

## Case Report

### Management of Peripheral Ossifying Fibroma by Erbium YAG LASER: A novel approach- Case Report

#### Abstract:

Peripheral ossifying fibroma is a reactive gingival overgrowth, thought to arise from periosteal and periodontal membrane. These growths are rare in origin accounting for 3.1% of total gingival lesions. This article is describing, a case of peripheral ossifying fibroma, wherein various aspects of its incidence, growth pattern, management and review of literature are discussed. It is very important to diagnose such conditions accurately because of its recurring tendency. Therefore, histologic examination is very crucial. Conventionally these type of growths are treated by surgical excision, using knife/scalpel. This was a case of recurrence wherein Er: YAG laser was used for excision of growth and management of wound. We have found that patient was much comfortable with negligible post-operative pain and swelling. This provided better patient compliance, clean operating field, lesser pain and excellent healing. Regular follow up showed no signs of recurrence, beautifully healed lesion. So, Lasers can be good alternative modality for excision and management of such type of reactive lesions.

**Keywords:** Peripheral ossifying fibroma(POF), Er: YAG laser, reactive lesion, differential diagnosis, biopsy

#### Introduction:

Fibrous soft tissue overgrowths are quite common. These can be neoplastic or reactive. Peripheral ossifying fibroma (POF) is a type of soft tissue reactive overgrowth, arising from periosteum and periodontal membrane. POF was first reported by the Shepherd in 1844 as alveolar exostosis, Eversol and Rovin in 1972 coined the term peripheral ossifying fibroma<sup>[1]</sup>.

The word 'Peripheral' means "from soft tissue" while 'ossifying' denotes "randomly distributed calcifications, immature bone and osteoid within the overgrowth". POF is a rare gingival overgrowth accounting for 3.1% of all oral overgrowths and 9.6% of gingival lesions. POF is a local inflammatory overgrowth believed to arise from periosteal and periodontal membrane.<sup>[2]</sup> About 60% of these overgrowths occur in maxilla and more than 50% of all cases of maxillary POF are found in the incisors and canine regions<sup>[5]</sup>. The lesion has female predilection in second decade of life, which was presented the same way in our case.<sup>[6]</sup> Size of the lesion is generally small <2 cm; however, in our case it was 3X4 cm. Aetiology of such lesions are suggested as chronic local irritation like dental calculus, plaque, orthodontic appliances and faulty restorations, etc.<sup>[3,4]</sup> This can be pedunculated or sessile. Initially growth appears as irregular in shape and red in colour, gradually acquires smooth pink surface. Surface ulceration may be present.<sup>[7]</sup>

The major concern for these cases is recurrence, which was also the chief complaint of our patient in this case. In previous studies conducted by Cundiff, and Eversole et al recurrence rate was found to be 16% and 20% respectively.<sup>[8]</sup>

#### Case report:

A 14-year-old female visited the outpatient department, with a chief complaint of swelling with respect to upper anterior teeth. Patient gave positive history of similar lesion 6 months back, which was excised in the dental clinic. But the overgrowth recurred in 3 months and the size has increased gradually to present stage. Medical and family history were non-contributory. Intraoral examination revealed a pink-red, firm swelling, 3X4 cm in size approximately, extending on labial surface wrt to 11& 21 (fig. 1). Patient's oral hygiene was fair, calculus and stains were observed.

Lesion was asymptomatic and overlying mucosa was intact. Intraoral periapical radiograph showed no alveolar bone involvement. (fig. 2) Clinically differential diagnosis included Traumatic fibroma, peripheral giant cell granuloma, pyogenic granuloma, Peripheral ossifying fibroma and Peripheral odontogenic fibroma

Initially, oral prophylaxis was done to remove all local irritants and patient was recalled after 1 week and planned for excision of growth by Er: YAG Laser. Consent for the procedure was obtained.

After 1 week, under topical anaesthesia and local infiltration, using Er: YAG (Skywalker, Fotona) laser at power 150mJ at pulsed QSP mode, 15 Hz frequency and air: water at 60:40 ratios (Fig.3), the lesion was excised along the base of swelling, from its origin. After removing the swelling, edges were removed using non- contact handpiece, at 110mJ, and 12 Hz frequency. Bleeding was negligible and low-level laser therapy was applied to accelerate healing. No sutures were required (Fig. 4), and the patient was advised to maintain oral hygiene and prescribed pain killers, if required and follow up visits were arranged at 1week, 1 month, 3 months (Fig. 6), 6 months (Fig.7), to assess healing and look for any recurrence.

The excised tissue was fixed in 10% formalin solution and sent for histopathological examination.

Histopathological examination revealed, "Para keratinised stratified squamous epithelium of varying thickness overlying connective tissue stroma. Stroma is composed of foci of calcifications, interspersed with endothelial lined vascular spaces of varying size and shape, few filled with RBCs. The calcified areas resembled cementum-like and bone-like ossifying areas (fig 5a, b, c) Stroma also consists of moderately intense infiltration of neutrophils, lymphocytes and plasma cells, interspersed with collagen fibres".

### Discussion:

Intraoral soft tissue reactive lesions can be classified as fibrous hyperplasia, peripheral giant cell granuloma, pyogenic granuloma and peripheral giant cell granuloma. POF was first reported by the Shepherd in 1844 as alveolar exostosis, Eversole and Rovin in 1972, later coined the term peripheral ossifying fibroma.<sup>[1]</sup> Peripheral ossifying fibroma was first documented in 1844 by Shepherd who reported this entity as "alveolar exostosis".<sup>[9]</sup> Over the years various terminologies were used to describe these lesions like peripheral fibroma with osteogenesis, peripheral fibroma with cementogenesis, peripheral fibroma with calcification, fibrous epulis, calcifying or ossifying fibrous epulis and calcifying fibroblastic granuloma.

Ossifying fibroma can be categorized into two categories – central and peripheral. The central type has its origin from endosteum and expands through medullary cavity of bone, whereas, the peripheral type originates from **Periodontal Ligament** or from the soft tissue overlying alveolar process i.e. Periosteum<sup>[2]</sup>

Prevalence of POF is 20.78% among all reactive lesions.<sup>[10]</sup> These lesions generally occur in maxilla with female predilection. Local irritation has been reported as main etiologic reason for the occurrence. Etiopathogenesis is not well known, but in our case we believe that chronic local irritation resulted in inflammatory response of periodontal tissues and led to metaplastic changes in connective tissue stroma<sup>[11]</sup>.

Traumatic fibroma, peripheral giant cell granuloma (PGCG), pyogenic granuloma, and Peripheral odontogenic fibroma can be considered for differential diagnosis of POF. Clinically, PGCG has a purple or bluesish tint while POF presented as smooth and shiny pinkish firm nodule. Traumatic fibromas are generally seen along the occlusion table i.e. bite line. Pyogenic granuloma is presented as soft, friable nodule, which is generally associated with tooth displacement and alveolar bone resorption. Peripheral Odontogenic fibroma is very rare, generally presented as intraosseous lesion.<sup>[6,11,12]</sup>

Histopathology of the tissues give definitive diagnosis for these lesions. PGCG can be differentiated from POF, by presence of giant cells. Peripheral odontogenic fibroma generally presented with odontogenic epithelium and dysplastic dentin and cementum can be differentiating easily with POF<sup>[12]</sup>. POF characteristically shows, Para keratinised stratified squamous epithelium overlying connective tissue stroma. Stroma is composed of foci of calcifications, interspersed with intense infiltration of chronic inflammatory cells like, lymphocytes and plasma cells.<sup>[11,8]</sup>

Treatment plan should involve removal of irritation factor, effective oral prophylaxis and motivation of patient for oral hygiene. Complete excision and curettage are important to avoid recurrence. Excision can be done via conventional scalpel, electrocautery, or cryosurgery. But various studies have shown high recurrence rates (16-20%) using these treatment modalities<sup>[10]</sup>. Therefore, in this case, we have used Laser for excision of the lesion.

Lasers have a thermal, pressure and electromagnetic effect that effectively excises diseased tissue, and seals off peripheral nerves and vessels at the same time. This phenomenon leads to decreased blood loss at operative field and least experience of pain. According to modern studies, one can use CO<sub>2</sub>, Er: YAG or diode Laser for excision in such cases.

Er: YAG (Erbium-doped yttrium aluminium garnet) laser operates at wavelength 2940nm. Mechanism of action of Er: YAG laser lies in its higher water absorption coefficient which causes rapid vaporization and micro-explosions that creates high pressure on the surrounding cells<sup>[14]</sup>. Erbium family lasers can also produce reactive oxygen species in irradiated tissue that have sterilization effects and stimulate fibroblasts, collagen, and extracellular matrix formation<sup>[15]</sup>, thereby promoting better healing than conventional protocols.

Arora et al<sup>[15]</sup>, also used an Erbium family laser for treatment of two peripheral ossifying fibroma cases, which proved to be a success with no sign of scarring and recurrence in 1 year. He addressed advantage of using Erbium laser over the near infrared laser (810 nm to 1,064). Erbium laser cause less thermal deep or lateral damage as the heat escapes by means of vaporization. Good hemostasis can be achieved by photothermal induced coagulation. When used in noncontact technique, it causes minimal tissue distortion.

Rui Liu et al.<sup>[16]</sup> conducted a comparative study between CO<sub>2</sub> and Er: YAG lasers and stated that CO<sub>2</sub> laser treatment is handy, easy to conduct, and lesion can be cauterized in layers in less time than Er: YAG till no white spot tissue remains. Er: YAG laser has high sterilizing ability even when the output energy is low, and the temperature will not rise excessively. At the same time, the Er: YAG laser can split water molecules and produce OH-free radicals. A large number of oxygen free radicals also have certain bactericidal effects. Finally, he concluded stating that Er: YAG laser was better than CO<sub>2</sub> laser in eliminating oral lesions.

It is very essential to highlight possible unseen thermal damage induced by Er: YAG. According to Geminiani et al<sup>[17]</sup> application of Er: YAG lasers for 10s generate a high temperature above critical threshold. To which Monzavi<sup>[18]</sup> reported that use Er: YAG with air and water spray can eliminate the possible risk of thermal damage

Laser safety should be considered while operation. Wavelength-specific eye gears should be used by operator, assistant, and patient to prevent the retinal damage. High-speed evacuation device should be used to eliminate the poisonous laser fumes produced during the procedure.

### **Conclusion:**

Peripheral ossifying fibroma accounts for a rare gingival lesion. Several techniques have been tried for management of peripheral ossifying fibroma. But the main drawback in managing such lesion is its high recurring tendency. In our case, we have used Er: YAG laser for excision, which is proved to be a more effective alternative to conventional surgeries in many aspects. Laser excision improved patient compliance, minimal operative and post-operative pain, clean operating field, excellent healing and easy removal of remaining granulomatous tissues. Total excision of involved Periosteum and periodontal membrane is required to eliminate recurrence. In this case patient had minimal pain, took no medication, evident healing within a week and no signs of recurrence. Hence, Lasers are becoming promising alternative for management of these lesions.

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Fig 1. Clinical presentation of the lesion (smooth, Shiny, pink nodule)



fig 2. IOPA wrt 11,21 (showing no sign of alveolar destruction)



Fig.3 Operative Photograph during excision of lesion using Er: YAG laser



Fig, 4 Post- operative photograph after excision

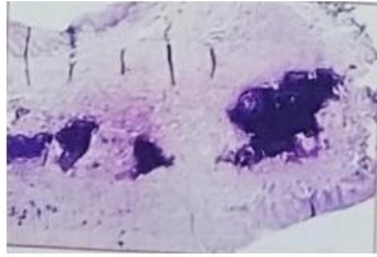


Fig 5a.

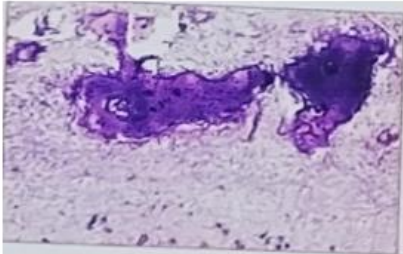


Fig 5b

Fig 5a.,b., Showing para-keratinised stratified squamous epithelium overlying connective tissue stroma

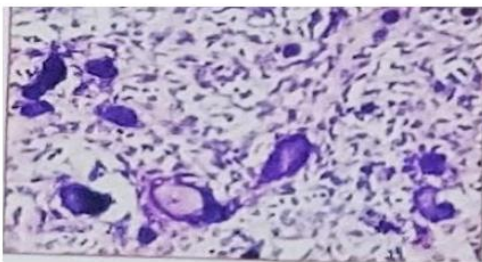


Fig. 5c Stroma containing foci of calcifications, interspersed with endothelial lined vascular spaces of varying size and shape, few filled with RBCs



Fig 6. 3- months follow up



fig 7. 6-months follow up

UNDER PEER REVIEW