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CASE STUDY

MANAGEMENT OF AN UNUSUAL CASE OF PERIPHERAL GIANT CELL GRANULOMA IN THE MAXILLARY REGION OF A 9-YEAR-OLD DENTAL PATIENT

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ABSTRACT

Peripheral giant cell granuloma is benign and an unusual lesion that is seen infrequently stemming from the dense irregular connective tissue of the periosteum or periodontal membrane, subsequent to a continuous irritation or persistent trauma of the specific area. Although this lesion has been reported to occur in every sort of age groups, however fifth and sixth decades are the most commonly affected stages of life according to certain documented researches with a small degree of female predisposition. Various clinicians have labeled repeated trauma at site of tumour, deficient oral hygiene and xerostomia as primary indicators which can be responsible for the lesion's growth and development, that could lead the size of lesion exceeding 5 cm in diameter. The most successful therapeutic management of PGCG involve the surgical resection of the mass including the whole base with every bit of the tissue of the lesion and extinction of the causative determinants that will eventually prevent the recurrence of the lesion. The purpose of this article is to report unusual occurrence of PGCG in the maxillary arch of a 9-year-old male child and discuss the features leading to correct diagnosis and successful management.

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INTRODUCTION

Peripheral giant cell granuloma is a benign and an unusual lesion that is seen infrequently stemming from the dense irregular connective tissue of the periosteum or periodontal membrane, subsequent to a continuous irritation or persistent trauma of the specific area. (Chaparro-Avendaño *et al*., 2005; Regezi, 2007; Abdulkareem *et al*., 2015; Shadman *et al*., 2009) It probably presents as an abnormal and atypical hyperplasic activity rather than a neoplastic growth resulting in response to the chronic exasperation caused by the accumulation of dental plaque or the sub gingival calculus or due to poor fitting dental appliances, or poor dental restorations or periodontal disease or trauma related to dental extraction. (Chaparro-Avendaño *et al*., 2005; Abdulkareem *et al*., 2015; Shadman *et al*., 2009; Bodner *et al*., 1997; Maryam Assadat Hashemi Pour *et al*., 2008; Alaa' Z. Abu Gharbyah and Mohammad Assaf, 2014; Nedir *et al*., 1997)Some authors use different terms such as giant cell hyperplasia or giant cell epulis, reparative giant cell granuloma, osteoclastoma for describing this typical lesion (Chaparro-Avendaño *et al*., 2005; Shadman *et al*., 2009; Maryam Assadat Hashemi Pour *et al*., 2008; Falaschini *et al*., 2007) that approximately accounts for 7% of all the benign tumours of the jaws.

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(Shadman *et al*., 2009; Maryam Assadat Hashemi Pour *et al*., 2008) On the basis of various case reports documented in dental literature, these lesions appear as a well circumscribed, firm to soft, sessile or pedunculated mass or as a glossy solitary nodule, which may be dark red to purplish blue in colour,occurring exclusively on gingival or alveolar mucosa frequently in the anterior and the facial region of the jaws. (Chaparro-Avendaño *et al*., 2005; Regezi, 2007; Abdulkareem *et al*., 2015; Bodner *et al*., 1997; Falaschini *et al*., 2007; Shafer *et al*., 2009; Flaitz, 2000; Cloutier *et al*., 2007) The mass may either have an unwrinkled regular outline or can occur as an irregularly shaped multi-lobulated bulging eminence with surface indentations, (Carranza and Takel, 2002) on the marginal gingiva , interdental papilla or on the edentulous alveolar mucosa. The lesion varies widely in measurements but usually is between 0.5-1.5 cm in dimensions and in rare instances is reported to have a dimension greater than 2 cm. (Maryam Assadat Hashemi Pour *et al*., 2008) Various clinicians have labeled repeated trauma at site of tumour, deficient oral hygiene and xerostomia as primary indicators which can be responsible for the lesion's growth and development, that could lead the size of lesion exceeding 5 cm in diameter. Although this lesion has been reported to occur in every sort of age groups, (Chaparro-Avendaño *et al*., 2005; Regezi, 2007; Motamedi *et al*., 2007) however fifth and sixth decades are the most commonly affected stages of life according to certain documented researches with a small degree

of female predisposition. (Chaparro-Avendaño *et al*., 2005; Shafer *et al*., 2009; Flaitz, 2000; Gandara-Rey *et al*., 2002) This lesion has been reported to display an aggressive potential in younger children where it results in the involvement of inter-proximal bone leading to pathological displacement of the teeth along with tendency of frequent recurrences. (Falaschini *et al*., 2007; Shafer *et al*., 2009) Radiographic evaluation of this granuloma is discreet to determine its extent and origin[11] and to confirm the nature and type of the granuloma, whether the lesion is of gingival origin or related to bone which has spread into the outer surface. (Chaparro-Avendaño *et al*., 2005; Patil *et al*., 2014) Clinically PGCG shares similar features with other oral lesions like pyogenic granuloma, peripheral ossifying fibroma (Regezi, 2007; Flaitz, 2000; Patil *et al*., 2014) which makes the histopathological review of the case mandatory for a definitive judgment. Microscopically this lesion is distinctive by the existence of abundant multinucleated giant cells along with numerous young proliferating fibroblasts with a background of vascularized fibro cellularstroma. (Chaparro-Avendaño *et al*., 2005; Cloutier *et al*., 2007; Patil *et al*., 2014) The growth related to PGCG are usually symptomless and does not cause any pain or discomfort to the patient, but sometimes the growth interferes with the oral functions like occlusion and mastication, resulting in the ulceration and subsequent infection of the mass, which may necessitate the management **(**Nedir *et al*., 1997**;** Falaschini *et al*., 2007; Shafer *et al*., 2009, Gandara-Rey *et al*., 2002**)** The most successful therapeutic management of PGCG involve the surgical resection of the mass including the whole base with every bit of the tissue of the lesion and extinction of the causative determinants that will eventually prevent the recurrence of the lesion. (Chaparro-Avendaño *et al*., 2005; Warrington *et al*., 1997) The purpose of this article is to report unusual occurrence of PGCG in the maxillary arch of a 9-year-old male child and discuss the features leading to correct diagnosis and successful management.

Case Report

A 9-year-oldmale subject was referred to the clinical department of Pediatric and Preventive Dentistry for the management of an abnormal swelling in the gums of the upper arch that had appeared around 3 months back. Clinical exploration of the site revealed a soft, well defined pedunculated swelling with a smooth surface and a large base that involved the gingival surfaces corresponding to the permanent central incisor and the permanent lateral incisor of left side of the maxilla. The growth was reddish to blue in colour and was about 2×1,5cm in size. The lesion showed no manifestations of any ulceration, trauma or Hemorrhages. **(**Fig-1)

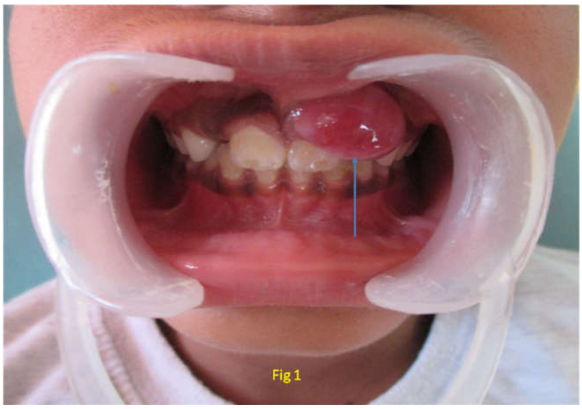

Fig. 1. Intraoral View of Lesion

The mother mentioned that initially a small sized growth showed up in anterior region of the maxilla which grew steadily and enlarged to the existent proportion and became esthetically inappropriate. There was no pain or discomfort presented but patient faced mild bleeding while tooth brushing. 22 was partially erupted and the clinical crowns of 21 & 22 were sound with absence of any abnormal mobility and revealed no signs of tenderness on percussion ruling out the possibility of pulpal or periapical involvement. There was also no abnormal spacing or irregular placing of the teeth as pathological migration of the incisors was not evident. The patient had unsatisfactory oral hygiene with significant amount of dental plaque and calculus located in all the teeth surfaces. There was no past history of any trauma related to teeth or jaws or any associated chronic fever, or loss of weight. This was child's first dental visit and the deciduous maxillary lateral incisors had exfoliated few months back. The family history was noncontributory and non-significant. IOPA radiograph of 21 & 22 region revealed no signs of bone loss or aberrant widening of PDL space**.** (Fig-2)

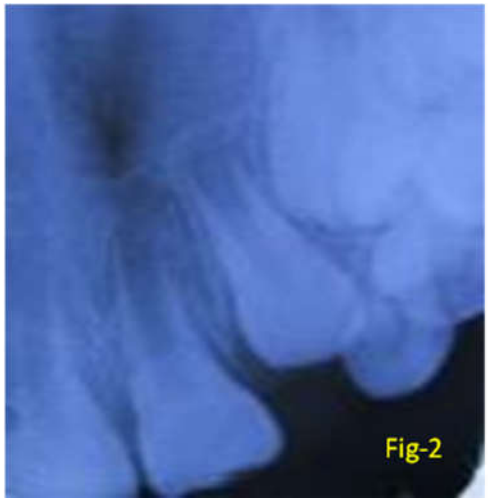

Fig. 2. Pre-operative IOPA radiograph showing no signs of bone resorption

Following oral prophylaxis of the patient, an excisional biopsy of the whole lesion was carried out under local anaesthesia and careful surgical curettage of wound was performed. **(**Fig-3 & 4).

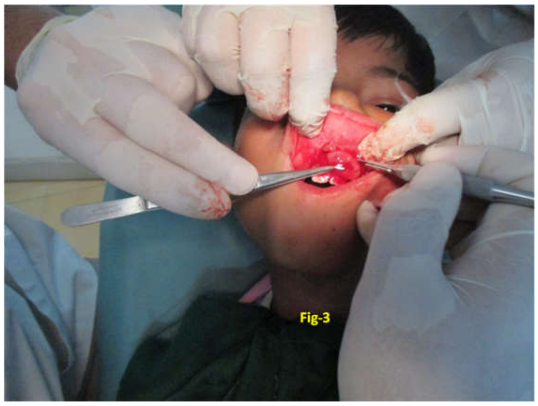

Fig. 3. Surgical excision under LA

A well circumscribed lesion incorporating a substantial number of fibroblast cells along with a considerable amount of multinucleated giant cells was revealed in the histopathological investigation, (Fig 5)

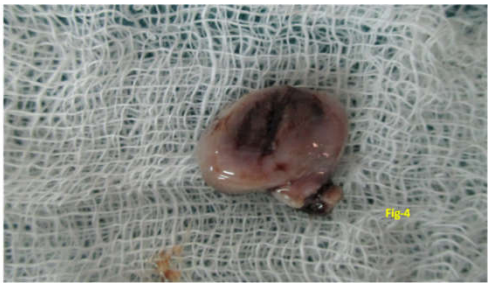

Fig. 4. Excised Lesion after Surgical resection

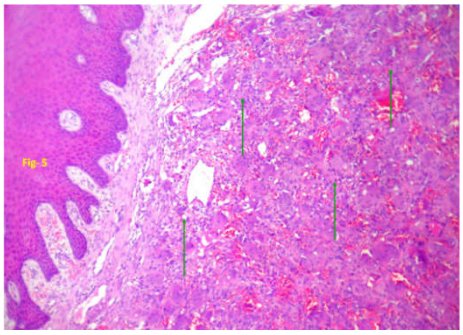

Fig. 5. Histological appearance of the lesion showing large number of multinucleated giant cells

and these were consistent with microscopic features of giant cell granuloma. A confirmed diagnosis of Peripheral Giant Cell Granuloma (PGCG) was made on the collective findings of clinical evaluation and radiographic evidence of absence of bone loss along with the histopathological analysis Postoperative healing was smooth and uneventful with the satisfactory closure of the surgical site. No recurrence of the lesion was found 10 months after surgery and patient felt satisfied and had no aesthetic issues. Radiographically the healing site showed no signs of bone resorption (Fig-6 & 7).

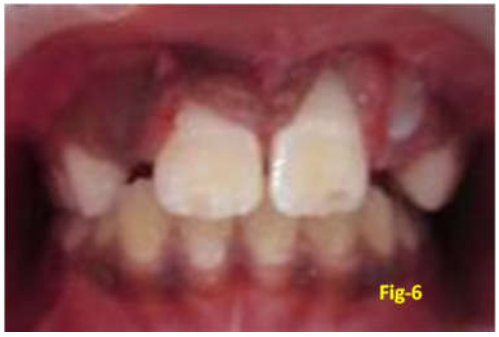

Fig. 6. Post-Operative View showing satisfactory healing of the surgical site

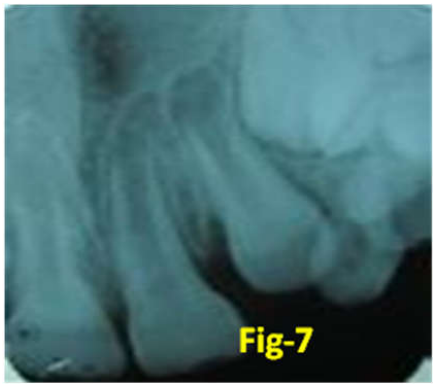

Fig. 7. Post-operative IOPA radiograph showing no signs of bone resorption after 3 months

Patient was instructed to maintain a good oral hygiene along with regular oral prophylaxis and check-ups.

DISCUSSION

Peripheral giant cell granuloma is an oral pathological condition that is benign in nature notably occurring in the gingiva or the alveolar mucosa as an atypical response to a local trauma or a chronic irritation. (Nedir *et al*., 1997: Falaschini *et al*., 2007; McDonald, 2016) The emergence of giant cell granuloma is ambiguous and according to the several studies the cells responsible for giant cells proliferation can be endothelial cells, osteoblasts and spindle cells. (Abdulkareem *et al*., 2015) or may be the cells of the mononuclear phagocyte system (Tandon *et al*., 2012). While some authors have proposed that these giant cells may simply serve as a stimulating fraction of the lesion which are collected through blood stream from the bone marrow mononuclear cells (Tandon *et al*., 2012; Flanagan *et al*., 1988; El-Mofty and Osdoby, 1985) any authors have suggested that this lesion can occur in subjects demonstrating increased amount of calculus and plaque , misaligned teeth, or following a complicated dental extractions and few researches have linked the association of giant cell granuloma with increased levels of female sex hormones (Abdulkareem *et al*., 2015; Cloutier *et al*., 2007) where the giant cells likely become the focus for estrogen influence. (Gunhan *et al*., 1998) This lesion may also represent an unusual response to tissue injury (McDonald, 2016) and rarely has been found in cases following the placement of dental implants. It may be clinically present as one the atypical oral manifestations in patients with hypoparathyroidism (Chaparro-Avendaño *et al*., 2005; Shadman *et al*., 2009; Shafer *et al*., 2009) where the increased parathyroid hormone (PTH) production, favors the initiation such lesions like giant cell granuloma. (Chaparro-Avendaño *et al*., 2005) The chances of developing such lesions are enhanced in children suffering from hypophosphatemic rickets- a condition associated with a sub clinical hyperparathyroidism (Chaparro-Avendaño *et al*., 2005; Giansanti and Waldron, 1969).

The etiology in the present case could be poor oral hygiene as the child was not following regular oral hygiene practice. A positive correlation of poor oral hygiene and occurrence of the giant cell granuloma has been established in a study of group of people belonging to the low socio-economic strata. (Eronat *et al*., 2000) This has been further corroborated in a clinical study by Bodner *et al.* 1997 that concluded that patients with poor oral hygiene were more susceptible to larger sizes of PGCG lesion. (Bodner *et al*., 1997) Clinically this lesion manifests itself as a soft to firm, bright nodule with a smooth or mamillated surface that can be sessile or pedunculated usually bluish red in colour on the attached gingiva, or on the alveolar mucosa, frequently in the anterior region involving the incisors and canine. (Nedir *et al*., 1997; Falaschini *et al*., 2007; Shafer *et al*., 2009) Based on the findings of various studies, both the sexes can be inflicted, but women are affected more with nearly 2:1 predilection of females to males and mandible is the most frequently involved jaw. (Chaparro-Avendaño *et al*., 2005; Regezi *et al*., 2007; Maryam Assadat Hashemi Pour *et al*., 2008**;** Falaschini *et al*., 2007; Shafer *et al*., 2009; Patil *et al*., 2014; McDonald, 2016) The PGCG can occur throughout life with maximum incidences reported during mixed dentition (Tandon *et al*., 2012) or in individuals of 5 years to 15 years of ages. (Abdulkareem *et al*., 2015; McDonald, 2016**)** The mean

age of diagnosis is in between 38-42 years (Shafer *et al*., 2009) whereas Motamedi *et al*. 2007 reported the average age to be 31 years. Thelesion is usually reported to have a relatively rapid growth rate and the size lies in between 0.5and 1.5 cm but few authors contradict and suggest that expansion of the lesion is a relatively a slow process and ranges from 0.1 to 3 cm in size with 94% of lesion smaller than 1.5 cm in diameter. (Bodner *et al*., 1997) In the present case the gingival growth appeared in the anterior region of the maxilla which is an unusual disposition, in a 9 years old male subject which was approximately 2×1.5cm in size that was attained over a stretch of 3 months.

The smaller lesions cause no serious symptoms except that they may bleed occasionally and cause few observable changes in gingival anatomy but large ones can interfere with the normal oral function. (Chaparro-Avendaño *et al*., 2005; Shadman *et al*., 2009; Shafer *et al*., 2009) Shadman N *et al*. 2009 reviewed123 consecutive cases of PGCG and discovered that 96% of patients did not give history of pain while remaining cases reported dull and slight pain (Shadman *et al*., 2009). In this concerned case also no complaint of pain or discomfort was reported and apprehension was related to the position of the tumour. Mild bleeding was observed by the patient on chewing and tooth brushing but no signs of ulceration was evident. Since PGCG is a growth related to soft tissue hence the radiographic analysis is unspecific and vague but sometimes there may be evidence of the bone being affected beneath the lesion in the form of superficial alveolar bone resorption that are observable in an IOPA radiographs. (Chaparro-Avendaño *et al*., 2005; Alaa *et al*., 2014; Flaitz, 2000; Patil *et al*., 2014)**.** A peculiar concave resorption pattern, referred to as "leveling effect" or "cupping resorption or "eburnation" of underlying bone can be detected beneath the lesion especially in the edentulous regions of the cortical bone. (Chaparro-Avendaño *et al*., 2005; Flaitz, 2000; Cloutier *et al*., 2007**,** Patil *et al*., 2014) In certain instances there may also be evidence of widening of PDL spaces associated with tooth mobility in the involved region. (Chaparro-Avendaño *et al*., 2005; Patil *et al*., 2014) Dental resorption is extremely rare, and only two cases have been reported in the dental literature so far. (Nedir et al., 1997; Kaya *et al*., 2011) Radiographs also demonstrate the presence of irritating factors like sub gingival calculus (Bodner *et al*., 1997; Patil *et al*., 2014) or vertically aligned bony spicules at the bottom of the lesion.

(Patil *et al*., 2014; Kaya *et al*., 2011) The granuloma exhibits indistinguishable clinical and histological features that are consistent with other oral pathological conditions like central giant cell granuloma displaying similar pattern of occurrence within the jaw bones which necessitates a careful radiological evaluation. Since there was no radiographic evidence of bone resorption or pathological loss of the interdental bone of the teeth at the site of the lesion hence an appropriate diagnosis of peripheral giant cell granuloma was concluded. There are a wide range of lesions in the oral cavity other than PGCG that have identical clinical features such as Pyogenic Granuloma, hemangioma, CGCG, Peripheral ossifying fibroma and metastatic carcinomas thus a histopathological evaluation is obligatory for a confirmed clear-cut diagnosis. (Patil *et al*., 2014; Kaya *et al*., 2011) The histopathological findings of PGCG exhibit a marked parallelism with the features of central giant cell granuloma, and some dental specialists assumed that PGCG could be a soft tissue analogue of the central bony lesion but CGCGs distinctively involves the resorption of the bone and tooth. (Nedir *et al*., 1997).

Histologically PGCG present as anon – encapsulated lesion of tissue composed of a hyper cellular fibro-vascular stroma incorporating a multitude of ovoid, spindle shaped connective tissue cells along with numerous amounts of multinucleated giant cells that exhibit a random distribution of nuclei within the cytoplasm. (Chaparro-Avendaño *et al*., 2005; Regezi *et al*., 2007; Shafer *et al*., 2009; Lewis and Eversole 2002; Neville *et al*., 2015) There is also seen a scattered distribution of spicules of newly formed of bone or osteoid tissue within the granulomatous stroma. (Shafer *et al*., 2009) The growth related to the PGCG lesions are self-limiting hence the treatment is focused on the surgical resection of the whole lesion along with the base accompanied by the removal of the underlying source of the determinants responsible for the pathology. (Shadman *et al*., 2009; Maryam Assadat Hashemi Pour *et al*., 2008; Patil *et al*., 2014**)** Some clinicians prefer to surgical eviscerate, following which the site is curettaged that ensures the comprehensive removal of the lesion from its origin resulting in the thorough elimination or the suppression of the etiological factors (Chaparro-Avendaño *et al*., 2005; Alaa *et al*., 2014**;** Falaschini *et al*., 2007; Flaitz, 2000) The involvement of the periodontal membrane of the affected teeth mandates their extraction to safeguard full resection. (Patil *et al*., 2014) The lesion can be treated successfully with several available diverse techniques varying from traditional surgical knife to electric scalpel, as well as application of liquid nitrogen or cryoprobe by incorporating cryosurgery and lasers (Chaparro-Avendaño *et al*., 2005; Patil *et al*., 2014). The management of the lesion with laser has an edge over other techniques as it result in less intra operative bleeding, sterilizes the wound, demand no suturing and offers better patient comfort pre and post operatively. (Patil *et al*., 2014) But in cases where the lesions is proximate to bone ,the carbon dioxide laser has limited applicability as laser resection is not preferred and in such situations surgical curettage is undertaken for the successful treatment. (Chaparro-Avendaño *et al*., 2005) Subsequent to the surgical resection, the lesion has excellent prognosis and only 10-15%cases might show recurrence which can be managed easily with additional therapy. Reappearance of the growth can be anticipated if the lesion is not excised entirely. (Regezi *et al*., 2007; Neville *et al*., 2015) There are no reports in literature of the lesion displaying any aggressive inclination or malignant transformation. (Patil *et al*., 2014)

Conclusion

PGCG in children, demonstrate a rapid growth which can attain a significant size within few months that may impede the normal eruption of dentition and can result in minor to moderate tooth movement, hence their early diagnosis will help in conventional management with low risk of the tooth and bone loss.

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