

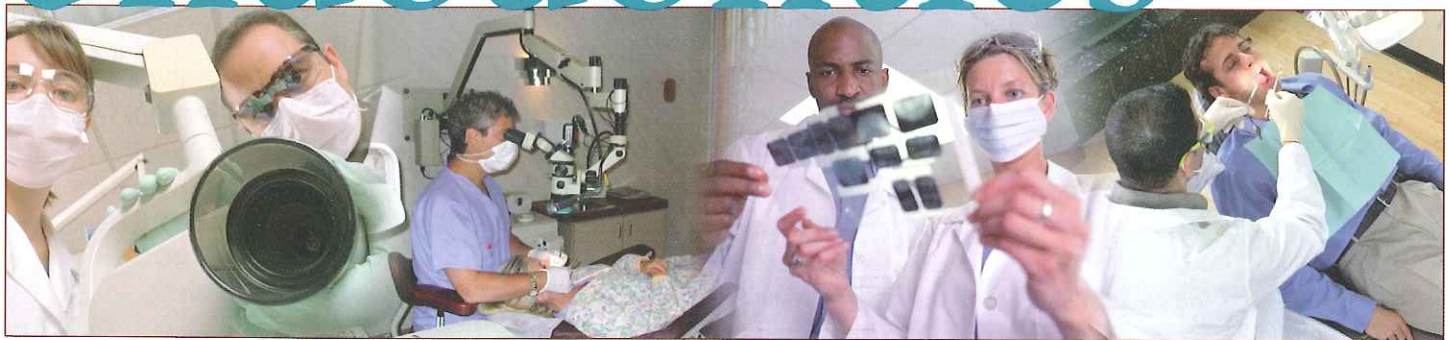
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Premedication with Ibuprofen and Indomethacin for Inferior Alveolar Nerve Block

Adequate pain control during endodontic treatment is of paramount importance, helping the dentist and patient to be confident and comfortable during the entire treatment. The inferior alveolar nerve block (IANB) is the conventional method for anesthetizing mandibular molar teeth. Research has shown that achieving anesthesia in mandibular molars with irreversible pulpitis is much more difficult than achieving anesthesia in teeth with normal, healthy pulps. Numerous investigations have sought to increase the success rate of anesthesia during dental—particularly endodontic—procedures through the use of various anesthetic techniques and solutions, including pretreatment with analgesics.

Compared with normal pulps, inflamed pulps have demonstrated significantly higher amounts of prostaglandins. These prostaglandins can affect tetrodotoxin-resistant receptors and decrease nerve responses to local anesthetic agents, making it clinically difficult to achieve profound anesthesia on teeth with irreversible pulpitis.

The use of preoperative analgesic drugs to increase the effectiveness of IANB is based on reports of their beneficial effects on postoperative pain. Previous investigations using analgesics before administering IANB have reported conflicting results. Parirokh et al from Kerman University of Medical Sciences, Iran, compared 2 types of nonsteroidal anti-inflammatory medication (ibuprofen and indomethacin) and placebo to examine their effects on the success rates of IANB for endodontic treatment of mandibular molar teeth with irreversible pulpitis.

In a randomized, double-blind clinical trial, 150 patients (divided into 3 groups of 50) with irreversible pulpitis were given either 75 mg of indomethacin, 600 mg of ibupro-

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fen or placebo 1 hour before local anesthesia.

Patients recorded pain on a visual analogue scale at the following points:

- before taking the medication
- 15 minutes after successful anesthesia in response to a cold test
- during each step of access cavity preparation
- during root-canal instrumentation

Success was defined as no pain or mild pain at every stage. Analysis of variance and χ^2 tests were performed to analyze data.

Success rates for ibuprofen and indomethacin were 78% and 62%, respectively, compared with 32% for placebo ($p < .001$; Table 1). Ibuprofen and indomethacin performed significantly better than placebo ($p < .01$); the difference between ibuprofen and indomethacin was not significant ($p = .24$).

Conclusion

Premedication with ibuprofen and indomethacin significantly increased the success rates of IANB anesthesia. This study supports premedication for patients with irreversible pulpitis if there is no spontaneous pain.

Parirokh M, Ashouri R, Rekabi AR, et al. The effect of premedication with ibuprofen and indomethacin on the success of inferior alveolar nerve block for teeth with irreversible pulpitis. *J Endod* 2010;36:1450-1454.

Removing Fractured Instruments

A recent literature review reveals a prevalence of retained fractured instruments of between 0.7% and 7.4% (mean, 1.6%) in teeth undergoing root-canal treatment. The risk of instrument fracture seems to be higher for stainless steel instruments than for rotary nickel-titanium instruments.

Parashos and Messer (*J Endod* 2006) concluded that no influence of a retained instrument on success or failure could be demonstrated in half the studies, but 5 of 11 publications showed a reduced success rate. A fractured instrument may be an obstacle to mechanical and chemical treatment of an infected root-canal system. Bacteria and pulp tissue, which remain in the root canal because of insufficient cleaning, may have a negative impact on treatment outcome.

Instrument removal itself represents a risk. Depending on the technique used, perforation of the root, ledge formation and transportation of the original canal may occur, as well as the weakening of the affected root in case of excessive removal of dentine or fracture of an additional instrument. Therefore, treatment planning should include a risk assess-

ment. The chance of successfully removing a fractured instrument from the root canal depends on the following factors:

- angle and radius of the curvature of the affected root
- site of the broken instrument in relation to the curvature
- type of fractured instrument
- length of the fractured instrument

Ruddle (*Endod Pract* 2003) presented a removal technique using the dental operating microscope (OM), the creation of a “staging platform” and the use of ultrasonic file tips and a modified Masserann tube. Until now, no study on the success rate of this technique has been published.

Cujé, a private practitioner from Germany, et al, evaluated the success rate of this contemporary “microendodontic” removal technique for fractured instruments. Removal was attempted in 170 consecutive referral cases with fractured instruments. All removal attempts were performed using an OM and ultrasonic tips.

Of the 170 fractured instruments, 162 were removed without perforation of the root canal, a success rate of 95%. Eight instruments (5%) could not be removed, with root wall perforation occurring in 1 case. The highest success rate (100%) was obtained in maxillary premolars, and anterior and canine teeth of both jaws; the lowest success rate (93%) was obtained in mesial canals of maxillary molars. All removal failures occurred in cases where the fractured instruments were located in either the apical or the middle and apical part of the root.

Table 1. Comparison of success rates among the 3 groups

Group	Success (%)	Failure (%)	p value*
Placebo	16 (32)	34 (68)	.001†
Ibuprofen	39 (78)	11 (22)	
Indomethacin	31 (62)	19 (38)	

* χ^2 test; †there were significant differences between the placebo and ibuprofen groups and the placebo and indomethacin groups ($p < .01$) using pair-wise comparisons with the Bonferroni correction.

Conclusion

Based on the use of ultrasonically activated files and preparation of a staging platform by means of modified Gates-Glidden drills and improved vision through an OM, the removal technique investigated in the present study was highly effective for the removal of fractured instruments even from severely curved root canals. The position of the instrument within the root canal, the angle of the curvature of the root canal and the location of the fractured instrument in relation to the root-canal curvature were the decisive factors in treatment outcome.

Cujé J, Bargholz C, Hülsmann M. The outcome of retained instrument removal in a specialist practice. *Int Endod J* 2010;43: 545-554.

Comparing Methods of Retrograde Filling

The main objective of apical surgery is to create a barrier in between any irritants persisting in the root-canal system after endodontic treatment and the periapical tissues. This seal is accomplished by root-end cavity preparation followed by the placement of a root-end filling.

The introduction of ultrasonic microsurgical tips in the 1990s revolutionized the retrograde preparation technique. The Retroplast technique, however, uses a different approach: A shallow concavity is prepared on the root tip using a ball-shaped, diamond bur. This concavity encompasses the whole cut root face and is then filled with Retroplast, which is placed after etching and application of a priming-

Table 2. Healed cases per type of tooth and type of surgery in relation to treatment method

	MTA (n = 173) n/N (%)	Retroplast (n = 166) n/N (%)	Total (n = 339) n/N (%)
All	158/173 (91.3)	132/166 (79.5)	290/339 (85.5)
Maxilla			
Anterior teeth*	51/57 (89.5)	37/41 (90.2)	88/98 (89.8)
Premolars	29/30 (96.7)	29/37 (78.4)	58/67 (86.6)
Molars	28/31 (90.3)	23/26 (88.5)	51/57 (89.5)
Mandible			
Anterior teeth*	5/5 (100)	3/3 (100)	8/8 (100)
Premolars	10/11 (90.9)	6/9 (66.7)	16/20 (80.0)
Molars	35/39 (89.7)	34/50 (68.0)	69/89 (77.5)
Surgery			
First time	141/153 (92.2)	119/149 (79.9)	260/302 (86.1)
Resurgery	17/20 (85.5)	13/17 (76.5)	30/37 (81.1)

*Incisors and canines.

bonding agent. Optimal hemorrhage control is paramount with this method because contamination of the etched and bonded surface can occur in the presence of bleeding. The rationale for using a dentin-bonded resin is to completely seal the cut root surface, including dentin tubules, isthmuses and accessory canals, as well as all main root canals.

Introduced in 1989, the Retroplast technique has a long history, and favorable outcomes have been reported in the literature. However, mineral trioxide aggregate (MTA) has gained wide acceptance for a variety of dental procedures and, in this regard, is considered by many to be the preferred root-end filling material. However, only a few clinical studies have compared MTA with other materials for retrograde filling in apical surgery.

von Arx et al from the University of Bern, Switzerland, performed a prospective clinical 1-year study to

report the healing outcomes of 2 different methods of root-end preparation and filling in apical surgery: MTA and an adhesive resin composite (Retroplast).

The study included 353 consecutive cases with endodontic lesions limited to the periapical area. The patients were divided into 2 groups:

- MTA group (n = 178): Root-end cavities were prepared with sonic-driven microtips and filled with MTA.
- Retroplast group (n = 175): A shallow concavity was prepared in the cut root face, with subsequent placement of an adhesive resin composite.

Patients were recalled for follow-up after 1 year. Cases were defined as healed when no clinical signs or symptoms were present and radiographs demonstrated complete or incomplete (scar tissue) healing of previous radiolucencies.



The overall rate of healed cases at the 1-year follow-up was 85.5% (Table 2). Teeth treated with MTA as the retrofilling material demonstrated a significantly ($p = .003$) higher rate of healed cases (91.3%) than did teeth treated with Retroplast (79.5%). Within the MTA group, 89.5% to 100% of cases treated for the first time were classified as healed, depending on the type of treated tooth. In contrast, more variable rates, ranging from 66.7% to 100%, were found in the Retroplast group. Mandibular premolars and molars demonstrated considerably lower rates of healing when treated with Retroplast.

Conclusion

MTA is a highly successful root-end filling material for use in apical surgery, irrespective of the type of treated tooth. The teeth surgically treated with MTA retrofills had a success rate of 91.3%.

von Arx T, Hänni S, Jensen SS. *Clinical results with two different methods of root-end preparation and filling in apical surgery: mineral trioxide aggregate and adhesive resin composite.* J Endod 2010;36:1122-1129.

Intermediate Rinses to Prevent Precipitate Formation

Bacteria in the root canal can initiate and cause periapical inflammatory lesions. Therefore, one of the most important objectives of endodontic therapy is the complete elimination of microorganisms from the root-canal system. Various antimicrobial agents, such as sodium hypochlorite (NaOCl), are

used as irrigants during the canal preparation and as a final flush to reduce necrotic tissue and bacteria that may be left behind after canal instrumentation. Chlorhexidine (CHX) has been suggested as an irrigant alternative to or in combination with NaOCl because of its lower toxicity and antimicrobial effectiveness.

However, the presence of NaOCl in the canals during irrigation with CHX produces an orange-brown precipitate known as parachloroaniline. The precipitate occludes the dentinal tubules and may compromise the seal of the obturated root canal. The precipitate is also cytotoxic, leading to concern if it leaches out of the canal. Preventing the formation of this precipitate with an intermediate rinse has been recommended.

Krishnamurthy and Sudhakaran from Rajiv Gandhi University of Health Sciences, India, performed a study with the following 2 purposes:

- To evaluate the maximum thickness and chemical composition of the precipitate formed by NaOCl and CHX.
- To evaluate the effectiveness of intermediate rinses of absolute alcohol as an intermediate flush to remove residual NaOCl and thereby prevent formation of the precipitate.

Forty extracted single-rooted human teeth were decoronated, and the canals instrumented. In the test group, canals were irrigated with 5 mL 17% EDTA and 5 mL 2.5% NaOCl, followed by 2% CHX. In the absolute alcohol, saline and distilled water groups, intermediate flushes of 5 mL absolute alcohol, 5 mL saline and 5 mL distilled water were used be-

tween the last 2 irrigants, respectively. Teeth were sectioned longitudinally and subjected to stereomicroscopic examination.

The test group samples showed orange-brown precipitates, concentrated in the coronal and middle thirds of the root canals, whereas the absolute alcohol group showed no evidence of precipitate; the saline and distilled water groups exhibited minimal precipitate. Beilstein and hydrochloric acid solubility tests confirmed that parachloroaniline was the main product of the interaction of NaOCl and CHX.

Conclusion

The interaction between NaOCl and CHX resulted in an insoluble neutral salt as a precipitate, a formation that can be prevented by using absolute alcohol and minimized by using saline or distilled water as intermediate rinses.

Krishnamurthy S, Sudhakaran S. *Evaluation and prevention of the precipitate formed on interaction between sodium hypochlorite and chlorhexidine.* J Endod 2010;36:1154-1157.

In the next issue:

- Pulp sensibility tests
- Effect of needle-insertion depth on irrigant flow
- Management of invasive cervical resorption

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