

# Risk Management in Endodontics

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## Abstract

**Introduction:** Endodontic claims are the most frequently filed malpractice claims in dentistry. The aim of this study was to categorize and review errors and complications related to endodontic procedures that resulted in legal actions against the treating practitioner. **Methods:** All dental malpractice complaints reported to the Medical Consultants International Company (MCI) in Israel between the years 1992–2008 were retrospectively analyzed according to a structured form. All complaints were categorized as either financial risk bearing (eg, justified) or financial non-risk bearing (eg, nonjustified). The treatment errors that were found in the files were categorized according to phases of treatment: preoperative, intraoperative, and postoperative errors. **Results:** A total of 720 complaints were analyzed including 520 complaints (72.2%) that were found to be justified and 200 complaints (27.8%) that were judged as not justified. Most of the treatment errors occurred during the intraoperative phase. In lower anterior teeth and in cases involving more than 1 tooth, significantly more errors were found during instrumentation and root canal filling ( $P < .05$ ). There was a similar distribution of operator errors and of negative outcomes for teeth with elective endodontic treatment and teeth with endodontic treatment as a result of a pathologic process. **Conclusions:** The technical skills of the dental practitioners performing root canal treatments require improvement. All possible risks and complications should be considered and explained to the patient before treatment. (*J Endod* 2010;36:982–984)

## Key Words

Endodontic, malpractice claims, risk management, root canal treatment

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Endodontic claims are the most frequently filed malpractice claims in dentistry (1). Hapcook (2) reported that endodontic procedures account for 17% of the total malpractice claims in dentistry, almost double the percentage in the other specialty practice areas. Rene and Owall (3) reported that malpractice cases as a result of endodontics were very common, reaching 14% of claims.

Previous reports suggested that the common technical quality of endodontic treatment in the general population is low (4, 5). The negative outcomes of the errors and ensuing complications might require intervention, which includes nonsurgical retreatment, endodontic surgery, or tooth extraction. Thus, a revision of the prosthodontic treatment is often required (6–9).

In certain cases the patient experiences permanent physical injury or disability such as facial deformation (10–13), significant alveolar bone loss (14, 15), and/or neurologic complications (16–19).

The aim of this study was to categorize and review errors and complications related to endodontic procedures that resulted in legal actions against the treating practitioner.

## Materials and Methods

Most of the dental practitioners in Israel (85%) are obligated to report any incidence or suspicion of legal action against them to the Medical Consultants International Company (MCI) as part of their professional liability insurance. All dental malpractice complaints that were reported to MCI between the years 1992–2008 (5217 total) were retrospectively analyzed.

Cases related to endodontic procedures included 720 patients, which were 13.8% of the total dental malpractice complaints. These 720 patients, who underwent endodontic procedure/s, took legal actions as a result of various endodontic-related complications.

The MCI records were evaluated by 2 authors (I.T, N.G) according to a structured form that included the following variables: age and gender; tooth location, reason for endodontic treatment, complication type, and operator errors.

All complaints were categorized as either financial risk bearing (eg, justified) or financial non-risk bearing (eg, nonjustified).

Tooth location was divided into 6 groups as follows: upper molars, upper premolars, upper anterior teeth, lower anterior teeth, lower premolars, and lower molars. Cases with a complaint involving more than 1 tooth were considered as a separate group.

Reasons for endodontic treatment included elective root canal treatment (RCT) and RCT as a result of a pathologic process. The possible negative outcomes of the endodontic treatments were retreatment, surgical intervention, or tooth extraction.

Operator errors were categorized as follows: preoperative (including diagnosis, patient management in achieving informed consent); intraoperative (operative technical errors during access cavity preparation, detection of canal orifice, canal instrumentation, filling); and postoperative (failure to properly and timely restore endodontically treated tooth).

The results were statistically analyzed by using  $\chi^2$  test;  $P$  value  $< .05$  was considered statistically significant.

## Results

A total of 720 complaints were analyzed, including 520 complaints (72.2%) that were found to be justified and 200 complaints (27.8%) that were judged as not justified.

TABLE 1. Distribution of Operators' Errors

	Preoperative			Intraoperative			Post-operative	
	Total*	Diagnosis	Informed consent	Access cavity preparation	Detection of the canals' openings	Instrumentation	Filling	Restoration failure
Upper molars	113	24 (21%)	43 (38%)	44 (39%)	48 (42%)	62 (55%)	56 (50%)	49 (43%)
Upper premolars	114	27 (24%)	31 (27%)	29 (25%)	29 (25%)	55 (48%)	52 (46%)	40 (35%)
Upper anteriors	119	22 (18%)	36 (30%)	37 (31%)	36 (30%)	54 (45%)	55 (46%)	43 (36%)
Lower anteriors	24	7 (29%)	7 (29%)	8 (33%)	10 (42%)	17 (70%) <sup>†</sup>	16 (67%) <sup>†</sup>	3 (13%)
Lower premolars	81	18 (22%)	24 (30%)	31 (38%)	32 (40%)	34 (42%)	31 (38%)	28 (35%)
Lower molars	222	59 (27%)	84 (38%)	88 (40%)	86 (39%)	101 (45%)	89 (40%)	74 (33%)
Cases involving more than 1 tooth	47	16 (34%)	29 (62%)	24 (51%)	25 (53%)	33 (70%) <sup>†</sup>	36 (77%) <sup>†</sup>	32 (68%)
Total <sup>‡</sup>	720	173 (24%)	254 (35%)	261 (36%)	266 (37%)	356 (49%)	335 (47%)	269 (37%)

\*Total number of teeth per tooth group.

<sup>†</sup>P < .05.

<sup>‡</sup>Total number (percent) of errors per error type (there is more than 100% because some complaints included multiple errors).

The complaints included 221 (30.6%) male and 499 (69.4%) female patients. Mean age was 38.5 years (standard deviation, 13.9), ranging from 7–77 years. Average age for female and male patients was 39 ± 13.5 and 38.2 ± 14.1 years, respectively.

Data regarding the reason for RCT were available for 661 cases; 193 cases were elective RCT, and 468 cases were endodontic treatment caused by pathologic processes. There was a similar distribution of the operator errors and of the negative outcome (retreatment, surgical intervention, or tooth extraction) for teeth with elective RCT and teeth with RCT caused by a pathologic process (P < .05). No significant difference was found in operator errors between elective RCT and RCT performed as a result of an existing pathology (P < .05).

Distribution of operators' errors is presented in Table 1. Most of the errors occurred in the intraoperative phase (Fig. 1). In lower anterior teeth and in cases involving more than 1 tooth, significantly more errors were found during instrumentation and root canal filling (P < .05).

Swelling and/or pain as the only complaint appeared in 100 of the cases. None of them were found to be justified. There were significantly less complaints of swelling in upper molars (P < .05).

### Discussion

The percentage of endodontic claims from total dental malpractice claims was 13.8%, second only to prosthodontics complaints. This percentage is similar to data in previous studies (2, 3).

Bjorndal and Reit (20) evaluated the reasons for and outcome of malpractice claims handled by the regional and national Danish Dental Complaint Boards. In their study no access to original material such as letters, office records, and radiographs was available. In the present study, dental history, the dentist's documentation, letters, and radiographs were available for evaluation by the authors.

Endodontic procedural errors are not considered the direct cause of treatment failure. Rather, they increase the risk of failure because of the clinician's inability to eliminate intraradicular microorganisms from the infected root canals (21).

In the present study, the majority of operator errors were found to be during the intraoperative phase (Table 1). The lack of adherence to strict treatment protocols resulting in poor-quality treatments was a common cause of malpractice claims. In previous studies, the quality of endodontic treatment was found to be low (4, 5).

Errors in diagnosis and treatment plan were found in 24% of the cases reviewed. In evaluation of risk management for implant dentistry, Givol et al (22) found that the most common error was during the preoperative phase of diagnosis and treatment planning. Correct interpretation of the information collected before treatment and proper treatment planning are major parts of any dental treatment, preventing possible treatment complications and legal actions that might follow.

A malpractice claim might be perceived as a criticism of the dentist's competence and a sign of a breakdown in communication with the patient (20). It is of paramount importance to discuss the possible risks of the planned treatment during the informed consent procedure.

In the study by Bjorndal and Reit (20), whenever the dentist had documented the reasons for being short of the canal terminus, for example as a result of a complicated anatomic situation, the treatment result was accepted. Nevertheless, for a general dentist, it would be prudent to refer complicated cases to an endodontic specialist rather than perform procedures that are beyond the general practitioner's training or competency to avoid treatments that are below a specialist's standard (23).

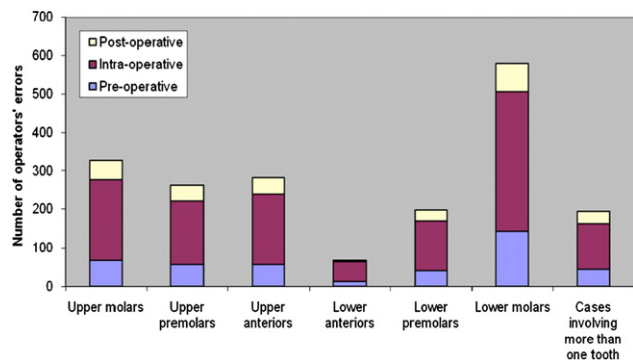


Figure 1. Teeth groups allocation according to operative errors.

The dental record must contain sufficient information to identify the patient, support the diagnosis, justify the treatment, and document the course and result of treatment (23).

In Bjorndal and Reit (20), claims concerning symptoms of infection or persistent pain were usually not judged as malpractice if no objective sign of pathology was observed. In the present study, swelling and/or pain as the only complaints appeared in 100 of the cases. None of them were found justified. Pain and swelling might appear after an endodontic treatment in 1.5%–20% of cases (24) and should be considered as side effects and not as complications. It is possible to reduce the risk of a following legal complaint by discussing these potential side effects with the patient during the process of getting informed consent.

In the present study there were 69% female complainants. These data are similar to other studies (20, 22). It might be explained by the fact that more female patients are seeking dental treatment (22, 25).

In the present study there was no significant difference in operator errors between elective RCT and RCT performed as a result of an existing pathology. This finding raises the need to consider all possible negative outcomes of RCT even during elective RCT. The patient should be informed of the risks of elective RCT and should get information on alternative treatments and their risks and prognosis.

### Conclusions

1. Technical skills of the dental practitioners performing RCT should be improved.
2. Elective RCT bears the same risks as nonelective RCT. All possible risks and complications should be taken into consideration even before performing elective RCT, and the patient should be informed about alternative treatment options.
3. Proper explanations before treatment (ie, proper informed consent) might save grief both to the patient and to the dentist.
4. Proper documentation is of utmost significance.

1. Selbst AG. Understanding informed consent and its relationship to the incidence of adverse treatment events in conventional endodontic therapy. *J Endod* 1990;16:387–90.
2. Hapcook CP Sr. Dental malpractice claims: percentages and procedures. *J Am Dent Assoc* 2006;137:1444–5.
3. Rene N, Owall B. Dental malpractice in Sweden. *J Law Ethics Dent* 1991;4:16–31.
4. Kirkevang LL, Orstavik D, Horsted-Bindslev P, Wenzel A. Periapical status and quality of root fillings and coronal restorations in a Danish population. *Int Endod J* 2000;33:509–15.
5. Lofus JJ, Keating AP, McCartan BE. Periapical status and quality of endodontic treatment in an adult Irish population. *Int Endod J* 2005;38:81–6.
6. Iqbal MK, Kim S. A review of factors influencing treatment planning decisions of single-tooth implants versus preserving natural teeth with nonsurgical endodontic therapy. *J Endod* 2008;34:519–29.
7. Torabinejad M, Goodacre CJ. Endodontic or dental implant therapy: the factors affecting treatment planning. *J Am Dent Assoc* 2006;137:973–7. quiz 1027–8.
8. Johnson BR, Witherspoon D. Periradicular surgery. In: Cohen S, Hargreaves KM, eds. *Pathways of the pulp*. 9th ed. St Louis: Mosby; 2006:724–85.
9. Tsesis I, Rosen E, Schwartz-Arad D, Fuss Z. Retrospective evaluation of surgical endodontic treatment: traditional versus modern technique. *J Endod* 2006;32:412–6.
10. Sharma S, Hackett R, Webb R, Macpherson D, Wilson A. Severe tissue necrosis following intra-arterial injection of endodontic calcium hydroxide: a case series. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2008;105:666–9.
11. Batrum DE, Gutmann JL. Implications, prevention and management of subcutaneous emphysema during endodontic treatment. *Endod Dent Traumatol* 1995;11:109–14.
12. Kleier DJ, Averbach RE, Mehdipour O. The sodium hypochlorite accident: experience of diplomates of the American Board of Endodontics. *J Endod* 2008;34:1346–50.
13. Pelka M, Petschelt A. Permanent mimic musculature and nerve damage caused by sodium hypochlorite: a case report. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2008;106:e80–3.
14. Walters JD, Rawal SY. Severe periodontal damage by an ultrasonic endodontic device: a case report. *Dent Traumatol* 2007;23:123–7.
15. Gluskin AH, Ruddle CJ, Zinman EJ. Thermal injury through intraradicular heat transfer using ultrasonic devices: precautions and practical preventive strategies. *J Am Dent Assoc* 2005;136:1286–93.
16. Escoda-Franco J, Canalda-Sahli C, Soler A, Figueiredo R, Gay-Escoda C. Inferior alveolar nerve damage because of overextended endodontic material: a problem of sealer cement biocompatibility? *J Endod* 2007;33:1484–9.
17. Gallas-Torreira MM, Reboiras-Lopez MD, Garcia-Garcia A, Gandara-Rey J. Mandibular nerve paresthesia caused by endodontic treatment. *Med Oral* 2003;8:299–303.
18. Grotz KA, Al-Nawas B, de Aguiar EG, Schulz A, Wagner W. Treatment of injuries to the inferior alveolar nerve after endodontic procedures. *Clin Oral Investig* 1998;2:73–6.
19. Pogrel MA. Damage to the inferior alveolar nerve as the result of root canal therapy. *J Am Dent Assoc* 2007;138:65–9.
20. Bjorndal L, Reit C. Endodontic malpractice claims in Denmark 1995–2004. *Int Endod J* 2008;41:1059–65.
21. Lin LM, Rosenberg PA, Lin J. Do procedural errors cause endodontic treatment failure? *J Am Dent Assoc* 2005;136:187–93. quiz 231.
22. Givol N, Taicher S, Halamish-Shani T, Chaushu G. Risk management aspects of implant dentistry. *Int J Oral Maxillofac Implants* 2002;17:258–62.
23. Zinman EJ. Endodontic records and legal responsibilities. In: Cohen S, Hargreaves KM, eds. *Pathways of the pulp*. 9th ed. St Louis: Mosby; 2006:400–58.
24. Tsesis I, Faivishevsky V, Fuss Z, Zukerman O. Flare-ups after endodontic treatment: a meta-analysis of literature. *J Endod* 2008;34:1177–81.
25. Manski RJ, Moeller JF, Maas WR. Dental services: an analysis of utilization over 20 years. *J Am Dent Assoc* 2001;132:655–64.