that as much as possible of the tooth substance should be conserved between the post and core and the preparation margin. For decoronated teeth, surgical crown lengthening can provide coronal dentine from the crown margin. However, such a procedure has limitations as the periodontal tissue support of neighboring teeth may be compromised.

On deciding the merits of a tooth for restoration, it is clear that the clinician must assess whether the quantity of residual supragingival tooth substance is sufficient. If a ferrule cannot be obtained, the patient should be informed of a questionable outcome of the crown restoration and be presented with an alternative treatment option, such as extraction and replacement with a traditional bridge, an implant, partial denture, or no replacement (Fig. 3). It should also be kept in mind that, even if the clinician seeks to obtain a ferrule effect, the risk for 'vertical fracture' may not be ruled out (Fig. 4).

## Evaluating the integrity of residual tooth substance

It is logical that not only the quantity but also the quality of the residual supragingival tooth substance be evaluated. Yet, an accurate assessment by simple clinical inspection or radiographic examination may not always be possible due to the presence of caries or restoration. It is therefore crucial to remove completely all carious tissues and all restorative materials present to allow proper assessment. This precaution is particularly important when a root fracture is suspected or is seen at a coronal level, as its presence may imply poor prognosis for tooth survival. In the case illustrated in Fig. 5, exploration of the base of the cavity, after removal of the restorative material and carious tissue,

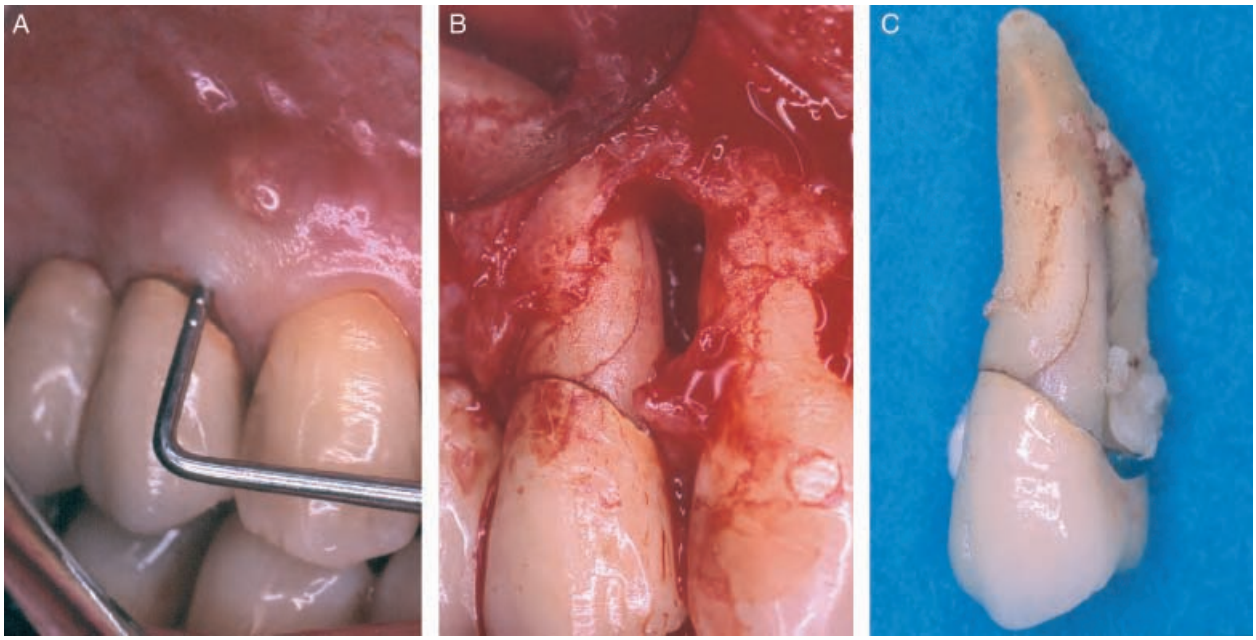



**Fig. 4. The maxillary first premolar of this 52-year-old woman had been treated endodontically and restored with a cast post and a ceramo-metallic crown with a ferrule. One year after cementation, the patient presented with a buccal sinus tract. An 8 mm pocket could be probed at the buccal aspect in addition (A). It was decided to raise a flap, which disclosed a vertical fracture (B). The tooth was extracted (C).**

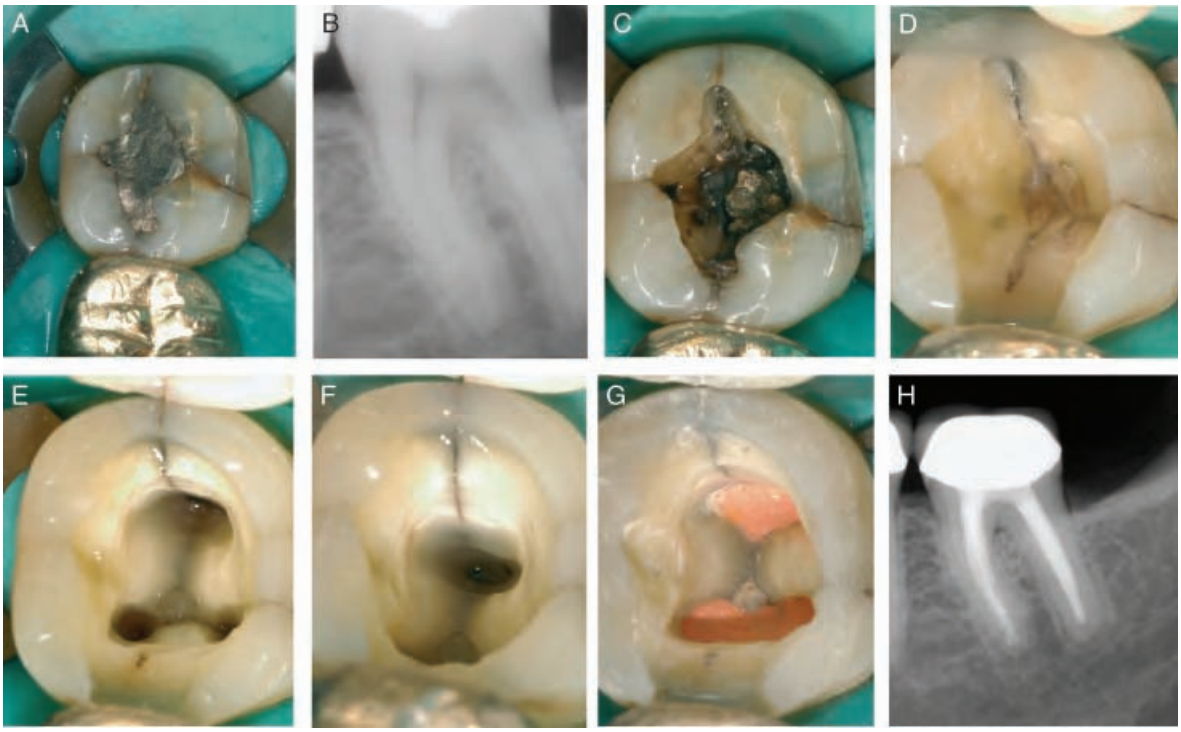



**Fig. 5. This case is about tooth #37 in a 38-year-old woman. The patient reported pain to chewing, and episodes of spontaneous pain. Thermal sensitivity testing gave exaggerated responses. Clinical inspection disclosed cracks in the enamel both buccally and lingually, as well as also in a distal direction involving the distal marginal crest (A). A periapical radiograph indicated no periapical pathology (B). Having arrived at a diagnosis of irreversible pulpitis, the tentative cause of a root fracture remained to be established. Removing the restoration to allow direct inspection of the underlying dentine was the first step to assess the depth of the cracks. This revealed carious tissue on the cavity floor (C). After removal of caries, a crack line running in a mesio-distal direction, together with a second crack running transversally, was observed (D). The next step was the removal of the pulp chamber roof (E). The distal fracture line appeared to be more severe (F). Its course in an apical direction seriously questioned conservation of the tooth. While endodontic treatment certainly is possible, the main problem is now periodontal, as an apical progression of the fracture may cause a periodontal lesion. At this point in time, no probable deep pocket was revealed. Prognosis is nevertheless not good and the patient was adviced extraction. In spite of the poor prognosis, the patient opted for a conservative treatment of the tooth. Endodontic treatment was completed (G), followed by a build-up with resin-composite, and a ceramo-metallic crown to hold the tooth pieces together. A radiograph taken after cementation of the crown shows no periodontal involvment (H). As cases like these carry a highly guarded prognosis, periodical follow-ups are mandatory.**

permitted the many fracture lines responsible for pulpal symptoms to be seen. However, it was only after uncovering the floor of the pulpal chamber that the extension of the fracture lines could be fully appreciated. At the time of examination, there was no sign of periodontal involvement at this level, but an apical propagation of the distal fracture line could be imminent. In a situation like this, the quandary is whether to treat or suggest extraction with replacement using an implant. Either way, the decision should be taken together with the patient. It is stressed that a proper diagnosis and thorough communication with the patient is imperative to maintaining a good rapport and to reduce the risk of medico-legal actions. After an analogous diagnostic procedure in the case displayed in Fig. 6, the presence of a fracture line was seen on the floor of the pulp chamber and resulted in a decision to extract the tooth.

While overextended access opening preparations for endodontic treatment should be avoided, direct straight-line accesses allow fracture lines on the floor of the pulp chamber to be revealed. When fracture lines involve the orifices of the root canals, conservation of the tooth must be deemed highly questionable (see case in Fig. 7). On superficial examination, the clinician could have easily presumed that a simple post and core and a porcelain-bonded crown would have resolved the esthetic problem of tooth #25. Removal of the

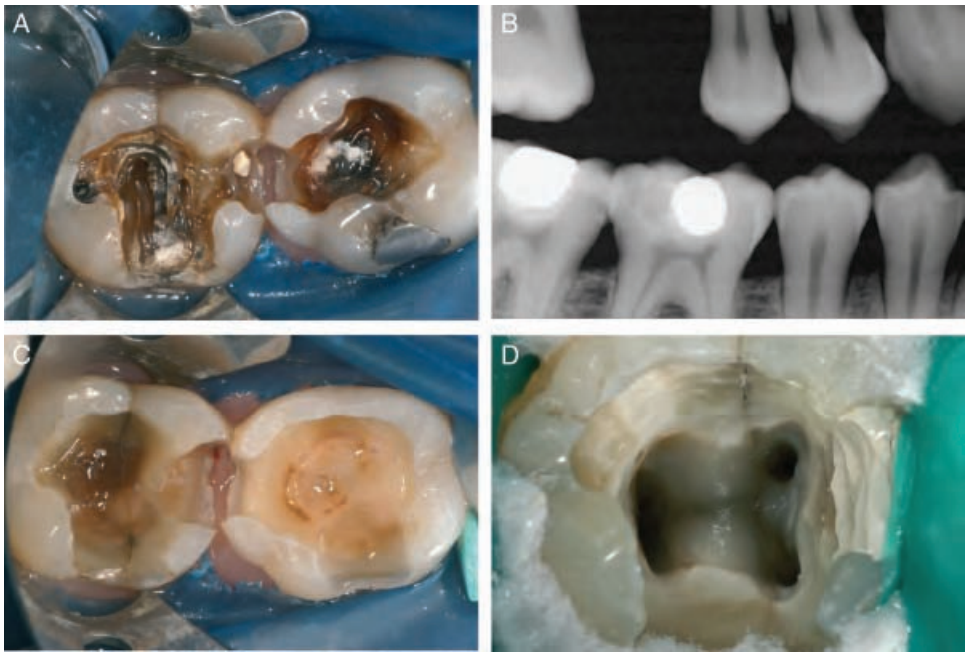



**Fig. 6. The case is a 40-year-old man presenting with severe pain to chewing in the mandibular right quadrant. A bite-wing radiograph displayed amalgam restorations and recurrent caries (B). It was decided to remove restorations to evaluate the residual dentine. After anesthesia, isolation, and removal of filling material, large quantities of carious tissue appeared (A). A fracture also crossing in a bucco-lingual direction appeared on the floor of tooth #47 (C). In order to explore the depth of the fracture, the pulp chamber was opened and revealed involvment of the pulp chamber floor (D), which cautioned the option of attempting a conservative treatment. The tooth was extracted.**

restorative material revealed the true amount of sound tooth structure and also the presence of a fracture line, thus lessening the chance for long-term maintenance. It should be stressed that all diagnostic procedures in this context are best carried out under a rubber dam using magnification and good light.

## Evaluating the periodontal tissues

When caries or a fracture has advanced to such an extent that the periodontal ligament and the crestal bone below the gingival margin are involved, restoration of the tooth presents with more advanced problems than those already described. In all cases, it is imperative that a restoration is completed on sound tooth structure. If gingival tissue extends over the tooth margins, the tooth cannot be restored properly unless the periodontal tissues are apically repositioned. Of course, lengthening of the clinical crown may be considered in such cases, as long as it does not necessitate excessive removal of bone tissue from the adjacent teeth. The final restoration must be placed in such a position that it does not encroach on the periodontal tissues, thus allowing for the width of a sufficient amount of attached gingiva (ca. 3 mm). Owing to this reason, meticulous clinical evaluation and radiographic examination are crucial. Aspects such as root length, proximity to the neighboring teeth (in the case of interproximal defects), the distance between the margin of the defect and the furcation area (in multirooted teeth), and above all, the distance between the apical limit of the defect and the bone must be evaluated. It is imperative that radiographs be taken with as little distortion as possible.

On crown lengthening, it is important to decide how much bone should be removed. Of course, all carious tooth substance should be excavated first to reveal the level of sound tooth substance. This is illustrated in the case displayed in Fig. 8, where the precise amount of bone to be removed distally to the canine could be assessed chairside after having eliminated the hyperplasic gingival tissue in the cavity and the carious lesion.

Multirooted teeth with loss of attachment in the furcation have special problems in that the prognosis is less favorable unless the area can be properly managed by oral hygiene measures. Hemisection and resection

procedures are used in an attempt to maintain multi-rooted teeth that present with advanced periodontal involvement (39). This may be considered when one root is affected by non-treatable periodontal disease, whereas the others are only moderately affected (Fig. 9).

There are few longitudinal studies over long periods assessing the outcome of this type of treatment, and it is difficult to compare the results of those published due to the differences in the periods of observation as well as criteria used for evaluation. Blomlöf et al. (44), in a longitudinal study conducted over 10 years, found that

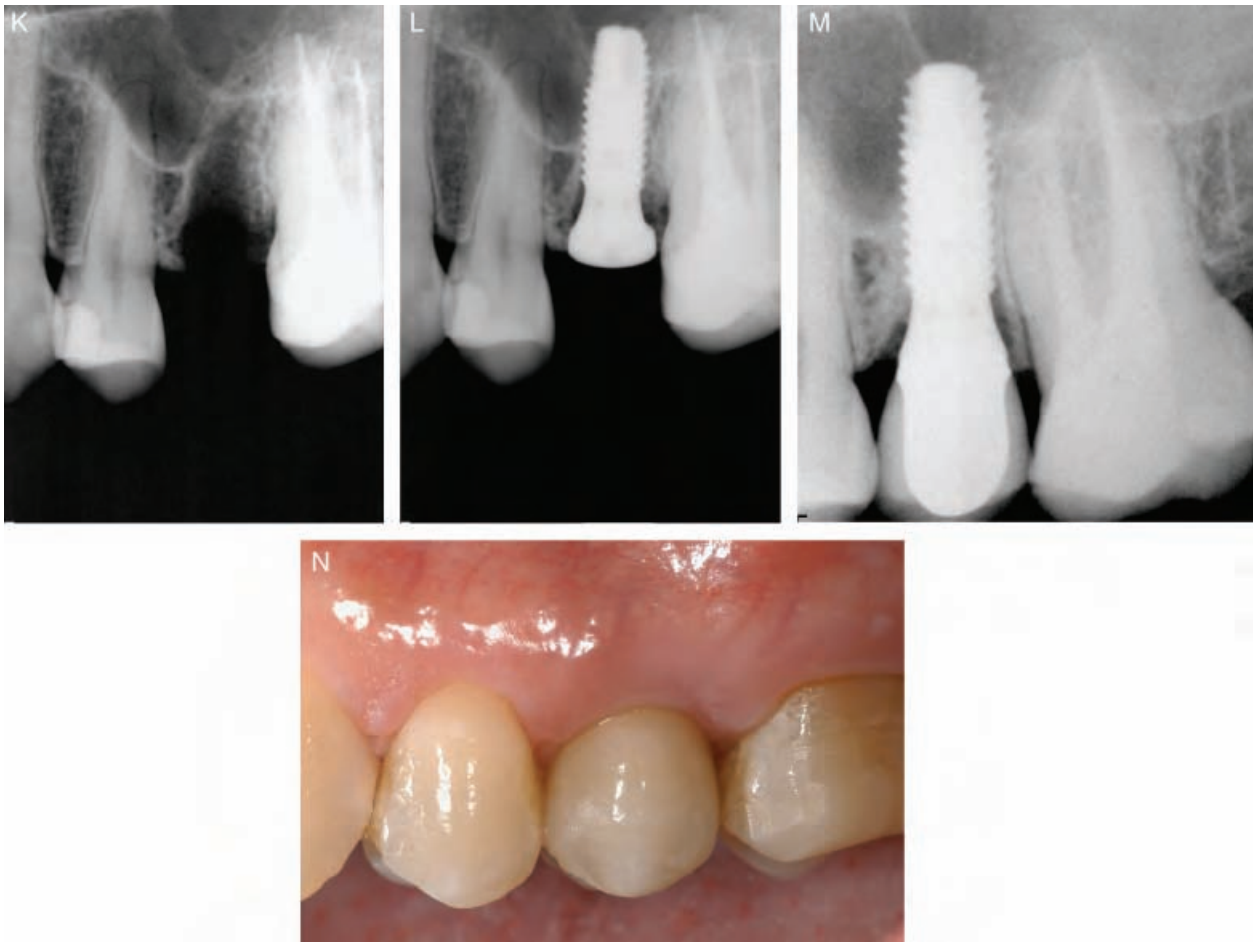



**Fig. 7. The case describes the diagnostic procedure and treatment of tooth #25 in a 38-year-old woman. The main problem was the unesthetic appearance of the maxillary second premolar (A). The tooth had been treated endodontically several years before and the crown had been restored with amalgam (B). A radiograph showed that the apex was in continuity with the sinus floor, and no periapical lesion was present (C). During preparation for the entrance of the canals, a significant quantity of tooth structure had been removed mesially. It is evident that clinical examination and radiograph alone were not sufficient to guide the treatment decision. After isolation and removal of all restorative materials, the residual tooth structure could be inspected (D). Only at this point the large loss of tooth structure was evident (only undermined enamel remained). A fracture line also became obvious at the distal aspect of the root. Conservation of the tooth through a cast post and a ceramo-metallic crown therefore did not seem worthwhile. The treatment plan included extraction and its substitution with an implant (E–J). In the absence of a periapical lesion, it was decided to place an immediate postextraction implant (H). To allow this procedure, great care must be exercised in removing the tooth to preserve the integrity of the alveolar margins, particularly at the buccal aspect. The extraction procedure included cutting the tooth into pieces (E–G). The radiographs show the integrity of the alveolus after extraction of the root (K), freshly inserted implant (L), and the 6-month follow-up (M). The maintenance of the gingival architecture and an optimum integration of the prosthesis from both a dental and a periodontal aspect is shown in (N).**

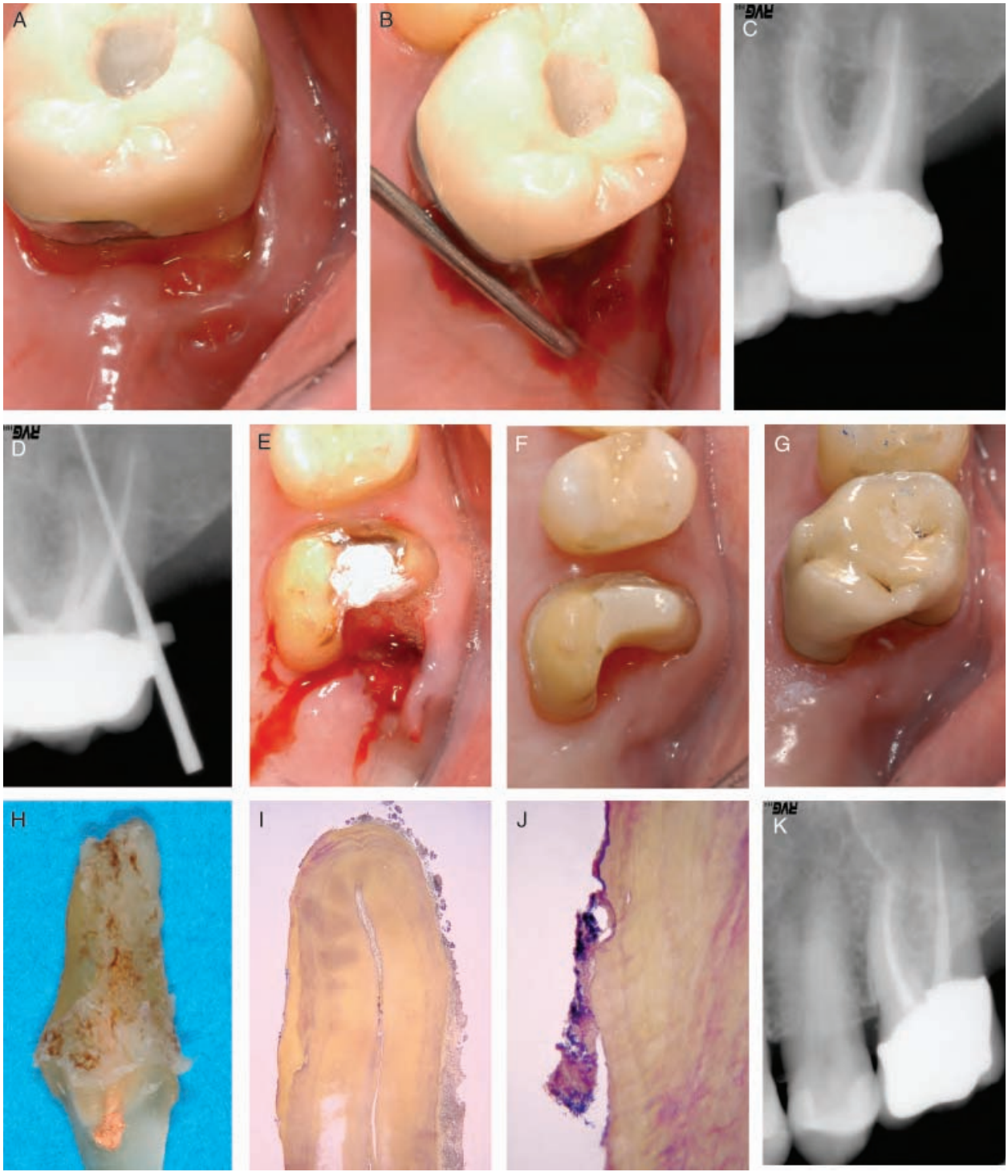
the prognosis for root-resected posterior teeth was not worse than that for single-rooted teeth with similar periodontal involvement. Also, other longitudinal studies have revealed high percentages of success of root-resected teeth (40, 41). Buhler (42) examined available longitudinal studies in the literature and recorded an overall failure rate of 13%. This percentage figure was compared with the results of studies on implants. It became apparent that the failure rate was quite similar. Fugazzotto (43) followed 701 resected molars and 1472 posterior implants for 15 years. Resection of the distal root of mandibular molars demonstrated the lowest percentage of success (75%). Other roots had a success rate of 95–100%. Implants in the position of the second molar, as posterior support for bridges, had the lowest success rate (85%). All other


**Fig. 8. The maxillary left canine in a 30-year-old woman had the clinical crown totally destroyed, and only the enamel remained buccally (A). A palatal view shows that the destruction and gingival tissue has grown into the defect, whose margins are not visible (B). The radiograph confirmed the severity of the tooth tissue destruction (C). It was evident that a proper root canal treatment to conserve this tooth would require removal of a certain quantity of bone at the distal aspect. The patient was informed about the possibility of extraction, followed by an implant-supported crown, but she opted for a conservative treatment. Crown lengthening was carried out following caries excavation to sound dentin and exposure of a vital pulp (D). Endodontic treatment could subsequently be carried out properly under adequate asepsis. (E, F) Finally a cast post and core and a ceramo-metallic crown was placed (G). The condition was stable at 4-year follow-up (H).**

implants in molar positions were near 100% successful (97–99%). Thus, hemisection, being a relative simple procedure, inexpensive, and having a relatively good prognosis in carefully selected cases, is a viable treatment alternative to tooth extraction. Outcome certainly depends on how well each step of the treatment is performed including endodontic, periodontal, and prosthetic treatments (40, 44, 45).

## Reflection on the use of dental implants for replacement of compromised teeth

Once the decision has been taken to extract a given tooth with bleak potentials for conservative treatment, replacement using an osseointegrated implant may be a very useful option (Figs 3 and 7). Within the dental profession, recent years have certainly witnessed a tremendous surge in the use of this technology spurred by prospective multi-center studies demonstrating very high rates of success for both single and multiple implants (46–57). In fact, failures registered have been few and when occurring most implant losses have been



observed during the first year of function (58, 59). Nevertheless, it would be ill-advised to promise, before extraction, that replacement using an implant invariably can be carried out successfully. In fact, there are a number of conditions that should caution the clinician to suggest such a treatment. These include whether or not the patient is a smoker, and whether or not there is non-treated periodontal disease. Such factors are now known to impair the prognosis for a successful long-term outcome (60, 61). Furthermore, the amount of bone resorption that may occur around an implant following extraction is not possible to predict, as implants are no bone-preserving vehicles (62). In the treatment-planning phase, one must also recognize the condition of neighboring teeth and any pathology these teeth may be affected by and that ought to be addressed. Further considerations include whether or not one shall attempt a direct procedure following extraction or wait for soft and bone tissue healing before insertion. In other words, for a successful outcome of tooth replacement using implants proper case selection and skillful management are indeed decisive factors (63).

**Fig. 9. Tooth #26 had been restored with a crown ca. 5 years before. Because of symptoms attributed to an endodontic problem, the tooth had recently been treated endodontically with an access prepared through the crown. Symptoms, however, did not resolve. Tooth #27 had been extracted several years earlier because of periodontal disease. At clinical examination, a gingival recession and a sinus tract were present (A). Probing distally revealed a more than 10 mm pocket (B). A radiograph taken in an orthoradial view was inconclusive (C). A long metal probe was inserted into the pocket, and an angulated radiograph subsequently taken (D) showed penetration beyond the root apex, confirming a large bone defect around the distal root. The other two roots had normal pocket probing depths. Hemisection with extraction of the distobuccal root was suggested and carried out following removal of the crown (E). A temporary resin crown was placed and after 6 months, the periodontal tissues appeared to be in a satisfactory condition (F). (G) shows the crown just cemented. After 1 year, a follow-up radiograph (K) revealed normal periodontal tissues. The extracted root (H) was processed for study under a light microscope. The microphotograph in (I) shows an overview of the apex stained with a modified Brown & Brenn to disclose bacterial profiles. High-power view of the apical root surface (J) shows resorption areas covered by a bacterial biofilm, confirming the cause of the condition as being periodontis.**

## Concluding remarks

The decision to maintain or extract a gravely compromised tooth is a challenging task, especially today, with the access to the potential of replacing the tooth with a dental implant-based restoration. The clinical cases selected for this article demonstrate that in some clinical situations, the decision may be to attempt salvaging the tooth using a multidisciplinary team approach. Yet, in other cases, a simple extraction would be equally correct. An appropriate treatment plan puts to test the diagnostic ability of the clinician, his/her clinical experience and skill as well the ability to communicate his/her assessment with the patient. Of course, as a responsible clinician, one must put aside preconceived ideas and not let financial needs dictate the advice. Resorting to implants whenever a case appears complicated should be discouraged. For example, a general dentist not overly experienced in the field of endodontics, who comes across a tooth with a complex anatomy and a periapical lesion, may be tempted to take the easier route of extraction. Similarly, an operator who does not master the means to cure periodontal disease or techniques of crown lengthening, root amputation as well as root resection may more readily prefer the implant alternative. By the same token, it is necessary to avoid the other extreme, that is, to being overly conservative and proceed with a treatment without critically evaluating the potentials for a successful outcome. Indeed, balancing these options is delicate. In these extreme cases, care must be taken to carry out every diagnostic procedure available, even those more invasive. This means that before arriving to a definitive diagnosis and treatment plan, a conscientious operator should obtain the patient's consent to remove a restoration in order to analyze the residual tooth structure and assess the potential to carry out a reliable treatment. When it does seem possible to maintain a compromised tooth with multidisciplinary intervention, the patient must be informed of the feasibility and the margins of success of each treatment option.

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