

ORTHOPRACTICE RUBRIC

Managing pain and discomfort in orthodontics

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1 – INTRODUCTION

People are often confused about the distinction between the pain and discomfort that may accompany orthodontic and dentofacial orthopedic treatment.

The International Association for the Study of Pain defines pain as “An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” while discomfort is a disagreeable sensation, an annoying condition.

Although a disagreeable sensation is common to both vocables, actual suffering is a component of pain while discomfort is merely irritating. But whether the condition is true pain or just discomfort isn't the end result similar, an unwelcome disturbance in the quality of the patient's life?

Today, any patient can surf the Internet and find a multitude of sites devoted to pain

in orthodontics. Many studies have shown the impact that pain and discomfort have on orthodontic treatment that can be forcible enough to make some patients abandon therapy. More often pain causes patients to become indifferent to their progress in treatment and to stop cooperating by not wearing appliances and auxiliaries like rubber bands and by failing to maintain good oral hygiene.

As therapists, it is our responsibility to manage the unpleasant sensations that appliances cause as effectively as possible, always bearing in mind the subjective, complex, and multi-dimensional nature of pain. We must also be sure to take into account the wide range of individual variations.

2 – MOVEMENT OF TEETH AND PAIN

Only 7% of our patients feel no pain at all³ while almost all of them, 99%, report dis-

agreeable sensations after the cementation of bands⁵. Pain management, accordingly,

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rightfully takes its place as one of our therapeutic objectives because it is caused by our ministrations.

2 – 1 – Orthodontic tooth movement and pain

The **pain** that patients experience in response to orthodontic forces is an **inflammation type**, resulting primarily from the action of peripheral nociceptors that respond to immediate stimuli as well as those that have been delayed.

High levels of pressure and/or tension can cause trauma or anoxia in the periodontal membrane that produce chemical mediators within the ligament in an inflammatory process.

Pain appears to be more intense during the early stages of treatment when teeth are being moved the greatest distances. Then the duration and the intensity of the discomfort diminish but do not disappear entirely, remaining related to the nature of the provocative action. Maximum intensity of pain is reached about twelve hours after the application of the force and lasts for two to three days and, in some cases, as long as 15 days.

Orthodontists should make a special evaluation of patients who have a low tolerance for pain to determine what minimum but adequate amount of force, possibly applied progressively, is appropriate for them.

- light force from braided or shape memory orthodontic wires, and elastic power chains, together with self-ligating brackets, can also reduce the intensity of force delivered to teeth and, accordingly, pain felt by patients.

- Two-thirds of orthodontic patients feel sensations of pain when they first begin to wear intermaxillary elastics provoking some patients to remove them before eating and then “forgetting” to put them on again.

- Orthodontists should eliminate premature contacts in occlusion because the trauma they provoke may cause pain for some patients.

Chewing increases pain causing some patients to change their eating habits. The advice they usually receive is to eat soft foods or to cut up the contents of their usual meals into tiny pieces. On the other hand, some writers recommend that orthodontic patients should chew on something fairly hard, like a sheet of plastic, in the first few hours after an archwire adjustment in order to stimulate the cells of the periodontium as a defense against inflammation.

2 – 2 – Treating pain with analgesics

As an indispensable first step, orthodontists should make a global evaluation of the pain patients experience, especially for children. Observers frequently underestimate the pain children endure because the young patients are incapable of expressing themselves the way adults do. But our young patients, both children and adolescents, may be indicating the suffering they undergo by failing to maintain good oral hygiene and by not cooperating.

Many studies have compared the effectiveness of various analgesics, classifying them by the level of intensity of the pain they can suppress

Mild to Moderate pain	Level I	“Peripheral” analgesics (non-narcotic)	Paracetamol (Acetaminophen) NAIDs, Aspirin
Moderate to Intense pain	Level II	Weak opiates alone or associated level I analgesics	Codeine + Acetaminophen Tramadol + Acetaminophen Powdered opium + Acetaminophen
Intense and/or recalcitrant pain	Level III	Strong opiates, pure agonists Partial agonists Agonistes-antagonistes	Morphine, fentanyl... Buprenorphine, Nalbuphine

Table 1
French Health Products Safety Agency analgesic classification.

Level	Name	Some Proprietary Names	Usual attack dosage in mg	Management Dosage in mg	Maximum per day mg	Principal undesirable effects, Principal contra-indications, Precautions for use
I	Paracetamol	Dafalgan Efferalgan Doliprane	1000	500	3000	Usual therapeutic dosage not advisable for patients with renal or kidney insufficiency Hepatic lysis (overdose) Digestive intolerance Gastroduodenal ulcers Acute renal insufficiency Asthma Increased bleeding time Pregnant or nursing women
	Ibuprofen	Advil Nureflex	400	200	1200	
	Ketoprofen	Toprec	50	25	200	
	Tiaprofen Acid	Surgam Flanid Gé	200	100	600	
II	Codeine + Paracetamol	Codoliprane Efferalgan + Codeine	60 + 1.000	30 + 500	180 + 3.000	Digestive troubles (constipation, nausea, vomiting) Insomnia, vertigo Respiratory insufficiency, asthma Hepatic insufficiency Pregnant or nursing women Patients taking psychotropic drugs or at risk for becoming dependent
	Tramadol + Paracetamol	Ixprim	75 + 650	37.5 + 325	300 + 2600	
	Opium powder + Paracetamol	Lamaline	20 + 600	10 + 300	100 + 3000	

Table 2
Analgesics advisable for adult orthodontic patients.

O R T H O D O N T I C S

Medication	Dosage
Acetaminophen	60 mg/kg/day in 4 to 6 applications
Ibuprofen	20-30 mg/kg/day in 3 to 4 applications
Codeine + Acetaminophen	3 mg/kg/day in 4 to 6 applications + 60 mg/kg/day in 4 to 6 applications

Table 3
Medications advised for children with indicated dosages.

(table 1). In 2010 the French Health Products Safety Agency¹ published its recommendations for the management of pain in adults.

Orthodontists should use the intensity of the nociceptive pain a patient is suffering as a guide in determining how to treat it, taking into account the effectiveness and risk profile of the prospective agent with regard to the site, the age of the patient, the eventual concomitant therapies, and its addictive potential in order to anticipate and prevent undesirable side effects. They should also consider the risk of cumulative increase in dosage becoming toxic. In other words they should weigh the benefits of an analgesic against its potential for causing undesirable side effects (table 2).

As a first line of action, orthodontists can consider an optimal dose of paracetamol, more commonly known as acetaminophen in the United States, Canada, and Japan, as the analgesic of choice⁷. The recommended dosage is 1,000 mg per single dose and up to 4,000 mg per day for adults, with a minimum interval of four hours between doses, adjusted to the weight and the age of the patient.

If the acetaminophen is ineffective, the orthodontist can prescribe a non-

steroidal anti-inflammatory drug (NAID) such as ibuprofen, in a short-term analgesic dosage of 200 to 400 mg at a time, renewable after six hours, but not to exceed 1,200 mg per day, adjusted to the weight and age of the patient, for a total of five days or fewer.

For intense pain⁴, orthodontists can prescribe analgesics of level II. Because a combination of drugs like Codeine + Acetaminophen or Tramadol + Acetaminophen may have serious side effects, especially when patients may be taking other over the counter pain relievers without medical supervision, orthodontists should prescribe them with great care and watch over their use scrupulously. As we have said, the dosage should be adjusted for weight (table 3). Acetaminophen remains the drug of choice.

2 – 3 – Conclusion

The pain patients experience as their teeth are moved orthodontically can be described as acute and moderately intense, inflammatory in nature, and characterized by marked individual variations.

So it would appear desirable to establish a systematic analgesic prescription dispensing classification to

discourage patients from self-medicating themselves. This prescription classification would consider:

- age of patient,
- health and past medical history of patient,
- type of adjustment at current appointment,
- patient's sensitivity to pain as noted in initial appointments,

By preventing pain from developing or worsening at an early stage, orthodontists can avoid aggravating the discomfort of an adjustment, smooth the course of treatment for both patient and practitioner, and favor the patient's return to a state of optimum health.

As an essential component of their therapeutic role, orthodontists should warn patients of the possible discomfort or pain they may experience and assure them that these sensations are not signs of pathology. It is important for orthodontists to help patients understand the treatment process, to learn how to deal with discomfort or pain associated with braces, to reduce that discomfort by prescribing analgesics when indicated, by paying special attention to keeping appliances as smooth and non-irritating as possible, and by teaching good nutritional and oral hygiene procedures.

3 – DISTRESS DERIVED FROM DISCOMFORT

3 – 1 – Distress caused by orthodontic appliances

One of our therapeutic objectives ought to be to lessen irritation to the soft tissues of the lips, cheeks, and tongue to an absolute minimum for patients as their oro-facial functions proceed in their appliance cluttered environment. Patients react in extremely variable ways to this new challenge. The development of aphthous ulcers in a patient, for example, might indicate an especial sensitivity to orthodontic appliances.

- **Orthodontic appliances**

- The size of the brackets should be adapted to the patient's circumstances and their edges should be rounded and well polished. Wings, hooks, sharp edges, twisted ligatures, and over-large or incompletely filled bracket slots can cause

bruises and ulceration. Self-ligating brackets have attractive features that may eliminate some of these problems.

- Orthodontists should correctly adjust archwires to the contour of the dental arches and be sure that loops bent into them are not too obtrusive. Orthodontists should be sure arch wires either do not protrude distally from the molar tube or else are bent back comfortably around them.
- Orthodontists should use elastic ligatures whenever possible, especially at the beginning of treatment, because they are less irritating than steel ligatures. But if a metal ligature is indicated, the orthodontist should be sure to tuck its end safely under the archwire.
- Lingual or palatal appliances can irritate the tongue in a particularly

injurious way. When such irritation occurs, orthodontists should be sure it doesn't become infected and that the patient's suffering is promptly alleviated.

- **Prevention of injuries**

We recommend that wax or silicone be applied either by the orthodontist or the patients themselves to any sharp protruding portion of an appliance. In lingual orthodontics practitioners can use pliable light-cured single-component materials, like Ivolar Vivadent's Systemp Inlay, to cover the appliance and make it more comfortable, especially, to help bruises heal. When it is feasible, in cases of relatively serious injury, the orthodontist may decide to remove the offending apparatus until healing has taken place.

Patients who participate in sports where there is a risk of oro-facial trauma or who play wind instruments should wear custom made mouth guards or commercial products *Comfort Cover and Lip Protector* sold by GACD, New Ortho, Ortho Plus, Ormodent, Dentaurum and other suppliers. Sports stores also sell generic plastic mouth guards that patients can customize by soaking them in hot water before biting into them.

- **Mouthwashes and gels**

Orthodontists have traditionally recommended mouthwashes composed of a disinfectant and an analgesic^{6,8}, the most popular now being chlorohexidine with an analgesic added. Orthodontists should advise patients that these products will discolor the teeth and soft tissues temporarily and also leave a transient after taste. But chlorohexidine should be used for a carefully limited time in low

concentrations so as to limit harmful side effects.

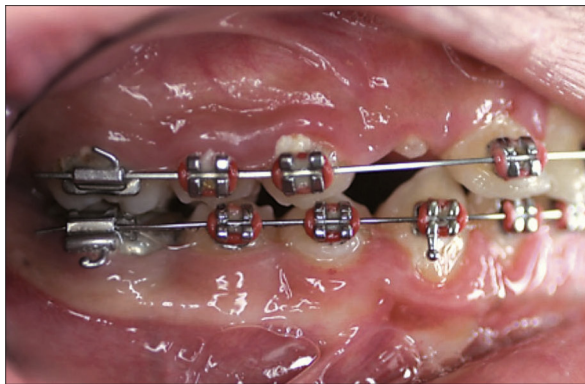
To soothe irritated soft tissues patients can also apply analgesic gels such as the "junior orthodontic" form of Pansoral or Dynexan 2% with a lidocaine chlorhydrate base. These gels reduce pain but their duration time is short and their actual curative value is debatable and, perhaps, non-existent.

The mouthwashes (like *Bioxaphte, Hyalugel, and Aftamed*), sprays, and gels with a high molecular weight hyaluronic base that have recently come on the market rapidly reduce pain by a barrier effect and improve the capacity of the mucosa to resist the assault of sharp appliance edges. The sprays and gels cover lesions, thereby encouraging healing through their high molecular weight hyaluronic base, which activates the natural mechanism of tissue repair. To date no contra-indications for their use have been discovered nor have they produced any undesirable side effects.

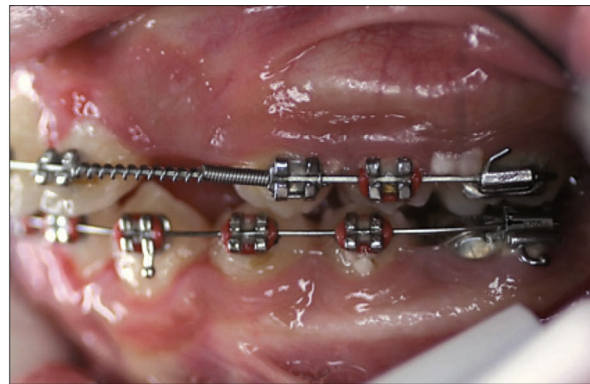
Orthodontists should systematically prescribe them for patients whose mucosa has demonstrated an especial sensitivity in addition to offering them the usual nutritional advice of avoiding citrus fruits, dry fruits, and sharp cheeses.

3 – 2 – Distress caused by poor oral hygiene

Orthodontic appliances may constitute a real impediment for patients trying to maintain good oral hygiene. Young patients have to learn how to make a special effort to keep their



a



b

Figures 1 a and b

Poor oral hygiene is responsible for this hypoplastic gingiva. Irritating parts of the appliance can include coil springs and unbent distal ends of archwires.



Figure 2

Contents of an oral hygiene kit for a patient wearing a full banded and bonded orthodontic appliance.

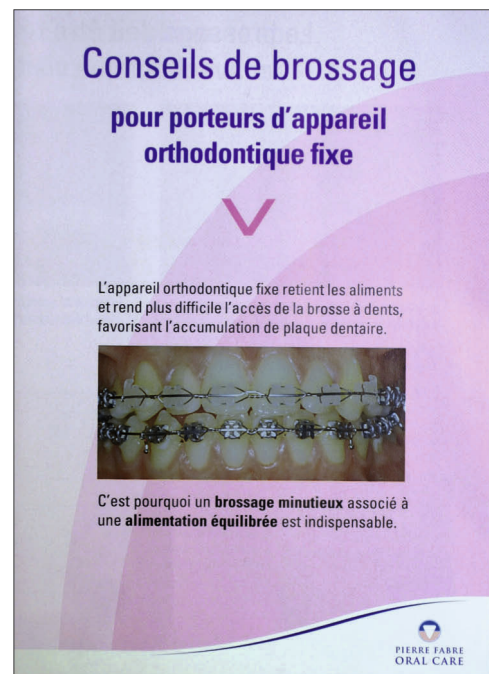


Figure 3

Technical brochure by Alexandra Kerner and Claude Chabre on oral hygiene advice, Pierre Fabre Oral Care Company.

appliance-covered teeth free of debris, especially around their necks and in interdental spaces where food particles may tend to collect. But in

attempting to remove sticky food remnants from attachments, they may dislodge them.

Young patients often diminish the vigor of their tooth brushing because of the cumbersome nature of the appliances and because of the orthodontically caused pain or discomfort.

In addition, movement of teeth causes a certain compression of attached gingiva, even hyperplasia, especially in extraction sites when the spaces are closed. This will present the distressed patient with the vision of gums bleeding after the slightest pressure, particularly when they are brushed. Ineluctably their response is to stop brushing. *Ipsa facto* inflammation results and a vicious circle has been created (fig. 1 a and b), which makes the re-establishment of good oral hygiene difficult.

Orthodontists may find it necessary in some cases to provisionally stop orthodontic traction, in effect, the treatment process. In cases when refractory inflammation persists even when oral hygiene is good, the orthodontist must suspect a systemic causation, an allergic reaction, perhaps, to a component of the appliance, or, possibly an anti-acne dermatological treatment with the drug Isotretinoïne.

Orthodontists should assist patients in developing good oral hygiene habits by telling them what cleaning tools to use and how to use them (fig. 2). Kits with proper instruments for maintaining oral hygiene during orthodontic treatment are becoming more widely available (fig. 3).

- **Toothbrushes and mini-brushes or periodontal brushes**

Patients should use toothbrushes with soft bristles during orthodontic treatment and, in cases of inflammation,

orthodontists may prescribe surgical brushes. Electric toothbrushes may be appropriate instruments for patients with limited dexterity and also as a “gimmick” means of motivating younger patients. Orthodontists may also prescribe brushes with heads especially designed to keep difficult to reach appliances clean.

- Small, inter-dental brushes are indispensable for interproximal zones and for areas under the arches.
- A single tuft brush may be useful for cleaning isolated teeth like impactions being brought into place and reaching other sites not accessible to a traditional brush.

- **Toothpaste**

- Fluoride toothpaste is advisable for patients with high rates of dental caries;
- Periodontal objectives: if patients respond with an episode of periodontitis to placement of appliances it because their gingival tissue is highly sensitive. Specific gingival pastes containing medications like glycyrrhetic acid have given satisfactory results in 30 days of gingivitis treatment². In cases of serious gingival irritation orthodontists may choose to employ chlorhexidine gels for short periods;
- A mixture of other proprietary products may be indicated in other cases.

- **Disclosing agents for dental plaque**

Vegetable dyes used as disclosing agents can help to control dental plaque. For children, making the *materia alba* visible can stimulate their zeal in removing oral debris.

- **Eating habits**

Many of our patients have poor eating habits, consuming too many snacks between meals and drinking too many sweetened beverages that are particularly prejudicial during orthodontic treatment.

- **Removable appliances**

Specific brushes and cleaning products have been designed for use by prosthetic and orthodontic patients. When orthodontists observe gingival hyperplasia or irritation of the palatal mucosa, they may encourage their patients to reinforce their oral hygiene or to stop wearing a removable appliance that may have been an irritant. If these steps do not suffice, the orthodontist may then prescribe a gel product.

3 – 3 – Orthodontic instruments, tools, and materials

Orthodontists should be aware of and try to palliate the temporary inconvenience and discomfort that impression trays and impression materials, bonding agents, cements, saliva ejectors, lip retractors, and other orthodontic *impedimenta* may generate for some patients.

Because of the great reduction in dental caries wrought by fluorides and

other treatments, the initial orthodontic impression will be the first dental act that many young patients have ever endured. They will approach this event with great trepidation. Orthodontists should marshal all their skill and charms to make this baptism bearable and, even, enjoyable.

3 – 4 – Psychological factors

Orthodontists should devote special attention to the psychological aspect of orthodontic practice, especially because of the great number of our patients who are nowadays adults, a segment of the population that has had time to accumulate an impressive baggage of anxiety, depression, weariness, and cares that make it difficult to put up with discomfort and pain. This is the adult counterpart to the child's unconscious resistance to having any orthodontic treatment at all.

Adults also bring to our offices individualized physiological variations in the number of pressure receptors and the susceptibility to inflammation.

What some patients perceive as uncomfortable others may regard as so painful that they abandon treatment.

4 – CONCLUSION

Should the words "pain" and "orthodontist" continue to have a close association?

Many patients consult us with great apprehension because they have heard from relatives and acquaintances how painful orthodontic treatment is.

So orthodontists who pride themselves on having reduced the unpleasant and troublesome aspects of their delivery of care to an absolute minimum, should be constantly alert to the harsh reaction some patients may have to what they thought were innocuous and anodyne procedures.

All patients deserve individualized and effective responses from orthodontists to the pain and discomfort they experience without which a few may complain and others go so far as to renounce treatment.

Orthodontists must strive to diminish the impact of pain and discomfort patients feel because this is a necessity for maintenance of the quality of their daily lives.

Orthodontists must be eternally vigilant, always listening to their patients and responding to their needs so that their recollections of orthodontic treatment will bring smiles to their faces that are testimonies not only to impeccably aligned teeth but also to memories of a pleasant, not a suffering, passage in their lives.

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