Pain Perception in Pediatric Patients Undergoing Laser Treatments

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Purpose: The purpose of this investigation was to evaluate the pain perception in pediatric dental patients with the use of an Er,Cr:YSSG laser for cavity preparations and oral surgery.

Materials and methods: Forty-nine pediatric patients participated in the study, divided into two different treatment groups: restorative dentistry (33 patients) and oral surgery (16 patients). The age of the patients ranged from 8 to 16 years. At the end of the treatment, the patients indicated the degree of pain felt on the Wong-Baker facial image scale.

Results: Scores on the pain scale were low in cavity preparation cases and moderately low in surgical cases. None of the 33 patients in the restorative dentistry group needed local anesthesia. Twelve patients underwent surgery without needing anesthesia, and 4 needed infiltration during treatment since it was started without local anesthesia. No analgesics were needed by any patient.

Conclusion: The Er,Cr:YSSG laser offers new and useful treatment possibilities in restorative dentistry and surgical procedures in pediatric dental patients.

Key words: pediatric dentistry, laser treatments, pain perception.

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Lasers are relatively new in pediatric dentistry and offer the pediatric dentist new possibilities to completely change some treatments, modify others, or to complement some. It has been stated by many authors that many procedures can be performed without the need for local anesthesia using laser technology.[1,2] However, much research is required to know with certainty which cases need local anesthesia or not, or the ideal therapeutic approach for each patient. It is necessary to know whether and to what extent children perceive pain when laser is used for dental procedures.

Several articles in the dental literature have reported the use of different lasers with great success for restorative procedures in primary and permanent teeth, for pulpal treatments, and different surgical or oral pathology treatments.[3-5]

The purpose of this study was to obtain more information about pain perception in children with the use of laser technology. That way we can more effectively use the new technology, more accurately define its indications, and support the development of pediatric dentistry through offering better treatment options to our young patients.

Table 1 Distribution of restorations performed

Tooth number and surface	Number of patients
# 36, 46 O	9
# 36, 46 F	5
# 37, 47 O	3
# 37, 47 F	3
# 16, 26 OL	9
# 12, 22 L	2
# 25, 35 O	2

Table 2 Distribution of surgical cases

Type of operation	Number of patients
Canine exposure (buccal)	4
Canine exposure (palatal)	1
Premolar exposure (occlusal)	1
Lingual frenectomy	2
Buccal frenectomy	1
Eruption cyst	1
Crown lengthening	2
Operculectomy	1
Pyogenic granuloma	1
Abscess drainage (mandibular, buccal)	1
Gingivectomy	1

MATERIALS AND METHODS

The study population of 49 patients was divided into 2 groups: restorative dentistry cases in permanent teeth (33 patients, 18 boys and 15 girls) and surgical cases (16 patients, 8 boys and 8 girls) (Tables 1 and 2). The age of the patients ranged from 8 to 16 years. All patients had previously experienced local anesthesia for conventional dental treatment.

The laser system used was the Waterlase YSGG (Biolase Technology, San Clemente, CA, USA). The Waterlase YSGG system is a powered hydrokinetic laser that produces a wavelength absorbed maximally in water molecules. The medium, which provides for photon amplification, includes the heterogeneous crystals yttrium, scandium, gallium, and garnet. It also contains the dopants erbium and chromium in the matrix of the crystal to enhance the performance of the laser emission.The settings used were the ones recommended by the manufacturer for hard and soft tissues.

The laser handpiece was operated in the mode exactly as described by the laser manufacturer. Treatments were first started by desensitizing the tissues with a low wattage and low water and air flow for 90 to 120 s.[6] The same dentist performed all the treatments evaluated in this investigation. The study was performed during the months of April and May, 2004.

According to their psychological profile, the patients were classified as very calm, calm, anxious, and very anxious (9, 14, 7, and 3 patients, resp, in the restorative group, and 8, 4, 2, 2 patients, resp, in the surgical group). This classification was made by the same pediatric dentist in all cases. It was recorded for each patient whether treatment was performed without local anesthesia, with local anesthesia from the beginning, or started without anesthesia but set later during the procedure. For cavity preparations, it was recorded if the preparation was in enamel (6 cases) or in dentin (27 cases). No sedation was used in any of the patients.

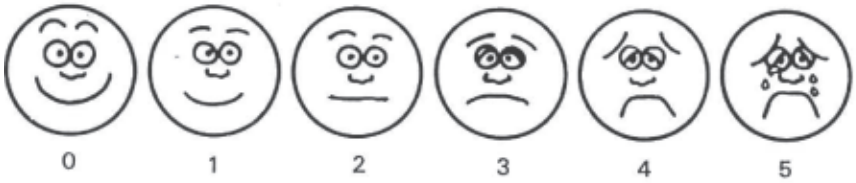
At the end of the restorative or surgical procedure, the patient was given the Wong-Baker facial image scale in order to indicate the degree of pain felt. The scale shows 6 different faces numbered from 0 to 5 (no pain at all to intense pain). The patient could choose just one face (Fig1).

All patients were checked one week after treatment to acquire data on postoperative pain and the need for analgesic medication. In surgical cases, wound healing was evaluated.

RESULTS

None of the 33 patients in the restorative dentistry group needed local anesthesia (Fig 2). Twelve surgical cases were performed without anesthesia and 4 needed infiltration during treatment, since it was begun without local anesthesia. The anesthesia used consisted of 2% lidocaine with 1:80,000 epinephrine (Fig 3).

Analgesics were not needed by any of the 49 patients who participated in the study. Only one surgical patient reported some discomfort postoperatively, but with no need to take pain-relief medication. The others reported no pain or discomfort at all.



Explain to the child that each face shows a person who feels happy because s/he has no pain (hurt) or sad because s/he has some or a lot of pain. Ask the child to choose the face that best describes how he/she is feeling.
Face 0 is very happy because s/he doesn't hurt at all.
Face 1 hurts just a little bit.
Face 2 hurts a little more.
Face 3 hurts even more.
Face 4 hurts a whole lot.
Face 5 hurts as much as you can imagine, although you don't have to be crying if you feel this bad.

Fig 1 Wong-Baker rating scale.

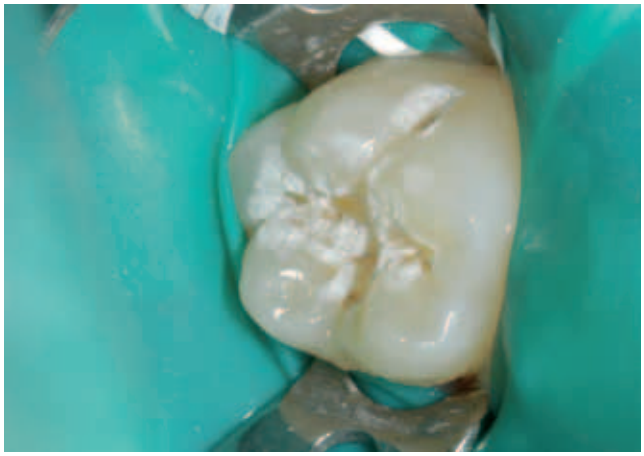


Fig 2 The use of rubber-dam is recommended. The laser creates its own bevel. The handpiece must be focused very well; if not, too much surface is exposed and etched. In cases where doubts arise regarding dentin coloration, stain or decay, a caries detector solution can be used to help determine the amount of tooth structure that needs to be removed.

Fig 3a Surgical treatment of a lingual frenum performed without local anesthesia: preoperative view.

Fig 3b Surgical treatment of a lingual frenum performed without local anesthesia: postoperative view.

Table 3 Distribution of scores on Wong-Baker scale (restorative cases)

Score	Number of patients
0	11
1	11
2	5
3	5
4	1
5	0

Table 4 Distribution of scores on Wong-Baker scale (surgical cases)

Score	Number of patients
0	3
1	3
2	2
3	7
4	1
5	0

Fig 4 Behavioral management techniques are important for preparing the patient before and during the treatment.

Wound healing was excellent and uneventful for all surgical cases.

Tables 3 and 4 show the distribution of scores on the pain scale used.

DISCUSSION

The Wong-Baker scale is considered to have many advantages for use with children. It is easy to administer and rate, does not take too much time to complete, and can be used with children and adolescents (valid and reliable for ages ranging between 3 and 18 years). The faces are not ambiguous and even little children find it easy to understand.[7]

No attempt was made to relate pain perception to the general anxiety scale (as an aspect of personality) or to a situation-specific anxiety scale (anxiety as a response to a specific situation). The intent was to determine whether children considered the procedures performed painful and to quantify this perception. A cardinal responsibility of the dentist is to provide comfort. Therefore, optimal management of pain is critical to achieving this goal. However, without methods to quantitatively assess pain, it is impossible to plan appropriate interventions and evaluate their effectiveness. The scale chosen in this study fulfilled the needs for the information needed in this investigation.

Most pain assessment is made from the dentists' perception of what the pain must be like. However, only the person experiencing pain can tell another what it is like. Unfortunately, the pain children may feel during certain procedures is sometimes underestimated. With reliable and valid pain assessment scales that do not necessarily rely on verbal descriptions of pain, health professionals may more readily assess the intensity of a child's pain and change the technique for the treatment needed or modify the method of application of the same technique.[8-10]

The scores obtained for the cavity preparation cases were low (eleven scored 0, and eleven more scored 1). However, in many cases the clinician thought the pa-

tient would score lower than he/she actually did. In the surgical cases, the scores were higher. In these cases as well the clinician expected lower scores. Our interpretation of this is that we may have presented laser therapy to the parents and patients in a way that expectations were too high and to a certain extent unrealistic. They were expecting to feel nothing. We inferred that the perception of a minimum stimulus made the patient indicate feeling some discomfort or pain on Wong-Baker scale. The way in which laser technology was presented apparently did not psychologically optimally prepare the patient. In the future, the technique will have to be described in a manner inducing more realistic expectations in the patients.

For preparations restricted to enamel, no patient felt any discomfort. When reaching the dentin, we found variability among patients. It took more time for less anxious children to express discomfort when dentin was treated, and when they expressed this, it was done in a less intense tone. For deeper parts of the dentin, we found that more children complained about feeling "more than agreed/expected". From our experience, we suggest that permanent teeth are more sensitive to the laser than primary teeth.

Before surgery, patients are more anxious than before any other type of treatment. This fact may have led to higher scores in these cases, in addition to objective perception of pain. In four of the cases, local anesthesia was necessary after having started treatment without it. It is important to be aware of the patient's mental state and possibilities of each treatment beforehand, in order to avoid creating behavioral problems.

We observed excellent wound healing 1 week postoperatively. No patient required analgesic medication, which is another advantage of this treatment modality. Very little bleeding occurred while performing the surgical treatments, which facilitated visibility of the surgical site.

Careful selection of patients (and parents) is critical for each therapeutic approach. This is also true for laser therapy. Sedation would have helped in many of the patients in this study, and it should be kept in mind for future treatments. After treatment, we found out that both children and parents were happy with the outcome and the way treatment had been done. None of the patients in whom treatment was performed without anesthesia would have preferred the conventional technique with anesthesia.

The pediatric dentist should not forget to apply behavioral management techniques while operating the laser, as with any kind of treatment (Fig 4). Until he feels comfortable using the laser, the dentist must pay a great deal of attention to the laser equipment and settings. However, as we know, pediatric treatments cannot be performed without proper patient management.

CONCLUSIONS

1. The Er,Cr:YSSG laser offers new and useful possibilities in the field of pediatric dentistry for operative and surgical procedures.
2. The Er,Cr:YSSG laser is excellent for surgery in children, since wound healing was rapid and proceeded without discomfort or the need for pain-relief medication.
3. Children scored higher on the Wong-Baker scale in surgical cases than in cavity preparations.
4. Further studies are needed to determine how the way in which laser technology is presented to patients and parents influences pain perception.

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