# Post-operative pain and use of analgesic agents following various dental procedures

LIRAN LEVIN, DMD, ALON AMIT, DMD & MALKA ASHKENAZI, DMD

ABSTRACT: ***Purpose:*** To evaluate the incidence and duration of post-operative pain and the use of analgesic agents in adults with regard to gender, type of injection, dental procedure performed, and tooth history. ***Methods:*** Frequency and duration of post-operative pain and use of analgesic agents were examined in 255 patients, aged 18-42 years, who received routine dental treatment, including amalgam and composite restorations, root canal treatment (instrumentation), root canal filling (obturation), posts, and extractions. Teeth were anesthetized by either local infiltration (for maxillary teeth) or inferior alveolar nerve block (for mandibular teeth). Information regarding post-operative pain and use of analgesic agents was obtained though a phone call, 24 hours after treatment. ***Results:*** The overall incidence of post-operative pain was 40.4% (103 patients) of whom 36.9% (38 patients) reported a low level of pain. Pain-relieving medication was used by 32% of the patients who reported post-operative pain (12.9% of the population). Incidence and severity of post-operative pain were significantly correlated with specific dental treatment: the highest after root canal filling (52.8%, 21% reported a low level of pain) and lowest after restorations (36.1%, 42.4% reported a low level of pain). Post-operative pain was reported more often by females (52.2%) than males (33.7%) (P= 0.012). Incidence of post-operative pain was not correlated with depth and extension of the restoration performed. However, the severity of post-operative pain as indicated by analgesic usage was more frequent following deep restorations (over 3 mm). (*Am J Dent* 2006;19: 245-247).

**CLINICAL SIGNIFICANCE:** Prediction of post-operative dental pain following a specific dental procedure and the need for post-operative analgesics should be an integral part of clinical practice for every dental professional. The possibility that more than 40% of patients who have dental treatment experience post-operative pain suggests that clinicians should be more aware of the problem and be prepared to prevent and manage the pain.

✉: Dr. Liran Levin, Department of Oral Rehabilitation, The Maurice and Gabriela Goldschleger School of Dental Medicine, Tel-Aviv University, Tel-Aviv, Israel. E-✉: liranl@post.tau.ac.il

## Introduction

Post-operative pain control is important, since an individual's pain experience is often a determinant as to whether patients seek health care in the future.[1] There is a great deal of literature on post-operative dental pain following surgical procedures; however, an area of pain that has not been extensively examined is post-operative dental pain following restorative procedures, which can result from damage to the dentin-pulp complex by thermal, mechanical, chemical, or osmotic irritation during instrumentation.[2-4] According to the generally accepted hydrodynamic theory, a gap between dentin and restoration allows inward leakage of microbial products and a slow outward movement of dentin fluid.[5,6] Movement of this fluid occurs mainly following thermal or mechanical stimuli, and is perceived by the patient as pain.

The number and diameter of the exposed dentin tubules increase in deep preparations. Thus, both the volume and flow of pulpal fluid susceptible to such hydrodynamic effects are increased. Resistance to fluid movement is proportional to the residual dentin thickness.[7] Studies have shown that restorations placed in deep cavities are associated with more pulpal problems, including postoperative dental pain.[8-10]

Furthermore, experience of postoperative dental pain could be a result of damage to the periodontal tissues caused by certain local anesthesia,[11,12] damage to the periodontal apparatus caused by extraction, injudicious use of rubber dam clamps, forceful interproximal insertion of wedges, deep pressure resulting from plunger cusp, or traumatic occlusion due to improper restoration. Occasionally, a foreign body, *e.g.*, a piece of rubber dam, wedge, restorative material, or impresssion material, is left unintentionally in the gingival sulcus resulting in postoperative dental pain.[2]

Grover *et al*[13] report a 90% incidence rate of postoperative dental pain in patients with routine restorative treatment, while Unemori *et al*[10] showed 11% post-operative sensitivity, which increased in deep restorations.

In endodontic treatment, the incidence of post-obturation pain was reported to be greatest during the first 24 hours post-operatively, subsequently subsiding.[14,15] In patients with a history of pre-operative pain compared to patients without pre-operative pain, post-obturation pain was insignificantly different.[14] Women also reported pain more frequently than men.[14,15]

Data regarding the comparative incidence of postoperative dental pain following specific dental procedures are limited. The common reaction to post-operative pain is to provide a pain-relieving drug. The use of analgesic drugs after restorative treatment has been reported in 41% of patients because of postoperative dental pain.[13] However, clinicians infrequently give serious consideration to postoperative dental pain relief for patients, especially children.[16-20]

This study evaluated the incidence and duration of post-operative pain and the use of analgesic agents with regard to type of injection, dental procedure performed, tooth history and gender.

## Materials and Methods

The study group consisted of 265 adults, aged 18 to 42 years old (mean 26.6 ± 7.5 years, 36.3% females), attending routine dental treatment in a 10-unit Medical Corps operative dentistry clinic. Experienced dentists (with more than 4 years of experience in operative dentistry) provided all treatments.

Table 1. Distribution of patients reporting postoperative dental pain (PDP) and use of analgesic agents in relation to operative procedure.

| Operative procedure | Number of patients (%) | PDP reports (%)* | Reports on taking medications (%)** |
|---|---|---|---|
| Restorations | 183 (71.8) | 66 (36.1) | 14 (21.3) |
| Root canal treatment (instrumentation) | 23 (9) | 12 (52.2) | 7 (58.2) |
| Root canal filling (obturation) | 36 (14.1) | 19 (52.8) | 10 (52.7) |
| Post and core | 13 (5.1) | 6 (46.1) | 2 (33.3) |
| Total | 255 (100%) | 103 (40.4%) | 33 (32%) |

* Percentage of total number in this group (P= 0.019 within the treatments).
** Percentage of patients who reported post-operative pain (P< 0.0001 within the treatments).

A structured form was designed to include information regarding patient's age, gender, tooth location, dental treat-ment procedure (restoration, root canal treatment (instrument-tation), root canal filling (obturation) and post and core), tooth history (caries lesion, previous restoration and pre-operative pain), and type of local anesthesia administered (local infiltra-tion in upper jaw *vs.* mandibular nerve block in lower jaw). Restorations were classified according to the material (composite or amalgam), type (proximal or occlusal), depth (1-2 mm, 2-3 mm, > 3 mm), and extension (up to ¼ of occlusal table, ¼ to ½ of occlusal table, > ½ of occlusal table).

Immediately after local anesthesia, tooth-clasp and rubber-dam were applied for all endodontic procedures. Operative treatments were performed according to previously approved treatment plans. The Ethics Committee of the Medical Corps, Israeli Defense Forces approved the study.

*Evaluation of postoperative dental pain and use of analgesic drugs. 24 hours post-operatively* - Dentists avoided suggestions regarding postoperative dental pain or analgesics during and immediately after treatment. Questions were answered but no prescriptions for pain medications were given. A secretary, unaware of the treatment performed, telephoned the patients 24 hours post-operatively for a report regarding the presence, severity, and duration of postoperative dental pain and/or use of analgesic drugs. Patients (n=10) who could not be reached 24 hours after dental treatment were excluded from the study.

Data were analyzed by SPSS 10.0.[a] Pearson chi-square was used to evaluate associations between the study variables. Stepwise logistic regression was used to calculate the odds for postoperative dental pain according to the relevant parameters.

## Results

All patients who could be reached by telephone (255 out of 265 patients; 96%) responded to the questionnaire (100% response rate). Of all treatments, 57.8% were performed in the maxilla and 42.2% in the mandible. Treatments were mostly in the molars (66%), followed by premolars (27%) and incisors (7%). The overall incidence of post-operative pain was 40.4% (103 patients) of whom 36.9% (38 patients) reported a low level of pain. Pain-relieving medications were used in 32% of the patients who reported post-operative pain (12.9% of the population). Table 1 summarizes the distribution of treatment procedures, postoperative dental pain and medication use. The reported post-operative pain correla ted with the type of dental procedure performed: highest after root canal filling (obturation) (52.8%; 21% reported a low level of pain) followed by root canal treatment (instrumentation) (52.2%; 16.7% reported a low level of pain), post and core (46.1%; 66.7% reported a low level of pain), and lowest after restorations (36.1%; 42.4% reported a low level of pain) (P= 0.019 within the treatments). More post-operative pain was reported by women (52.2%) than men (33.7%) (P= 0.012). No relation was found between reported post-operative pain and depth, extension and restoration material. However, analgesic use was more frequent among patients who received deep restorations (over 3 mm, P= 0.022). Post-operative dental pain of more than 5 hours was reported by 65.2% of the patients reporting postoperative dental pain (Fig. 1), with no correlation to the treatment procedure.

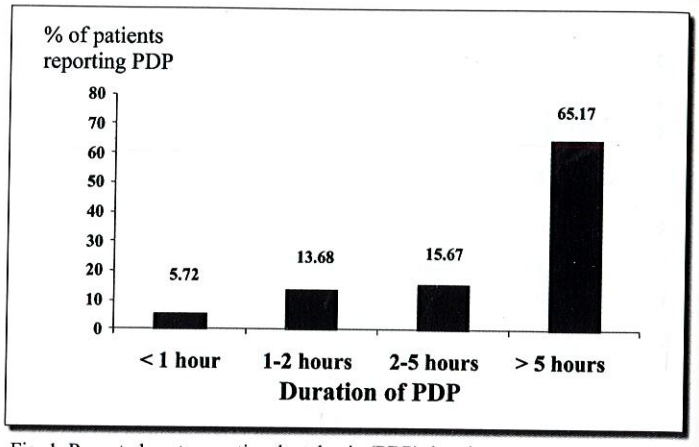



Fig. 1. Reported post-operative dental pain (PDP) duration.

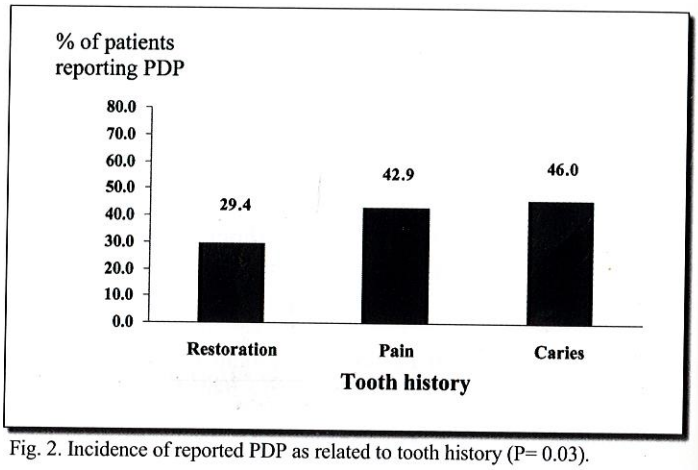



Fig. 2. Incidence of reported PDP as related to tooth history (P= 0.03).

Post-operative dental pain was reported less frequently by patients with a history of previous restorations compared to patients with a history of caries lesion and pre-operative pain (P= 0.03, Fig. 2).

Patients also complained of pain during mouth opening (16.4%) and during mastication (26.6%). During mouth opening, postoperative dental pain was more frequent after mandibular nerve block than after local infiltration (23.8% *vs.* 12.9%, P= 0.047) and during mastication, it was most common after root canal treatment (56.5%), followed by root canal filling (33.3%) and restorations (21%, P= 0.001). More post-operative pain during mastication was reported by women (37%) compared to men (21%) (P=0.008).

Table 2 shows stepwise logistic regression results that were used to calculate the odds for postoperative dental pain according to the relevant parameters, *i.e.*, gender, treatment procedures and tooth history (P< 0.005 with 95% C.I. for odds).

Table 2. Stepwise logistic regression results: the odds for postoperative dental pain according to gender, treatment procedures and tooth history.

| Parameter | | Odds for PDP | P |
|---|---|---|---|
| Gender | Male | 0.405 | 0.005 |
| | Female | 1 | |
| Treatment procedure | Restorations | 1 | 0.002 |
| | Root canal treatment (instrumentation) | 5.1 | |
| | Root canal filling (obturation) | 4.161 | |
| Tooth history | Caries lesion | 1 | 0.001 |
| | Previous restoration | 0.248 | |
| | Pre-operative pain | 0.29 | |

## Discussion

Post-operative pain is a frequent occurrence after dental treatment. Therefore, patients should be informed as to the possibility of experiencing postoperative dental pain after dental procedures and given instructions regarding the use of analgesic drugs to relieve the expected pain. This is important to reduce patient apprehension and to prevent postoperative dental pain by prescribing analgesic drugs post-operatively. Unfortunately, patients who experience post-operative pain after dental treatment seldom report it to their dentist, which can mislead the clinician regarding the actual incidence of postoperative dental pain. The present study evaluated the incidence of postoperative dental pain in adults through actively initiating a telephone interview.

The incidence of pain after different dental procedures has had little attention in the literature. Acs & Drazner[21] showed that 31.5% of all children with routine invasive restorative dental procedures reported post-operative pain. This is in accordance with the present study in which 35.1% of the patients reported post-operative pain after restorative treatment. In contrast, a markedly higher incidence of postoperative dental pain was found by others who reported an incidence of 70.7%[13] to 78%[22] after restorative treatment in an adult population. The reason for these conflicting results is not completely clear, but could be attributed to the different culture of the populations studied and to the treating clinician.

The present study is the first to compare post-operative pain after different dental operative procedures. Postoperative dental pain was highest after root canal treatment and lowest after restorations. The use of analgesic agents, which is an indirect indicator of pain severity, was more frequent after root canal treatment. Clinicians who perform root canal treatment or obturation should be aware of the possibility of postoperative dental pain, and should consider prescribing an analgesic drug before or immediately after dental treatment.

Interestingly, women reported postoperative dental pain more frequently than men, which support other studies.[14,23,24] This may be interpreted, in part, by differences in physiological reaction to pain or that men are expected by society to tolerate pain better than women, and thus are less likely to report it.[15]

In the present study, 32% of all patients who reported post-operative dental pain used analgesics. The highest rate was after root canal treatment (58.2%), which agrees with Grover *et al*,[13] who reported 41% use of analgesic drugs after restorative treatments.

The prediction of postoperative dental pain following a specific dental procedure and the need for post-operative analgesics should be an integral part of clinical practice for every dental professional. Post-operative pain after dental treatment is common, especially for root canal treatment and deep restorations. The possibility that more than 40% of patients who have dental treatment may experience post-operative pain suggests that clinicians should be more aware of the problem and be prepared to prevent and manage the pain.

a. SPSS Inc., Chicago, IL, USA.

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Dr. Levin was Head of the Dental Research and Development Department, Medical Corps, Israeli Defense Forces and is currently Clinical Instructor, Department of Oral Rehabilitation, The Maurice and Gabriela Goldschleger School of Dental Medicine, Tel-Aviv University, Tel-Aviv, Israel, and Unit of Periodontology, Department of Oral and Dental Sciences, Rambam Health Care Campus, Haifa, Israel. Dr. Amit is Head of Tel-Hashomer Operative Dental Clinic, Medical Corps, Israeli Defense Forces, Tel-Aviv, Israel. Dr. Ashkenazi is Lecturer, Department of Pediatric Dentistry, The Maurice and Gabriela Goldschleger School of Dental Medicine, Tel-Aviv University, Tel-Aviv, Israel.

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