

## Pain and swelling in periapical surgery. A literature update

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### Abstract

In recent years, periapical surgery (PS) has evolved thanks to the incorporation of technical and diagnostic advances. In PS, secondary effects such as pain and swelling occur as with all surgical procedures. The objective of the present study is to review the literature of articles published on pain and swelling during the postoperative period in periapical surgery. For this review, a search was made in Medline and of literature published in Spanish odontological journals.

In the reviewed literature the maximum pain was produced during the first 24 postoperative hours and maximum swelling between the first and second day. Recent studies propose the use of corticoids and nonsteroidal anti-inflammatory drugs (NSAIDs) during the pre-and post-operative period, in order to reduce pain perception during the first postoperative week after surgery. Likewise, low-level laser therapy has been used; although with no statistically significant results being observed for the control of pain. In the majority of published studies there was no statistically significant relationship between age and sex and the postoperative symptoms. However, greater pain and swelling is observed in patients with poor oral hygiene before surgery, and higher pain in patients who smoke, and in those with pain before surgery. Surgery of anterior teeth and molars is associated with greater pain.

**Key words:** Pain, swelling, periapical surgery.

### Introduction

All surgical procedures produced secondary effects such as pain and swelling, the intensity of which depending on the degree of tissue damage. The two effects are intimately related, and occur in parallel obeying the same physiopathology. The pain is acute and the consequence of the nociceptive stimulation produced by the surgical aggression, distension of ligaments, muscular spasms, swelling of tissue, and in general all situations related to surgical manipulation. There is extensive literature on the pain and swelling produced in the surgery of implants and impacted third molars (1-4). However, few studies have been published on these postoperative effects in PS. (5-16), the majority of authors (8-13,15,16) finding maximum

pain during the first 24 postoperative hours and maximum swelling between the first and second postoperative day. In these maximum peaks, between 40 and 76% of patients presented either no or moderate pain (5,13,14) and between 45 and 66% of patients presented either no or moderate swelling (8,13,16).

Due to the advances in periapical surgery, the success rates have improved over the years, the indications have broadened and it continues to be a highly frequent procedure. Therefore the aim of this study is to review articles published on pain and swelling in periapical surgery. Articles published in Medline and in Spanish odontological journals were searched (Tables 1 and 2).

*- Preoperative medication*

Studies have been published (8,14) in which corticoids or NSAIDs have been used before and after surgery to control pain and swelling during the postoperative period. Tsesis et al. (8) premedicated all their patients with 8 mg of dexamethasone, followed by two postoperative doses of 4 mg, on the first and second postoperative days. Lin et al. (14) administered an NSAID, etodolac, (600 mg preoperatively and at 1 and 2 days postoperatively), or dexamethasone (8 mg preoperatively and 4 mg on the first and second postoperative days). These last authors observed less pain during the postoperative period on administering either etodolac or corticoids against the placebo group.

*- Low-level laser therapy*

Kreisler et al. (9) and Payer et al. (10) studied the use of low-level laser therapy to control pain following PS. Kreisler et al. (9) found a statistically significant effect only during the first postoperative day; according to these authors, the use of laser has a psychological effect on the patients and the therapy needs to be repeated during the postoperative period in order to prolong its analgesic effect.

*- Studied populations and preoperative symptomatology*

In the majority of the published studies (5,6,12-14,16), the age and sex have no statistically significant relationship with the postoperative symptoms. However, Iqbal et al. (15) found greater pain and swelling in younger people and women. Likewise, Garcia et al. (16) observed greater pain

and swelling in patients with poor oral hygiene before surgery, and greater pain in smokers before surgery. For Tsesis et al. (8) and Seymour et al. (5), patients with pain before surgery perceived greater postoperative pain; however Peñarrocha et al. (13) did not observe this relationship.

*- Surgical technique*

Until 2003, in the studies published on pain and swelling in PS, small burs and micro-handpiece were used to form the root-end cavity (5-7) and studies since Tsesis et al. (8), have used ultrasound. By using ultrasound, smaller ostectomies to access the apices of the teeth are required. Tsesis et al. (11) in 2005 compared the postoperative course after carrying out PS with small burs and micro-handpiece against the use of ultrasound and microscopic surgery; observing less pain with ultrasound, however, swelling was the same.

With respect to the type of anaesthesia used, Meechan and Blair (6) observed the same postoperative pain and consumption of analgesics after carrying out PS with lidocaine at 2% with adrenalin 1:80,000 as with etidocaine at 1.5% with adrenalin 1:200,000. Regarding root-end filling material, Chong and Pitt Ford (12) found no statistically significant differences with respect to pain in patients following PS with IRM against MTA.

Regarding the treated areas, Lin et al. (14) observed higher pain on treating molars, and Iqbal et al. (15) and Peñarrocha et al. (30) higher pain on treating anterior maxillary teeth and anterior mandibular teeth respectively. Likewise,

**Table 1.** Articles published on pain and swelling in periapical surgery.

Author	Year	Surgical Technique	Material	Pain	Swelling
Seymour (5)	1986	Small burs and micro-handpiece	-	Night	-
Meechan and Blair (6)	1993	Small burs and micro-handpiece	Amalgam	-	-
Kvist and Reit (7)	2000	Small burs and micro-handpiece	Burnished Gutta-percha	Night	1 <sup>st</sup> day
Tsesis et al. (8)	2003	Ultrasound + microscope + dexamethasone	IRM	1 <sup>st</sup> day	1 <sup>st</sup> day
Kreisler et al. (9)	2004	Laser	-	1 <sup>st</sup> day	-
Payer et al. (10)	2005	Laser + ultrasound	IRM	1 <sup>st</sup> day	-
Tsesis et al. (11)	2005	Small burs and micro-handpiece / Ultrasound + endoscope	IRM	1 <sup>st</sup> day	2 <sup>nd</sup> day
Chong and Pitt Ford (12)	2005	Ultrasound + microscope	MTA/IRM	3-5 hours	-
Peñarrocha et al.(13)	2006	Ultrasound	Amalgam	For 48 hours	2 <sup>nd</sup> day
Lin et al. (14)	2006	NSAID/ Methylprednisolone + ultrasound	IRM	8 hours	-
Iqbal et al. (15)	2007	Microscope + NSAID + ultrasound	MTA	Night	1 <sup>st</sup> day
Garcia et al. (16)	2007	Ultrasound	Amalgam	For 48 hours	2 <sup>nd</sup> day

**Table 2.** Relation between variables and pain and swelling in PS.

Author	Year	Age	Sex	Preoperative pain	Hygiene	Smoking	Location	Technique	Material	Nº teeth	Duration
Seymour (5)	1986	-	No	> P if preoperative pain	-	-	No	-	-	-	No
Tsisis et al. (8)	2003	No	No	>P if preoperative pain	-	-	No	-	-	-	-
Tsisis et al. (11)	2005	-	-	-	-	-	-	>P with Small burs and micro-handpiece against ultrasound	-	-	-
Chong and Pitt Ford (12)	2005	-	No	-	-	-	-	No	No	-	-
Peñarrocha et al. (13)	2006	No	No	No	No	No	>P anterior mandibula	-	-	>P and S increasing with Nº teeth treated	>S increasing with duration surgery
Lin et al. (14)	2006	No	No	-	-	-	>P in molars	-	-	-	-
Iqbal et al. (15)	2007	>P in women and young people	>P and S in women	-	-	-	>P in anterior maxilla	-	-	No	-
García et al. (16)	2007	No	No	-	>P and S if worse hygiene before PS	>P if smoker before PS	-	-	-	-	-

P: Pain

S: Swelling

No: No statistically significant relationship.

Peñarrocha et al. (13), found greater pain and swelling in proportion to the increase in number of teeth treated, contrary to results obtained by Iqbal et al. (15).

*- Postoperative symptomatology*

The majority of published studies (5, 7, 9-12, 14, 15) have used visual analogue scales (VAS) to measure postoperative symptomatology, and the remainder used numerical scales (VNRS) or verbal scales (VRS) (8, 10, 13, 16). Payer et al. (11) compared the results obtained when using a VAS and the VNRS; finding no statistically significant differences.

With respect to postoperative pain, the maximum occurred within the first few hours after surgery in the majority of the studies published (5, 7, 12, 14, 15), where between 40 and 76% of patients presented either no or moderate pain (5, 13, 14). However, according to Chong and Pitt Ford

(12), 90% of their patients presented pain between the first 3 and 5 postoperative hours.

With respect to postoperative swelling, this reached a maximum between the first and second postoperative day, where between 45 and 66% of patients presented no or moderate swelling (8, 13, 16). In the studies by Kvist and Reit (7) and Lin et al. (14), on the day of maximum swelling values of 46/100 were reached on the VAS.

*- Consumption of analgesics*

With respect to the use of analgesics during the first postoperative week, in a study carried out by Kvist and Reit (7) (analgesic not specified) 67% of the patients took analgesics, and in the study by Tsisis et al. (11) (paracetamol or sodium naproxen) were used by 81% of the patients during the first postoperative day. However, Kvist and Reit (7) gave analgesics on demand as the only established phar-

macological treatment, while Tsesis et al. (11) administered dexamethasone in the pre-and postoperative. In the study by García et al. (16) 58% used magnesium metamizol and for Chong and Pitt Ford (12) this was 68%; these last authors did not recommend any analgesic, however the most frequently used analgesics by the patients were ibuprofen (26%) and paracetamol (22%). Seymour et al. (5), found that women took more analgesics than men; these authors did not recommend any specific analgesic, and observed no statistically significant difference on comparing the values for pain when taking aspirin, paracetamol or other analgesic compounds.

## Discussion

As stated above, the maximum pain in PS occurs during the first few hours after surgery (5,7,12,14,15); similar to the results found in studies on the extraction of impacted third molars (17,18). In a study published on the placing of dental implants (19), the authors found maximum pain at six hours after surgery.

With regard to swelling, in studies on the extraction of impacted mandibular third molars, maximum swelling occurred during the first day following surgery (17), in a study carried out on dental implants (19), the maximum swelling was produced at 48 hours. In PS, the maximum occurs between the first and second day.

The age and sex of the patient have no statistically significant relationship with any of the postoperative symptoms in PS (6,7,13-15,17); however, some studies indicate that pain is more acute in females (20), or in males (21) following the extraction of impacted third molars. Furthermore, for García et al. (16) patients with poor oral hygiene had higher maximum pain. In the study carried out by Peñarrocha et al. (17) on impacted third molars, patients with poor oral hygiene also had higher levels of postoperative pain. With respect to smoking, for García et al. (16) patients who smoked were those who perceived greater pain; similar to the data obtained in the study by Grossi et al. (22) in third molars, however, López-Carriches et al. (23) found no statistically significant relationship.

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