

Surgical endodontic retreatment

C. REIT & J. HIRSCH* *Department of Endodontics, Faculty of Odontology, University of Göteborg, and *Department of Oral Surgery, Public Dental Service, City of Göteborg, Sweden*

Summary. In teeth with periapical lesions and defective root canal seals non-surgical retreatment is usually preferred. Sometimes, however, such treatment may not be feasible and periapical surgery must be performed. The present study investigated a technique of retrograde root canal treatment as an alternative to the more conventional types of surgical procedure. The material consisted of 35 teeth whose root canals contained posts. In 77 per cent of the cases it was possible to instrument and obturate the root canal up to the post. Following treatment the periapical tissues, as evaluated clinically and radiographically, showed evidence of having healed in 71 per cent of cases.

Introduction

The basic objective of endodontic treatment is to clean and obturate the root canal space. However, treatment procedures do not invariably produce the desired healing. Periapical lesions, sometimes in conjunction with clinical symptoms, may persist or develop. The frequent association of periapical lesions with defective obturation of root canals has been demonstrated in several studies (Strindberg 1956, Engström 1964, Kerekes & Tronstad 1979). In such cases it has been recommended that the root canal should be retreated non-surgically, in order to clean the canal and improve the seal (e.g. Bergenholtz *et al.* 1979). Sometimes non-surgical retreatment may not be feasible, for example, when the root canal contains a post which is very difficult or impossible to remove; in this situation surgical retreatment is an appropriate alternative.

A method designed to improve the technical quality of the seal during periapical surgery has been described by Nygaard-Östby (1971). He suggested a pro-

cedure where the root canal was debrided, shaped and obturated from the apical end and in a coronal direction. This 'retrograde root canal treatment' was designed to produce the optimal possibility of removing irritating material still present in the canal, and to produce a satisfactory seal. Since no reports have been published on the subject, the aim of the present study was to investigate the technical aspects of the proposed method, and to conduct a primary evaluation of resultant healing.

Materials and methods

The treatment sample was selected from patients referred to the Department of Endodontics, University of Göteborg, and the Department of Oral Surgery, Public Dental Service, City of Göteborg. Thirty-five teeth in 33 patients were chosen for treatment (Fig. 1). Their ages ranged 26–67 years (mean 54 years). The consecutively selected cases all had radiographic signs of periapical disease. In eight of the cases, clinical symptoms such as pain, tenderness or swelling, were also present. The root canals in each case had received previous endodontic treatment which was evaluated as technically unsatisfactory. Representative cases are shown in Fig. 2. Non-surgical endodontic retreatment was considered impossible or undesirable in all instances because of the presence of posts within canals.

Surgical procedure

After injection of a local anaesthetic a buccal marginal mucoperiosteal flap was raised. The apical parts of the roots were exposed by bone removal with burs when necessary. The apices were resected in cases with apical calcification. The root canals were cleaned and shaped with Hedstrom files held in a

Correspondence: Claes Reit, Department of Endodontics, Faculty of Odontology, University of Göteborg, Box 33070, S-400 33 Göteborg, Sweden.

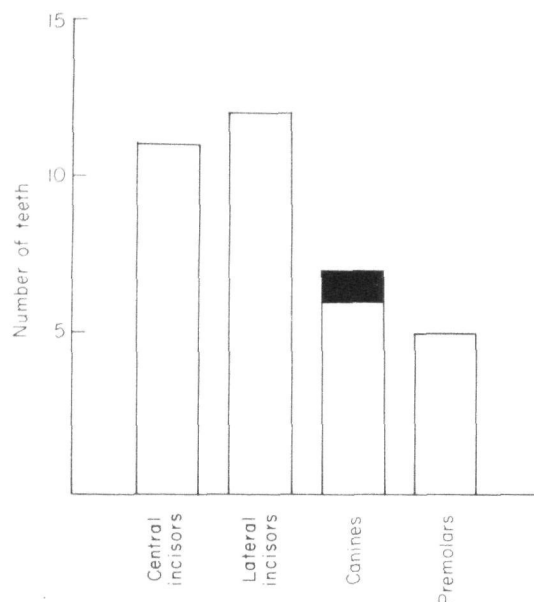


Fig. 1. Distribution of cases according to tooth type. Unfilled parts of bars denote maxillary teeth and filled parts mandibular teeth.

haemostat. Sodium hypochlorite (0.5 per cent) in a 5 ml single-use syringe¹ was used as an intra-canal irrigant. An attempt was always made to instrument the root canal up to the apical part of the post. Obturation of the root canal system was carried out with a lateral condensation technique using chloroform-softened gutta-percha.² The technical procedures are further described in Fig. 3. The surgical area was then carefully irrigated with sterile saline solution and the flap was replaced and sutured.

Evaluation of results

Patients automatically became participants in the recall system of the Department of Endodontics, which implies that a case is usually examined every other year, until it is classified either as healed or as a failure. In the present study patients were recalled for final clinical and radiographic evaluation during 1984. At these recall examinations two radiographs were taken from slightly

different angles using the method described by Eggen (1969). The radiographs were evaluated simultaneously by the two authors. Films were examined under moderate illumination at a light table and with the aid of a magnifying viewer equipped with a masking frame, which was the size of a dental film.

During evaluation of radiographs the maximum working length (the distance from the root apex to the apical end of the post) and the length of any observed space between the coronal end of the root canal filling and the post was measured (Fig. 3). Pre-surgical radiographs and final recall radiographs were compared and the bone lesions were classified as larger, unchanged, smaller or healed. The criteria used for classifying a case as healed were those of Rud *et al.* (1972): 'A lamina dura is to be followed around the apex. The width of the periodontal space in the apical region may be widened to as much as twice the normal around non-involved parts of the root. A tiny defect in the lamina dura adjacent to the root filling is tolerated (maximum 1 mm²). The bone cavity should be filled in with bone although this may not have the same radio-opacity and structure as the non-involved bone' (Fig. 2).

Results

The technical results obtained with retrograde root canal treatment are shown in Table I. In 27 of the 35 cases (77 per cent) it was possible to shape and obturate the root canal to within 0.5 mm of the post. The remaining roots were all negotiable with Hedstrom files, but to a shorter extent; in most of these latter cases this was due to inability to remove the coronal portions of the old root canal filling material or the cement surrounding the post. In all cases the instrumented part of the root canal was adequately filled with gutta-percha, i.e. no space was discernible between the root canal walls and the filling material, as judged radiographically.

At the final recall examination 25 of the cases were classified as healed (71 per cent), eight of the lesions (23 per cent) were reduced in size, and one was regarded as unchanged (Table II). Canals obturated to within

¹Once®, ASIK, Denmark.

²Ordinary gutta-percha points, DeTrey AG, Zürich, Switzerland.

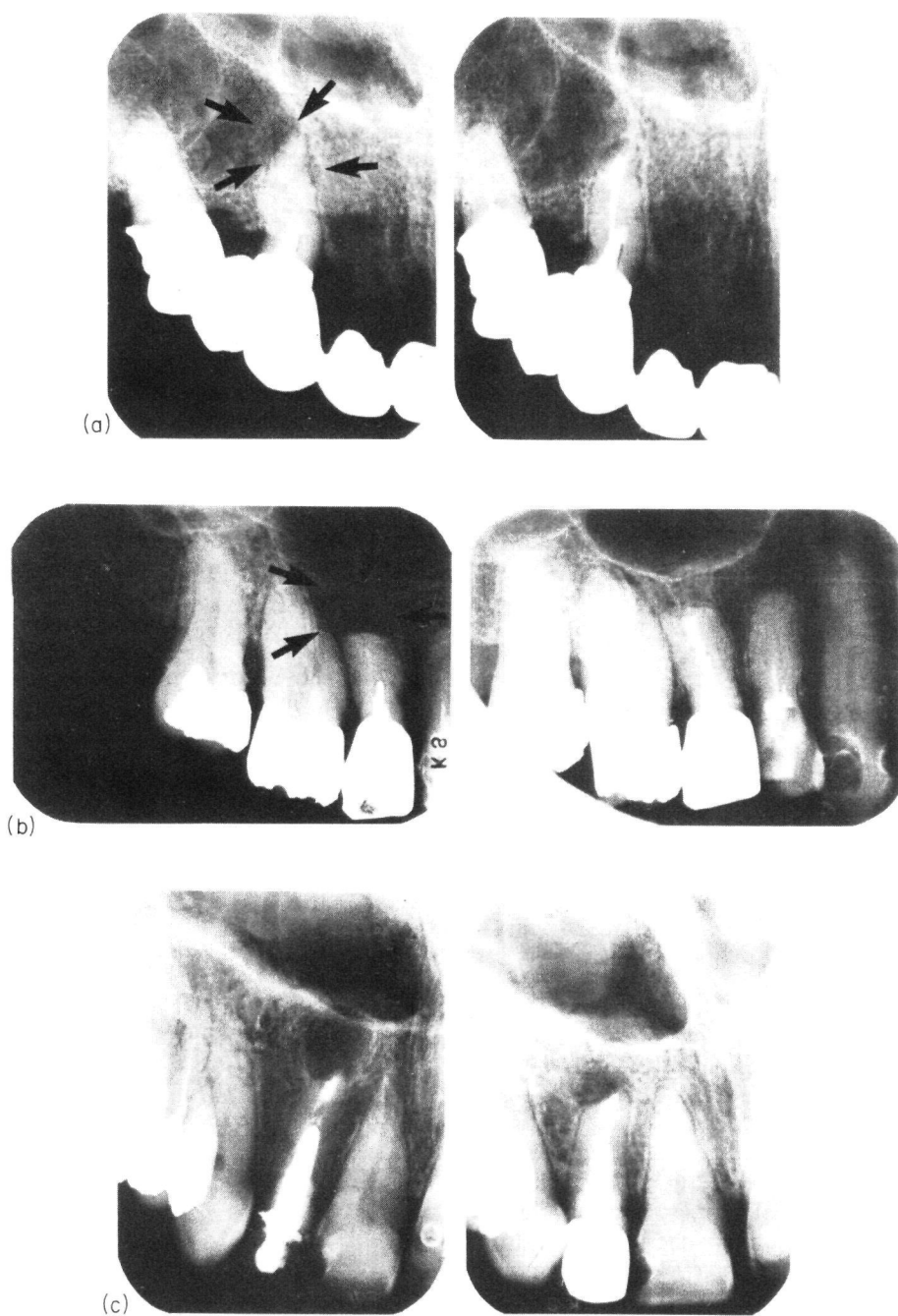


Fig. 2. (a) A 67-year-old woman presenting with acute apical periodontitis of the right maxillary canine. At the final recall examination, 6 years after surgery, the periapical tissues were classified as healed. (b) A 67-year-old woman with chronic apical periodontitis of a maxillary second premolar. This was classified as healed at the final 4-year recall. (c) A lateral incisor with chronic apical periodontitis in a 55-year-old woman. This patient developed a post surgical abscess. At the final recall, after 7 years, the periapical lesion was judged to be reduced in size.

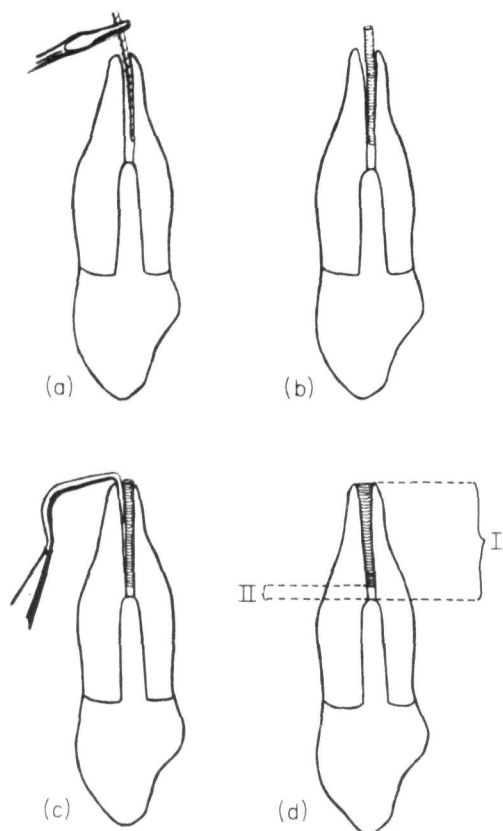


Fig. 3. Intracanal treatment procedures. (a) Instrumentation begins with a cut-off Hedstrom file (ISO size 20) held in a haemostat. Using a flare preparation technique the root canal is enlarged to ISO size 40–50. Sodium hypochlorite (0.5 per cent) is used as an irrigant. (b) A gutta-percha master point is selected, (large, long gutta-percha points¹) fitting 2 mm short of the coronal end of canal, which has been dried with absorbent paper points. (c) The master point is softened in chloroform and pushed slowly up to the coronal end of the root canal. Lateral condensation is carried out with the use of an angled gutta-percha spreader.² Additional points are softened in chloroform and inserted into the canal. Excessive root filling material is removed by a heated excavator. (d) Maximum working length (I) and the space between the root canal filling and the post (II) are measured on the radiograph.

0.5 mm of the post showed complete periapical healing in 21 cases (78 per cent). Of eight root canals obturated at a distance greater than 0.5 mm from the post, four showed complete healing (50 per cent).

¹DeTrey AG, Zürich, Switzerland.

²Gutta-percha spreader no. 3, Kerr Sybron, Romulus, Michigan, USA.

Table I. Technical results of retrograde root canal filling. Distribution of cases according to working length and unobturated distance between root canal filling and post

Maximum working length (mm)	Unfilled space (mm)	
	≤ 0.5	> 0.5
≤ 5	10	2
> 5	17	6

Only one of the patients developed clinical signs of periapical disease. In this case a draining sinus tract was noticed 4 years after surgery. Abscesses as immediate post-surgical complications were found in two patients.

Discussion

The development or persistence of a periapical radiolucency following endodontic treatment is often regarded as a criterion of failure. Endodontic failures are most frequently associated with defective root canal obturation (Strindberg 1956, Bergenholtz *et al.* 1973) and the presence of bacteria in the root canal system (Sundqvist 1976, Fabricius 1982). Hence, retreatment had been proposed in such cases. For the clinician faced with a choice between non-surgical and surgical procedures the literature on prognosis is confusing. For non-surgical endodontic retreatment the reported frequency of successful cases varies between 60 per cent and 80 per cent (Molven 1974, Bergenholtz *et al.* 1979). However, such studies are rare. The success rate of surgical treatment has been discussed by many authors and is reported to vary between 30 per cent and 65 per cent, depending on variations in material, method of operation and criteria for evaluation of healing (e.g. Persson 1966, Mattila & Altonen 1968, Nordenram & Svärdröm 1970, Hirsch *et al.* 1979). However, due to the problem of defining criteria of periapical normalcy and disease, comparisons and conclusions based on data obtained in radiographic recall studies are extremely difficult to make (e.g. Goldman *et al.* 1972, Reit &

Table II. Comparison of periapical lesions in 35 cases between initial and final examination

Follow-up period (years)	Healed	Smaller size	Unchanged size	Larger size/symptoms
1	3			
2	3	2	1	
3	3			
≥4	16	6		1
Totals	25	8	1	1

Hollender 1983). In any event, consensus has been reached in the literature regarding the importance of the quality of root canal obturation on the outcome of the treatment. This has led many authors to recommend a non-surgical approach to retreatment of periapical lesions in teeth showing defective root canal fillings (e.g. Nygaard-Östby 1971, Bergenholtz *et al.* 1979). However, such procedures sometimes cannot be done, primarily for technical reasons. In these cases the treatment method described in the present study offers a method to achieve canal debridement and establish an apical seal when non-surgical retreatment is contra-indicated.

Compared with the conventional surgical approach the retrograde shaping of the root canals sometimes required a more extensive removal of periapical bone. The retrograde root canal treatment thus seems most appropriate in regions where the roots are rather close to the buccal cortical plate of bone. Old root fillings were usually easy to remove, and root canals were instrumented in a coronal direction as far as possible; the working length was established merely on a tactile basis. A very gentle and careful cleaning of the root canal was then carried out in order not to contaminate the periapical tissues with intracanal infectious material. During this procedure the root canal was flushed with sodium hypochlorite (0.5 per cent), which has previously been shown to have a good antimicrobial effect (Byström & Sundqvist 1983, Foley *et al.* 1983) as well as a low irritant effect on tissues (Spångberg *et al.* 1973, Thè *et al.* 1980). However, efforts were always made to keep the irrigant strictly

within the canal. From a clinical point of view, shaping of the root canal was considered as complete when a large-sized, long gutta-percha cone with its tip cut off could easily be introduced.

Total debridement and obturation were the objectives of the 'retrograde root canal treatment' used. This goal was accomplished in 27 of the 35 cases (77 per cent). Thus, at least in the anterior region, this method appears to have considerable potential for removing intracanal irritants, and improving obturation in a sizeable area of the root canal system. Although the risk of spreading infectious material during cleaning of the canal might be considered high, only two of the patients developed postsurgical abscesses.

Using a very strict criterion of periapical healing 25 of the 35 treated cases were classified as healed (71 per cent). Further emphasis on the importance of thoroughly debriding and obturating the root canal was the fact that the healing frequency reached 78 per cent when the root canal could be shaped and obturated to within 0.5 mm of the post, compared with 50 per cent when this was not possible. Because of the small sample size of cases in this study, the use of statistical analysis was not warranted. However, the results do indicate the potential usefulness of a surgical approach to endodontic retreatment which combines surgical curettage with root canal debridement and filling. Further studies on the subject would be of value.

References

- BERGENHOLTZ, G., LEKHOLM, U., MILTHON, R.,
HEDEN, G., ÖDESJÖ, B. & ENGSTROM, B.

- (1979) Retreatment of endodontic fillings. *Scandinavian Journal of Dental Research*, **87**, 217–224.
- BERGENHOLTZ, G., MALMCRONA, E. & MILTHON, R. (1973) Endodontisk behandling och periapikalstatus. *Tandläkartidningen*, **65**, 269–279.
- BYSTRÖM, A. & SUNDQVIST, G. (1983) Bacteriologic evaluation of the effect of 0.5 per cent sodium hypochlorite in endodontic therapy. *Oral Surgery, Oral Medicine and Oral Pathology*, **55**, 307–312.
- EGGEN, S. (1969) Standardiserad intraoral röntgenteknik. *Sveriges Tandläkarförbunds Tidning*, **61**, 867–872.
- ENGSTRÖM, B. (1964) *Bacteriological cultures in root canal therapy*. Thesis, University of Umeå.
- FABRICIUS, L. (1982) *Oral bacteria and apical periodontitis*. Thesis, University of Göteborg.
- FOLEY, D.B., WEINE, F.S., HAGEN, J.C. & DE OBARRIO, J.J. (1983) Effectiveness of selected irrigants in the elimination of *Bacteroides melanogenicus* from the root canal system: an *in vitro* study. *Journal of Endodontics*, **9**, 236–241.
- GOLDMAN, M., PEARSON, A.H. & DARZENTA, N. (1972) Endodontic success—who's reading the radiograph? *Oral Surgery, Oral Pathology and Oral Medicine*, **33**, 432–437.
- HIRSCH, J.-M., AHLSTRÖM, U., HENRIKSSON, P.-Å., HEYDEN, G. & PETERSON, L.-E. (1979) Periapical surgery. *International Journal of Oral Surgery*, **8**, 173–185.
- KEREKES, K. & TRONSTAD, L. (1979) Long-term results of endodontic treatment performed with a standardized technique. *Journal of Endodontics*, **5**, 83–90.
- MATTILA, K. & ALTONEN, M. (1968) A clinical and roentgenological study of apicoectomized teeth. *Odontologisk Tidskrift*, **76**, 389–408.
- MOLVEN, O. (1974) *The frequency, technical standard and results of endodontic therapy*. Thesis, University of Bergen.
- NORDENRAM, Å. & SVÄRDSTRÖM, G. (1970) Results of apicectomy. *Svensk Tandläkare Tidskrift*, **63**, 593–604.
- NYGAARD-ÖSTBY, B. (1971) *Introduction to Endodontics*. Universitetsförlaget, Oslo.
- PERSSON, G. (1966) Bedömning av resultatet efter rotamputation. *Svensk Tandläkare Tidskrift*, **59**, 219–228.
- REIT, C. & HOLLENDER, L. (1983) Radiographic evaluation of endodontic therapy and the influence of observer variation. *Scandinavian Journal of Dental Research*, **91**, 205–212.
- RUD, J., ANDREASEN, J.O. & JENSEN, J.E. (1972) Radiographic criteria for the assessment of healing after endodontic surgery. *International Journal of Oral Surgery*, **1**, 195–214.
- SPÅNGBERG, L., ENGSTRÖM, B. & LANGE LAND, K. (1973) Biologic effects of dental materials. 3. Toxicity and antimicrobial effect of endodontic antiseptics *in vitro*. *Oral Surgery, Oral Medicine and Oral Pathology*, **36**, 856–871.
- STRINDBERG, L.Z. (1956) The dependence of the results of pulp therapy on certain factors. *Acta Odontologica Scandinavica*, **14**, Supplement 21.
- SUNDQVIST, G. (1976) *Bacteriological studies of necrotic dental pulps*. Thesis, University of Umeå.
- THÈ, S.D., MALTHA, J.C. & PLASSCHAERT, A.J.M. (1980) Reactions of guinea pig subcutaneous connective tissue following exposure to sodium hypochlorite. *Oral Surgery, Oral Medicine and Oral Pathology*, **49**, 460–466.

This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.