

# Use of the Er,Cr:YSGG Laser in the Treatment of Peripheral Ossifying Fibroma

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## ABSTRACT

Ossifying fibroma mostly occurs in the craniofacial bones and is generally categorized into two types, namely, central and peripheral ossifying fibroma. The peripheral type occurs solely on the soft tissue overlying the alveolar process and is 'non-neoplastic'. It is a common gingival growth that usually arises from the interdental papilla. The etiology and pathogenesis of peripheral ossifying fibroma (POF) is unclear. It is thought to arise from the cells in the periodontal ligament. Trauma or local irritation, such as dental plaque, calculus, ill-fitting dental appliances and poor-quality dental restorations are all known to precipitate in the development of POF. Clinically, differential diagnosis includes peripheral giant cell granuloma, pyogenic granuloma, fibroma and peripheral fibroma. Treatment of POF consists of elimination of etiological factors, scaling and root planing of involved teeth and total aggressive surgical excision. Another option available in place of the conventional surgical excision is the excision using lasers. A new addition to this generation of lasers is Er,Cr:YSGG laser. The aim of this paper is to analyze the effectiveness of Er,Cr:YSGG laser in the treatment of POF. The outcome in this case was painless experience to the patient, minimal intraoperative bleeding in the surgical field and excellent healing of the operated area in 1 week period, concluding as one of the best treatment option available for excision of POF.

**Keywords:** Er,Cr:YSGG laser, Peripheral ossifying fibroma, Healing, Minimal bleeding.

**How to cite this article:** Iyer VH, Sarkar S, Kailasam S. Use of the Er,Cr:YSGG Laser in the Treatment of Peripheral Ossifying Fibroma. *Int J Laser Dent* 2012;2(2):51-55.

**Source of support:** Nil

**Conflict of interest:** None declared

## INTRODUCTION

Localized gingival enlargements are fairly common and typically represent reactive proliferative lesions, rather than true neoplasm.<sup>1-3</sup> Reactive or inflammatory lesions represent more than 90% of histopathologically analyzed gingival biopsies and most commonly include diagnoses of pyogenic granuloma, fibrous hyperplasia, peripheral ossifying fibroma (POF) and peripheral giant cell granuloma. Ossifying fibroma occurs mostly in craniofacial bones and is generally categorized into two types, namely, central and peripheral. The central type arises from the endosteum or periodontal ligament adjacent to the root apex and expands from the medullary cavity of the bone. The peripheral type occurs solely on the soft tissue overlying the alveolar process and is a 'non neoplastic', reactive fibrous proliferation of gingiva.<sup>4,5</sup>

The POF is a common gingival growth usually arising from the interdental papilla. There is a gender difference,

with 66% of the lesion occurring in females. The prevalence of POF is highest around 10 to 19 years of age. The peak incidence of POF is between the second and third decades. It appears only on the gingiva, more often on the maxilla rather than the mandible and is frequently found in the area around the incisors and canines. The adjacent teeth are usually not affected.<sup>6</sup> POF is typically a solitary, slowly growing nodular mass that is either sessile or pedunculated with the size usually being less than 2 cm; but patients with lesions of 6 and 9 cm in diameter have also been reported.<sup>7,8</sup>

The etiology and pathogenesis of POF is unclear. It is thought to arise from cells in the periodontal ligament. Trauma or local irritation, such as dental plaque, calculus, ill-fitting dental appliances and poor-quality dental restorations are all known to precipitate the development of POF.<sup>7</sup>

Clinically, differential diagnosis includes peripheral giant cell granuloma, pyogenic granuloma, fibroma and peripheral fibroma.<sup>10</sup>

Histopathological picture of POF can exhibit either an intact or an ulcerated stratified squamous epithelium. The deeper fibroblastic component is highly cellular with central areas of calcification. The mineralized tissue may consist of bone, cementum-like material, dystrophic calcification or a combination of each. Treatment of POF consists of elimination of etiological factors, scaling and root planing of involved teeth and total aggressive surgical excision along with involved periodontal ligament and periosteum to minimize the possibility of recurrence.<sup>9</sup>

Another option available in place of conventional surgical excision is the excision using lasers. Various soft tissue lasers, such as diode laser have been used. An Er,Cr:YSGG laser was used for the case presented in this article. It is a laser-powered hydrokinetic system that produces a wavelength absorbed maximally in water molecules and targets the hydroxyl groups of enamel and dentin. The wavelength of the Er,Cr:YSGG laser is 2,780 nm, which places this laser in the mid-infrared region of the electromagnetic spectrum. The energy produced by the Er,Cr:YSGG laser demonstrates good absorption by water and to a lesser degree by hydroxyapatite.<sup>11-13</sup> Because all dental tissues contain water, the Er,Cr:YSGG laser is useful for many dental procedures. Enamel contains approximately 3% water and dentin contains approximately 12% water.<sup>14</sup> Bone and cementum have approximately 15% water slightly

higher when compared with dentin and the soft tissue has the highest water content, i.e. greater than 70%. The water contained in enamel, dentin, cementum, bone and soft tissue absorbs the energy produced by the Er,Cr:YSGG laser and the result is ablation of the target tissue. Less laser energy is required to ablate soft tissue than enamel. The medium, which enables photon amplification includes heterogeneous crystals of yttrium, scandium, gallium, garnet. The crystal matrix also contains dopants (erbium and chromium) to enhance the performance of the laser emission.<sup>15</sup>

There are numerous benefits to using this type of laser in the surgical treatments. Rapid healing can be observed within a few days of the treatment, and as blood vessels are sealed, there is both reduced need for post-surgical dressings and improved hemostasis and coagulation. It also depolarizes nerves, thus reducing postoperative pain and destroys many bacterial and viral colonies that may potentially cause infection. Reduced postoperative discomfort, edema, scarring and shrinkage have all been associated with its use.<sup>16,17</sup>

The need for analgesics and anti-inflammatory medication has been reduced considerably. In some treatments, there is no need for local anesthesia, while in others, a smaller amount as compared to the conventional techniques is used. Recent reports in the dental literature describes the successful use of this laser for surgical procedures.<sup>17</sup>

The aim of this article is to analyze the effectiveness of Er,Cr:YSGG laser in the treatment of POF and to observe the pain, bleeding and healing.

## CASE REPORT

A 25-year-old, male patient had visited the Department of Oral Medicine and Radiology at Ragas Dental College and Hospital, Chennai, Tamil Nadu, India, with the chief complaint of a growth in the lower right front tooth region for the past 1 month. He gave a history of the growth appearing suddenly and it grew slowly to the present size in the lower right front tooth region arising from the gingiva. No pain was experienced by the patient. He had noticed the growth while brushing. No relevant medical history was given by the patient. On intraoral examination, there was solitary pedunculated growth arising from the interdental papillae on the buccal surface (Fig. 1) in relation to 41 and 42 measuring about 4 × 5 mm in size, arising inferiorly from the interdental papilla between 41 and 42 and extending superiorly up to the middle 1/3rd of 41 and 42, mesially up to the distal 1/3rd of 41 and distally covering almost the lower and middle 1/3rd of 42. Lingually, in between 41 and 42, a single growth was present measuring 3 × 4 mm in size (Fig. 2). Both the lesions appeared to be of



Fig. 1: Intraoral photograph of buccal lesion before scaling and root planing

same color as that of the gingiva, without any secondary changes. On palpation all the findings of inspection related to the size, site, shape and the extent of the lesion were confirmed. The lesion was firm in consistency, non-tender on palpation. Supragingival calculus was present. The growth was then provisionally diagnosed as pyogenic granuloma involving the interdental papilla region between 41 and 42.

The patient was then referred to the Department of Periodontics for root scaling and planing. After the periodontal treatment, the patient was kept under observation for 1 week in order to confirm whether the lesion regressed after the removal of the local factors, such as calculus. After 1 week, the buccal lesion remained the same even after the removal of the stimuli (Fig. 3). But the lingual lesion totally regressed within a week after scaling and root planing (Fig. 4). The patient was then referred to Smile Dental Clinic, T Nagar, Chennai, Tamil Nadu, India for excision of the lesion by laser. The growth was excised using Er,Cr:YSGG laser (Waterlase MD, Biolase, USA) with the settings of the laser in H mode, 1.50 W, air-30% and water-10%, MT 25 Hz. (Fig. 5). The excision was done using a sapphire tip (Fig. 6). No topical anesthesia or local anesthesia was administered. No antibiotics or analgesics were provided after the procedure. Throughout the procedure the patient did not experience any pain and there was only minimal bleeding (Fig. 7). The excised specimen (Fig. 8) was then sent for histopathological analysis.

The microscopic examination revealed stratified squamous epithelium with irregular acanthosis and submucosal chronic inflammation and perivascular inflammation (Fig. 9). Foci calcifications were seen (Fig. 10) and the lesion was histopathologically diagnosed as POF involving the interdental papilla between 41 and 42.



**Fig. 2:** Lingual lesion before scaling and root planing (mirror image)



**Fig. 5:** Er,Cr:YSGG laser settings



**Fig. 3:** Preoperative buccal lesion 1 week after scaling and root planing



**Fig. 6:** Er,Cr:YSGG laser with gold handpiece and sapphire tip used for excision of the lesion



**Fig. 4:** Regression of the lingual lesion 1 week after scaling and root planing (mirror image)



**Fig. 7:** Postoperative site immediately after excision of the buccal lesion

The patient was then recalled 1 day after the excision of the lesion by laser for a postoperative review (Fig. 11) when he was observed for initiation of healing. The patient

did not experience any pain or discomfort after 1 day and healing had initiated without any complications. The patient was again recalled 1 week after the surgery for review

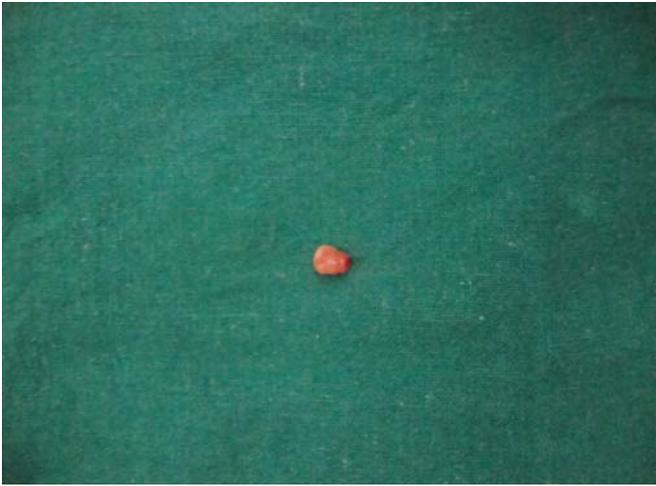


Fig. 8: Tissue of the buccal lesion after excision



Fig. 11: Field of excision (between 41 and 42) 1 day after the procedure

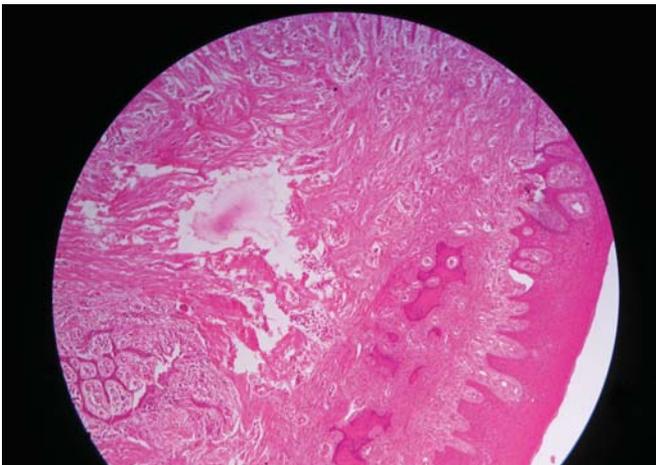


Fig. 9: Histopathological picture confirming POF (20x resolution)



Fig. 12: Field of excision (between 41 and 42) 1 week after the procedure

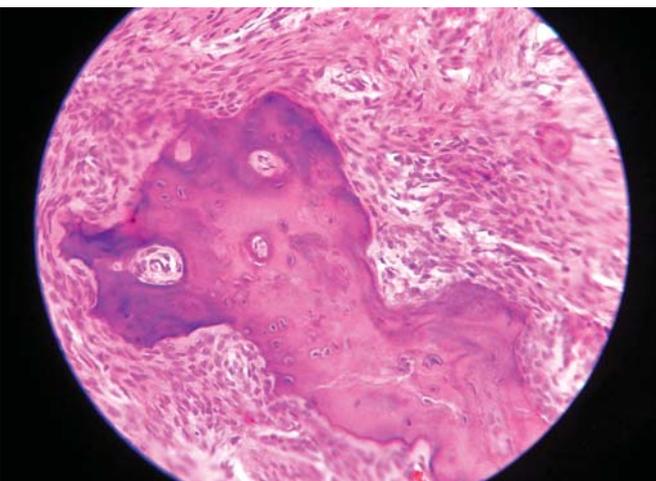


Fig. 10: Histopathological picture of POF with foci of calcification (40x resolution)

(Fig. 12). Complete healing of the excision site was observed with normal interdentary papilla between 41 and 42.

## CONCLUSION

Peripheral ossifying fibroma has always been described as a solitary, slow-growing nodular mass treated by scalpel excision. The case described here has been treated with Er,Cr:YSGG laser with sapphire tip. The Er,Cr:YSGG laser has proved excellent for dealing with such lesion. No suture was necessary. The patient experienced no pain or any discomfort. The intraoperative bleeding was minimal and the postoperative healing was excellent. It may be necessary to treat a series of such lesions with laser excision so that the recurrence pattern of these lesions, if any, can be established, thus confirming the efficacy of Er,Cr:YSGG laser. A long-term follow-up is also required to understand if any late complication arises with the use of Er,Cr:YSGG laser.

This reported lesion was on a male patient occurring in between the incisor teeth in the mandible, thus making the case unique.

## ACKNOWLEDGMENT

We would like to personally thank Dr R Padmapriya for her consistent help throughout this case report.

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