CASE REPORT

940 nm Diode Laser assisted excision of Peripheral Ossifying Fibroma in a neonate.

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Background: Peripheral ossifying fibroma associated with neonatal tooth extraction is a rare, benign reactive lesion, but its nature and location often scares the patient & parents for possibility of neoplasm. A high recurrence rate makes its histopathological examination and long term follow up important.

Case Report: A 2 months old boy presented with enlarging soft tissue growth on the anterior mandibular ridge. The history revealed extraction of two neonatal teeth at 2 weeks of age. Lesion was excised using 940 nm diode laser and histopathological examination revealed hypercellularity and prominent dystrophic calcification, confirming it to be Peripheral Ossifying Fibroma. There was no recurrence after 18 months follow up.

Conclusion: Paediatric dentists should be aware of possible outcomes of natal and neonatal teeth extraction and histopathological features of soft tissue lesions in neonates and infants. This report also highlights that 940 nm diode laser can be safely used for minor oral soft tissue surgeries in neonates and infants.

Key words: peripheral ossifying fibroma • neonatal teeth • laser excisional biopsy

Introduction

Human gingiva and periodontium is subjected to constant irritation through materia alba, plaque, calculus, irregular tooth surfaces, faulty restorations, inadequate removable or fixed prosthesis and trauma. Eversole and Rovin (1972) 1) emphasized that similar etiologic irritants lead to varied “Reactive lesions” of gingiva. In recent times, Buchner et al (2010)2 described Localised hyperplastic reactive lesions (LHRLs) of gingiva as- 1) focal fibrous hyperplasia (FFH), 2) pyogenic granuloma (PG), 3) peripheral ossifying fibroma (POF) and 4) peripheral giant cell granuloma (PGCG). These represent a group of lesions with overlapping clinical and histologic features. 1, 2) Peripheral ossifying fibroma (POF) is a non neoplastic, reactive lesion seen exclusively in gingiva. 2, 3) Clinically it appears as red to pink, solitary, smooth/lobulated, pedunculated or sessile, nodular mass of 0.2-3 cm in size, emerging from interdental papilla. 1, 2) Most common site of occurrence has been maxillary anterior region with a higher female susceptibility and Caucasian predilection. 2, 3)

Natal teeth are present since birth while neonatal teeth erupt within first month. Their prevalence has been recorded as 1:800 to 1:3000 in different populations with natal teeth being three times more common than neo natal teeth. 4, 5) Severe infections secondary to natal and neonatal teeth have also been described in past. 5) Extraction is recommended in many cases though conservative means like smoothening of edges can be attempted for treating the associated sub lingual

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traumatic ulcers. 4, 5) LHRLs of gingiva in neonates and within first 10 months of life are very rare with only 5 cases reported till date (Table I). 6-10) POF associated with neonatal tooth has been even rarer with only one case in literature. 7) A case of peripheral ossifying fibroma secondary to neonatal tooth extraction, treated by Diode laser assisted excision, has been presented in this report.

Case Report

A two month old boy was referred to the outpatient department from a paediatrician with a soft tissue enlargement on the anterior mandibular ridge that was increasing in size. Parents reported uncomplicated antenatal history, normal vaginal delivery after full term and a birth weight of 3.5 Kilograms. He was the first born and only child of healthy parents with unremarkable post natal medical episodes.

Presence of neonatal teeth was discovered by parents in second week after birth when mother felt discomfort in breast feeding. A consultation with paediatrician was sought and they were referred to a general dentist who extracted two mobile teeth (as described by parents) under local anesthesia. Healing was uneventful till mother got alarmed by presence of a mass on lower jaw at six weeks of age. They consulted the dentist and were advised that it will regress on its own. However, the lesion kept growing and they were referred to this tertiary care centre.

Clinical examination revealed a healthy male child with no extra oral swelling or deformity. Intra oral examination showed a midline, pink, nodular, pedunculated, non tender soft tissue growth of 2.5 cm x 1 cm x 1 cm with smooth intact surface, present on the anterior mandibular alveolar mucosa (Figure 1). A clinical diagnosis of epulis was made and excisional biopsy under local anesthesia was planned. A diode laser (Biolase, USA- 940 nm, power settings of 2 Watt, continuous mode and a tip of 300 microns diameter) assisted excisional biopsy was performed under topical local anesthesia with child held in parent’s lap and

<table>
<thead>
<tr>
<th>Author &amp; Year</th>
<th>Age/ Sex</th>
<th>Region &amp; Final Diagnosis</th>
<th>History, Clinical Course &amp; Pre surgical clinical features</th>
<th>Treatment, Follow up &amp; Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yip WK &amp; Yeow CS 1973</td>
<td>7 days Female</td>
<td>Maxillary Right Posterior-Deciduous first molar region Peripheral Ossifying Fibroma</td>
<td>- Present since birth - No history of natal tooth - Soft pedunculated swelling 1.5 cm x 1 cm</td>
<td>Surgical excision at 7th day under local anesthesia. 5 months No recurrence</td>
</tr>
<tr>
<td>Muench et al 1992</td>
<td>6 days Male</td>
<td>Mandibular Anterior region. Pyogenic Granuloma</td>
<td>- Natal tooth attached to a loose mass. - Extraction of natal tooth &lt; 6 days. - Rapid enlargement after extraction. - 0.6 cm x 0.4 cm x 0.4 cm soft pedunculated mass.</td>
<td>Surgical excision at 16th day under local anesthesia. 1 month No recurrence</td>
</tr>
<tr>
<td>Kohli et al 1998</td>
<td>2 hours Female</td>
<td>Mandibular Anterior Region Peripheral Ossifying Fibroma</td>
<td>- 2 cm x 1.2 cm x 0.6 cm soft fluid pink fluctuant mass since birth. - Neonatal tooth at 2 weeks. - Extraction at 2 weeks. - Growth of mass (0.8 cm x 0.4 cm x 0.4 cm) over extraction site on 3rd week.</td>
<td>Surgical excision at the age of 4 weeks under local anesthesia. 2 weeks No recurrence</td>
</tr>
<tr>
<td>Singh et al 2004</td>
<td>4.5 months Male</td>
<td>Mandibular Anterior Region Reactive Fibrous Hyperplasia</td>
<td>- Natal tooth - Soft growth covering the tooth at 2 months. - Soft pedunculated 0.5 cm x 1.5 cm mass</td>
<td>Surgical excision with natal tooth at 4.5 months under local anesthesia 1 month No recurrence</td>
</tr>
<tr>
<td>Sethi et al 2015</td>
<td>8 weeks Female</td>
<td>Mandibular Anterior Region Reactive Fibrous Hyperplasia</td>
<td>- Natal tooth - Growth around natal tooth at 6-7 weeks which was increasing in size. - Smooth, pink 0.5 cm x 1.3 cm pedunculated mass with embedded natal tooth.</td>
<td>Surgical excision with Natal tooth at 8 weeks under local anesthesia. 1 month No recurrence</td>
</tr>
</tbody>
</table>

Table I: Showing the review of salient features of reported cases of LHRLs in neonates and infants.
head supported by a trained nurse. (Figure 2a & b) Excised tissue was sent for histopathological examination as per the protocol. The procedure was completely blood less and child was discharged without any medications, after basic infant oral health counselling.

The histopathology revealed pseudo-epitheliomatous hyperplasia of stratified squamous epithelium with parakeratinization. Sub epithelial connective tissue revealed a highly cellular mass of proliferating fibroblasts and collagenous stroma with prominent dystrophic calcifications. On the basis of distinctive histopathological features, the lesion was diagnosed as peripheral ossifying fibroma. (Figure 3a-d) The child was followed up after 24 hrs, 1 week, 1 month, 6 months and 18 months. The clinical findings exhibited healed anterior mandibular ridge and no recurrence. Most recent follow up (18 months) showed erupted primary maxillary central and lateral incisors and mandibular lateral incisors. (Figure 4a-d)

Discussion

Peripheral ossifying fibroma is benign reactive lesion but its nature and location often scares the patient & parents for possibility of a neoplasm.11) Retrospective histopathology studies from various parts of the world have reported its prevalence rate to be 1-3% among all gingival biopsies and 16-40% of studied LHRLs.2, 3, 11)
A peak of incidence is seen in second and third decade of life with substantial fall after that. Prevalence in 0-10 years age group has been reported as 1-2% by most authors. 2) POF has a multitude of differential diagnoses ranging from other LRHLs to hemangioma and traumatic fibroma. 2, 3) A high recurrence rate of 16-20% and ambiguous clinical picture necessitates a histopathological examination after their excision and a long term follow up. 2, 3, 11)

POFs are believed to be derived from irritation induced hyper-reactivity of progenitor cells of periodontal ligament. 1) Immunohistochemical examinations have further strengthened this theory. 12, 13) Earlier belief that pyogenic granulomas mature into POF has not been fully negated, though their de novo development on interdental papilla has gathered more evidence. 15) Even in cases, where they were reported in edentulous areas (Trasad et al, 2011) 14) their derivation due to chronic irritation from affected teeth and possibility of extraction as causative factors have been proposed. Although smaller lesions are usually not associated with any ulceration, pain or displacement of adjacent teeth and alveolar bone, giant POFs (5-8 cms) 15) and multicentric POFs (multiple sites) 16) with adverse symptoms have been previously reported. Radiographic, tomographic and magnetic resonance imaging in larger lesions have also demonstrated null to varying degree of erosion in alveolar bone and presence of mineralized component in matrix. 17)

The classical histopathological features include dense fibrocellular proliferation with random focal deposits of calcified material varying from oviod-irregular dystrophic/metaplastic calcification to laminated, concentric deposits resembling Liesegang ring. Another pattern of osseous lamellae and trabeculae with circumferential osteoid has also been observed. The degree of mineralisation has been regarded as a part of maturation of POF and its distinctive hypercellularity as a histopathologic marker. 1, 2)

Immunohistochemical study of POF by Shumway et al (2013) questioned the overlapping nature of LRHLs and proved POFs to be benign (low proliferative index- Ki67) with myofibroblastic (reactivity to vimentin & SMA) or fibroblastic (reactivity to fibronectin ED-A) in nature. 12) Elanagai et al (2015) explored the role of osteopontin in mineralisation of LRHLs. 15) Proliferation index using nucleolar organising regions (AgNOR technique) and proliferating cellular nuclear antigen (PCNA) have been used to describe the nature of these lesions. 18) Similar applications of technology will definitely help us in understanding these lesions in future.

Approximately 90% of natal and neonatal teeth are prematurely erupted deciduous teeth, appearing as delicate, mobile and shell like structures. 4) This was also seen in present case with absence of primary mandibular central incisors at 20 months of age. Most often they are situated on a mound of soft tissue and associated with difficulty in breast feeding and other consequences as neonatal sublingual traumatic ulcer (NSTU) or riga-fede disease. 5) Their movement can lead to irritation and microtrauma in gingival tissues, periodontal ligament progenitors and periosteum resulting in LRHLs and POFs. 6, 7) Similar etiopathogenesis was reported by Singh et al (2004)8 and Sethi et al (2015) 10). Pyogenic Granuloma after extraction of natal tooth was reported by Muench et al (1992) 6) and POF with neonatal extraction was described by Kohli et al (1998) 7). A case of congenital POF without any natal or neonatal tooth was reported by Yip & Yeow (1973) 9). After reviewing the handful of reported cases of LRHLs in neonates and infants, we have presented their salient features in Table I. The irritation and trauma caused by extraction at 2nd week in the present case could have attributed to development of POF in anterior mandible, though its simultaneous occurrence and progression with neonatal tooth could not be ruled out on the basis of available records.

Reactive lesions of neonates and infants are scary for the parents and require surgical excision mostly under general anaesthesia, with in medical considerations. 11)

American Academy of Pediatric Dentistry adopted the policy on use of lasers in 2013 which recognized “Lasers as an alternative and complementary method of providing soft and hard tissue dental procedures for infants, children, adolescents, and persons with special health care needs”, with prime importance given on Laser safety at all times. 30) Its benefits in soft tissue procedures include precision, hemostasis, less thermal necrosis than electrosurgery, rapid wound healing, no suturing, reduced post-operative discomfort and lesser need for analgesics. Most of the procedures can be done with topical local anesthesia leading to better patient acceptance and reduced procedural time. Further, the bactericidal properties of lasers on tissues require less prescribing of antibiotics post-operatively. 19)

The choice of Diode laser in present case was based on its deeper penetration and proven safety in soft tissue surgeries. Surgical excision of a 2.5 cm x 1 cm x 1 cm mass in a 2 month old child by conventional scalpel & blade would have been definitely more invasive requiring hemostasis, suturing and post-operative
medications. Excision of LRHLs using Nd:YAG, 810 nm Diode and CO₂ Lasers have also been successfully performed in past without recurrence. The 940 nm diode laser is further associated with coefficient of absorption in both water and haemoglobin with lesser depth of penetration as compared to 810 nm diode laser. This property is significant in reducing the surgical time and effect on deeper layers, making it very effective for use in neonates and infants.

**Conclusion**

POF and LRHLs of neonates are rare but possible outcome of extraction of natal and neonatal teeth requiring a long term follow ups and histopathological examination. The paediatric dentists also need to be aware of classical features of these lesions and can safely use 940 nm diode laser in minor soft tissue surgery in neonates.

**References**