

A Comparative Study of the Single-Visit and the Multiple-Visit Endodontic Procedure

Walter Soltanoff, DDS, Montclair, NJ

This study compares the effects of treating teeth endodontically in either a single visit or in multiple visits based on the random selection of cases performed in clinical practice during a period of 20 years.

Few comprehensive studies of the one-visit endodontic procedure exist in the dental literature. This is surprising in view of the many advantages inherent in this procedure. Aside from the obvious advantage of economy of time is the importance of restoring esthetics expeditiously in a traumatically damaged crown of a tooth. Another consideration is the importance of completing an endodontic procedure in a single visit when it is performed with the patient under general anesthesia in the office or hospital environment.

This report is based on 20 years of clinical experience during which time the one-visit procedure was performed several hundred times. The following conditions were considered optimal for this procedure: A vital tooth with no evidence of periapical pathologic conditions or inflammation, or a nonvital tooth in which a fistula is present and traceable to the periapical region.

One hundred thirty-five single-visit cases and 195 multiple-visit cases selected at random are the basis for this report, which compares the two procedures.

Plan of Study

In comparing the single- and multiple-visit procedures, three aspects of treatment were examined. The first was the incidence of pain. Records were maintained relating to the severity of pain, its duration, and whether medications were taken by the patients. Figure 1 illustrates the records kept for each patient, and Figure 2 is the postcard each patient sent back to the office several days after completion of treatment. The filling procedure and its effect on the results of treatment was also com-

pared. Did it matter in either the single- or multiple-visit procedures if the root canals were filled past the apex, to the radiographic apex, or short of it? The third comparison between the two procedures related to any possible variation in healing as observed radiographically in periods ranging from six months to two years postoperatively. The basis for radiographic evaluation is illustrated in Figure 3.

METHOD

The technique used for the per-

| | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|--|--|--|--|-----------------|--|--|--|--|------------------------------|--|--|--|--|---|--|--|--|--|-------------|--|
| NAME: _____ | | | | | | | | | | DATE: _____ | | | | | | | | | | | |
| TOOTH: _____ | | | | | VITALITY: _____ | | | | | DIAGNOSIS: _____ | | | | | | | | | | | |
| | | | | | Amount of Pain | | | | | Swelling | | | | | DURATION of PAIN | | | | | Pills Taken | |
| | | | | | O Mild Mod Sev | | | | | O + O | | | | | Less 1 2 3 4 5 1 day 2 days 3 days 4 days 5 days | | | | | YES NO | |
| Pre - 1st Visit | | | | | | | | | | | | | | | | | | | | | |
| Pre - 2nd Visit | | | | | | | | | | | | | | | | | | | | | |
| Pre - 3rd Visit | | | | | | | | | | | | | | | | | | | | | |
| Pre 4th Visit | | | | | | | | | | | | | | | | | | | | | |
| Pre 5th Visit | | | | | | | | | | | | | | | | | | | | | |
| Post operative | | | | | | | | | | | | | | | | | | | | | |
| Remarks: _____ | | | | | | | | | | | | | | | | | | | | | |
| CULTURES | | | | | + O | | | | | RADIOGRAPHIC APPEARANCE | | | | | | | | | | | |
| 1st | | | | | | | | | | pre-operative: | | | | | | | | | | | |
| 2nd | | | | | | | | | | () mos. post-op: | | | | | | | | | | | |
| 3rd | | | | | | | | | | () mos. post-op: | | | | | | | | | | | |
| 4th | | | | | | | | | | () mos. post-op: | | | | | | | | | | | |
| pre-filling | | | | | | | | | | () mos. post-op: | | | | | | | | | | | |
| IRRIGATING AGENT: _____ | | | | | | | | | | CEMENTING MEDIUM: _____ | | | | | | | | | | | |
| FILLING MATERIAL: _____ | | | | | | | | | | BIO-MECH. ENLARGE TO No. () | | | | | | | | | | | |

Fig 1—Records kept for each patient on severity and duration of pain and medications taken.

NAME DATE.....

check proper squares

AMOUNT OF PAIN

- none
- slight
- moderate
- severe

DURATION OF PAIN

- none
- less than one day
- more than one day
-days (write how many)

SWELLING

- yes
- no

TAKE ANY PILLS

- yes
- no

Fig 2—Postcard returned by patients after completion of treatment.

Table 1 • Study of postoperative pain—severity.

| | No pain | Pain |
|----------------|---------|------|
| Single visit* | 40 | 48 |
| Multiple visit | 119 | 74 |

| | No pain | Mild | Moderate | Severe |
|----------------|-----------|----------|----------|--------|
| Single visit† | 40 (46%) | 31 (35%) | 14 (16%) | 3 (3%) |
| Multiple visit | 119 (62%) | 47 (24%) | 25 (13%) | 2 (1%) |

*Chi-square test: $\chi^2 = 5.8$, DF = 1.

†Chi-square test: $\chi^2 = 6.476$, DF = 1.

formance of either the single- or multiple-visit procedure was identical. Emphasis was placed on thorough mechanical enlargement of the canals with root canal files. A sterile physiologic saline solution was used for complete irrigation of the canal during its enlargement. The canals were filled with gutta-percha cones, and additional cones were used for lateral condensation. Ostby's Kloroperka* was used as the cementing medium. A chloroform diffusion technique was used to achieve uniform condensation of the gutta-percha within the canal. In teeth requiring post-crown restorations, the split point gutta-percha technique¹ was used. This sealed the apical third of the canal with gutta-percha and allowed the necessary space in the occlusal two-thirds of the canal to receive a post for the post-crown restoration. All of the treated teeth were examined radiographically in periods ranging from six months to two years.

RESULTS

Study of Pain

Eighty-eight single-visit and 193 multiple-visit cases with complete records of pain were compared. In

Table 2 • Study of postoperative pain—duration.

| | No pain | Pain for 1 to more than 7 days | | | |
|----------------|---------|--------------------------------|--|--|--|
| Single visit* | 41 | 48 | | | |
| Multiple visit | 122 | 71 | | | |

| | None | Less than 1 day | 1 to 3 days | 4 to 7 days | More than 1 week |
|----------------|-----------|-----------------|-------------|-------------|------------------|
| Single visit† | 41 (46%) | 20 (23%) | 22 (25%) | 5 (5%) | 1 (1%) |
| Multiple visit | 122 (62%) | 40 (21%) | 22 (12%) | 7 (4%) | 2 (1%) |

*Chi-square test values: $\chi^2 = 6.655$, DF = 1.

† $\chi^2 = 10.606$, DF = 3.

the single-visit cases, 40 had no pain, whereas 48 felt some pain (Table 1). Of the 48 patients, 31 had only mild pain, 14 had moderate pain, and three had severe pain. In the multiple-visit procedure, 119 patients had no pain, 47 had mild pain, 25 had moderate pain, and two had severe pain. Percentages of each are illustrated in Table 1. Results of the chi-square test imply a significantly higher number of patients with no pain in the group that had the multiple-visit procedure than in the single-visit group.

In examining the duration of pain in the two groups, there is a similar pattern. Forty-one patients of the 89 in the single-visit group had no pain, whereas 48 had pain lasting from one to more than seven days (Table 2).

| PRE-TREATMENT | POST-TREATMENT | |
|--------------------------|-----------------------------------|------------------------------------|
| | HEALING | NON-HEALING |
| NO EVIDENCE OF PATHOLOGY | NO CHANGE | EVIDENCE OF PATHOLOGY |
| APPARENT PATHOLOGY | DECREASE OR NO EVIDENCE PATHOLOGY | NO CHANGE OR INCREASE IN PATHOLOGY |

Fig 3—Basis for radiographic evaluation of healing.

Results of the chi-square test imply that significantly more patients in the multivisit group had no pain than in the single-visit group. Of the 48 patients who had pain, 20 had pain lasting less than a day, 22 had pain lasting one to three days, five had pain lasting four to seven days, whereas only one had pain lasting more than a week (Table 2).

In the multivisit cases of 193 patients, 122 had no pain, whereas 71 had pain lasting from one to more than seven days. Forty had pain lasting less than a day, 22 had pain lasting from one to three days, seven had pain from four to seven days, and two had pain lasting more than a week. This implies that the pattern of duration of pain resulting in the multivisit group is significantly dif-

ferent from the pattern of duration of pain resulting from the one-visit procedures.

The necessity for postoperative medication was examined. Of the single-visit cases, 59 did not require any medication after treatment. Twenty-nine patients did take some medication for the relief of pain. Of the multiple-visit cases, 169 did not require any postoperative medication, whereas 24 did take some medication. This implies that in the multivisit group, there were significantly more patients who did not require medication than in the single-visit group (Table 3).

Filling

The variation in the effects of filling a canal past the apex and short of it was compared; it was determined radiographically for both the single-visit and the multiple-visit procedures (Table 4). Teeth that were filled radiographically flush with the apex were eliminated from the results of the study. This

was decided because of the difficulty in determining the precise position of the gutta-percha at the apex—whether the canal was actually underfilled or overfilled. In the 32 underfilled cases performed in a single visit, 27 healed, whereas five did not. In the 28 cases overfilled in the single visit, 22 healed, whereas six did not. In the multivisit cases, a total of 70 were underfilled. Sixty-five healed, whereas five did not heal. Of the 55 overfilled cases performed in multiple visits, 45 healed, whereas ten did not. The chi-square test values in both the single-visit and the multiple-visit procedure are not significant. This implies that the results of overfilling and underfilling of the canals as they relate to healing are comparable.

Healing

Of a total of 80 single-visit cases examined radiographically, 68 (85%) appeared to have healed whereas 12 (15%) did not (Table 5). Of the 186 multiple-visit cases examined radiographically, 164 (88%) appeared to

have healed, whereas there was nonhealing in 22 (12%). This implies a chi-square value of 0.260, which is not significant. It appears, therefore, that the healing between the two procedures is comparable.

DISCUSSION

This study was undertaken to compare the effects of single- and multiple-visit endodontic procedures. The advantage of performing the procedure in a single visit is obvious but are its effects sufficiently innocuous to justify its performance in place of the multiple-visit procedure?

Pain in endodontic procedures is related to the presence or absence of inflammation. The potential for increasing the degree of inflammation is obviously greater when an entire endodontic procedure is performed in a single visit. It is reasonable to assume that if severe inflammation exists before treatment, there would be a tendency to expect a distinct increase in the postoperative pain after a single-visit procedure rather than if two or more visits were used. It seems reasonable to expect that a single-visit procedure would be contraindicated when a noticeable amount of preoperative discomfort exists. On the other hand, if the tooth is reasonably comfortable before treatment, the chances are that no great discomfort would result either from the single- or multiple-visit procedure. The only possible

Table 3 • Study of postoperative pain—medication.

| | No medication necessary | Medication taken |
|----------------|-------------------------|------------------|
| Single visit | 59 (67%) | 29 (33%) |
| Multiple visit | 169 (88%) | 24 (12%) |

Chi-square test: $\chi^2 = 15.315$, DF = 1.

Table 4 • Filling variation in relation to healing.

| | Healing | Nonhealing |
|---------------|---------|------------|
| Single-visit* | | |
| Underfilling | 27 | 5 |
| Overfilling | 22 | 6 |
| Multivisit† | | |
| Underfilling | 65 | 5 |
| Overfilling | 45 | 10 |

*Chi-square test values: $\chi^2 = 0.060$, DF = 1.

† $\chi^2 = 2.586$, DF = 1.

Table 5 • Difference in healing.

| | Healing | Nonhealing |
|--------------|-----------|------------|
| Single visit | 68 (85%) | 12 (15%) |
| Multivisit | 164 (88%) | 22 (12%) |

$\chi^2 = 0.260$, DF = 1.

Exception may occur in a small percentage of nonvital cases which may "flare-up" after the first visit. If a single-visit procedure is performed on teeth that have a potential for such a "flare-up," antibiotics are suggested beginning 48 hours preoperatively. This routine has greatly reduced the number of flare-ups.

Whether a canal is overfilled or underfilled in a single or multiple-visit procedure is apparently of no significance.

There is no significant influence on the degree of healing if the procedure is performed in a single visit or in multiple visits. Healing apparently occurs equally well in both situations. In this study, no attempt was made to differentiate between vital or nonvital cases. It is extremely difficult to determine degree of vital-

ity with the usual tests at our disposal. In actual treatment, the degree of vitality or nonvitality is of little significance. What is important is whether a pathologic condition exists. In this study, the presence or absence of pathologic conditions was of importance primarily to evaluate the healing as observed radiographically.

CONCLUSION

There is no significant difference between the healing capabilities of teeth treated either in a single visit or in multiple visits. There is no difference in the healing of teeth either overfilled or underfilled using either the one-visit or multiple-visit procedures. Significantly more postoperative pain occurred after the single-

visit procedure than with the multiple-visit procedure.

*Hygienic Dental Mfg. Co., Akron, Ohio.

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Dr. Soltanoff is clinical professor, department of endodontics, New Jersey Dental School, New Jersey College of Medicine and Dentistry, Newark, NJ. Requests for reprints should be sent to 20 Trinity Place, Montclair, NJ 07042.

Reference

1. Soltanoff, W. Apical sealing procedures. *New Jersey Dent J* 44:36, 1973.