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Labiocervical groove: A rare developmental defect of the enamel: A case report

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Abstract

Dental enamel, the hardest tissue in the body, is formed during only a certain period of the tooth development and once formed enamel cannot be replaced. Brin I, Ben Bassat Y in the year 1989 determined the presence of labiocervical groove—a developmental defect of enamel on the surface of the maxillary central incisors. The present case report describes a labiocervical groove that was reported in a 12 year old female on her right permanent central incisor, with the chief complaint of the patient and her parents being, the unaesthetic appearance of the tooth cause of the presence of 2 brown notches since the eruption of the tooth. Apart from the appearance, no other discomfort was experienced by the patient. An indirect porcelain laminar veneer was planned, fabricated and cemented onto the tooth after eliminating the defect, which helped in the upliftment of the patient's esthetics and self esteem.

Keywords: Labiocervical groove, developmental defect, enamel, esthetics

Introduction

Dental enamel, the hardest tissue in the body, is formed during only a certain period of the tooth development and once formed enamel cannot be replaced. Ameloblasts, are the secretory cells and they play the role of secretion of enamel. Any change in the environment can affect the functioning of the ameloblasts as these cells are very sensitive to the alterations in the environment during the process of enamel production, resulting into the Developmental Defects of Enamel (DDE) that may vary from slight abnormalities in the color of the tooth to an absolute absence of the dental enamel^[1,2].

Effects of developmental defects of enamel (DDE)

Developmental defects of enamel can affect the tooth by increasing its susceptibility to dental caries or can cause dental sensitivity. Apart from this, the aesthetic appearance of the tooth is highly compromised. Most importantly, most of the individuals discern developmental enamel defects to be disfiguring, resulting into a low self-esteem and disgrace^[2].

Pathology of DDE

Developmental defects of the enamel may be due to genetic mutations of the genes that code for the enamel proteins or they may be inherited as a trait of familial conditions. During such conditions often involvement of tissues, such as skin, that has the same embryologic origins of neuroectodermal mesenchyme with teeth, may be seen^[1,3]. Such enamel defects are usually generalized in nature.

Furthermore, enamel defects can also be caused by many acquired environmental factors or as a result of systemic influence such as metabolic conditions, infections, use of certain drugs and chemicals, irradiation and trauma. Although the damaging agents of ameloblasts are numerous, the defect of the enamel is usually presented in only a few ways: hypoplasia, may appear as pits, grooves, thin or missing enamel, or hypomineralization, may present as soft enamel, or hypomaturation where there is alteration in the translucency that can affect the entire tooth, or in a localized area known as an opacity^[2].

Based on the stage of the amelogenesis when the dysfunction occurred, the final appearance of the enamel defect shows great degree of variations accordingly.

The inactive state of the ameloblasts can be temporary or permanent which mainly is dependent on: how severe the insult was, how much was the duration of the insult, during what phase of ameloblast activity did the insult occur, and what was the agent involved. These factors largely govern the final appearance of the enamel defect. To exemplify, in case of an insult during the secretory stage of amelogenesis, the resultant enamel is a pathologically thin enamel, while an insult during the maturation stage can lead to the alteration in the translucency that might affect the entire tooth or in localized area that is known as an opacity [4, 5].

Labiocervical groove

Brin I, Ben Bassat Y in the year 1989 determined the presence of labiocervical groove on the enamel surface of the maxillary central incisors. According to a few authors, Labiocervical groove, starts on the cervical enamel surface and extends to the radicular surface, which has also been described as a notch (Lee *et al.*, 1968; Gaspersic, 1986; Kozlovsky *et al.*, 1988; Goon *et al.*, 1991; Seow, 1997; Ben Bassat and Brin, 2001; Shpack *et al.*, 2007). This defect is believed to be a developmental anomaly as a result of the infolding of the enamel organ and Hertwig's epithelial root sheath that leads to the creation of a groove on the labial surface of permanent maxillary incisors. Earlier it was believed that this defect occurred as a result of trauma to the developing tooth bud but now it is believed to be formed as a result of vertical extension of the mamelon grooves (Shpack *et al.*, 2007) (Simon *et al.*, 1971). This defect can present itself as a shallow/deep groove which may be either short or long. Shallow defects usually do not bring any alterations in the gingival contour but the deeper ones can result into irregular



Fig 1: Grooves on the labial surface

On probing, we found that the proximal groove extended further subgingivally. Probing onto the grooves did not cause any pain or sensitivity to the patient. The probing depth of both the grooves was 0.5 mm.

On soft tissue examination marginal gingiva was knife edged and scalloped in relation with 11.

An intraoral periapical radiograph revealed a thin linear radiolucency extending from the incisal edge upto the middle 3rd of the radicular surface that suggested that the proximal groove extended upto the middle 3rd of the radicular surface from the incisal edge while the lateral groove did not seem to extend apically onto the root surface. Through the radiograph, it was ruled out that there was no interdental and periapical tissue involvement with 11. No bone loss was evident (Fig. 3).

contours of the adjacent gingival margin (Lee *et al.*, 1968). Hence the presence of Labiocervical Groove can cause esthetic deficiency of the gingival marginal contour, accumulation of plaque and, consequently leading to gingival pocket with bone loss and/or increase in the chances of dental caries (Peikoff and Trott, 1977; Peikoff 1985) [6, 7].

Case report

A 12 year-old female patient reported to the Department of Pedodontics and Preventive dentistry, Guru Nanak Institute of Dental Sciences and Research, Kolkata with the chief complaint of deep brown notches on upper front tooth since the eruption of the tooth. The patient was unhappy with the appearance of her teeth and she was displeased with her smile. Apart from the unaesthetic appearance, the patient or her parents did not report of any other discomfort or pain in relation to the tooth.

On questioning, the parents of the patient gave history of direct trauma to the primary anterior teeth at the age of 1 and half years. A detailed family history, medical history and dental history was obtained. In family history, none of her family members had similar problem. Medical history was also not relevant. Extra oral examination elicited no abnormal findings.

Intraoral examination

On intraoral examination it was revealed that there were 2 grooves present on the labial surface of 11. The proximal groove extended from the incisal edge of the labial surface upto the cervical third of the labial surface, while the lateral groove extended from the incisal edge upto the middle 3rd of the labial surface (fig. 1 and 2).



Fig 2: The extent of the grooves cervico-gingivally

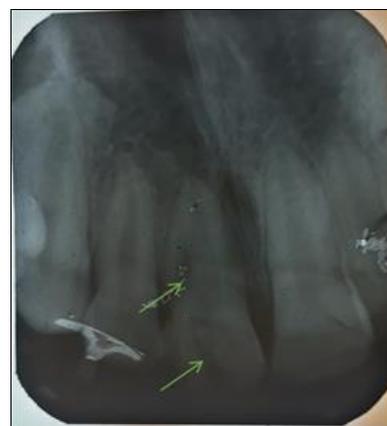


Fig 3: Intraoral periapical radiograph revealing the extent of the grooves

Through pulp vitality test using electric pulp tester, it was confirmed that the pulp was vital.

Following the history taking and clinical and radiographic examination, we diagnosed the condition as Labio-cervical groove, a developmental defect of the enamel.

The tooth was completely asymptomatic while the only concern of the patient was about the esthetics. Hence, the indirect laminate veneering was planned for the aesthetic correction of 11. The objective of the treatment plan was to eliminate the defect and improve the esthetics of the tooth in as conservative way as possible. The patient and her parents were explained the entire procedure and a written informed consent was taken from the parents and a verbal assent was taken from the patient before starting the procedure.

Treatment

The tooth preparation was performed according to the standard principles for tooth preparation required for veneer preparation for the ceramic veneering.

The facial surface was prepared in the three planes to give the effect of illusion to improve aesthetics. The facial surface was prepared to a depth of 0.5 mm close to the gingival margin further rising to a preparation depth of 0.7 mm for the bulk that was achieved with the aid of depth cutting burs. This type of preparation is to mimic the natural curvature of the tooth.

The chamfer margin was placed 0.5 mm subgingivally to improve the aesthetics and emergence profile of the tooth. The preparation of the incisal edge, was performed about 1 mm and the preparation was extended to the palatal surface to give wrapped-around preparation geometry. The proximal finish line was kept just short of breaking the contact. All the

internal line angles were rounded to reduce stresses in the margins of the veneers. Preparation was finished with yellow colour fine grit finishing diamond point. Shade selection was performed using VITA shade guide.

Recording an impression

After placing the gingival cord, Poly vinyl siloxane material was used to make the impression of the upper arch using the putty reline technique. Lower arch impression was made using alginate impression material. The cast was sent to the lab for the fabrication of porcelain laminate veneer.

Try-in procedure

The tooth was cleaned prior to the try-in procedure and the quality of fit, gingival extension and color match of the veneer was assessed.

Steps followed for the cementation of the veneer were

Etching of the intaglio surface of the porcelain veneer was done with 30% Hydrofluoric acid. The etched surface was coated with a silane coupling agent.

Etching of the prepared tooth surface was done using Orthophosphoric acid (Universal etch). The etched surface was coated with a dentin bonding agent (Prime and Bond NT). Cementation was done using resin luting cement (Calibra). The excess cement was first removed and then curing was done with light activation for 45 seconds.

After the curing process, finishing of the laminate veneer followed with the help of rotating disks (Soflex discs). (Fig. 4, Fig. 5 and Fig. 6).



Fig 4: Porcelain laminate veneer cemented on 11



Fig 5: Palatal view after veneer cementation



Fig 6: Esthetic smile restored

Home care instruction

Oral hygiene instructions were given and a strict follow-up protocol of 1 week, 3 months, and 6 months for assessing the treatment procedures and oral hygiene measures was advised to the patient.

Discussion

A labiogingival groove has the potential for accumulation of plaque leading to a compromised dental and periodontal health of the tooth [6]. According to a study by Shapack *et al* on 1250 patients he found that the labiocervical groove was present in 5.3% of upper incisors [7] and the central incisors were more commonly affected (94%) (Simon *et al.*, 1971).

Based on the severity of the groove Mass *et al.* 2005 proposed a classification: [8]

1. A mild subgingival shallow groove below the marginal gingiva that can be felt only by probing;
2. A moderate groove that can be detected with the eyes, extending subgingivally as in (1), and additionally supragingivally on the labial crown surface, not more

than 2 mm from the marginal gingiva in the incisal direction and

3. A severe defect extending supragingivally more than 2 mm from the marginal gingiva on the labial crown surface and further subgingivally.

Grooves can be appreciated on a periapical radiograph as one or more linear radiolucency extending along the length of the root parallel to or superimposed over the root canal.⁹ Prognosis of the tooth greatly depends on the depth & extent of the groove.

The labiocervical groove present on maxillary central incisor 11, in the present case can be classified as a severe defect (3) according to Mass *et al.*, 2005.

Based on the type of the grooves the different treatment options that have been put forth are gingivectomy or subgingival curettage, combined endodontic and periodontal treatment in severe cases, odontoplasty or saucerisation and conservative treatment by eliminating the grooves with restorative materials [9].

In several case reports various restorative materials like composite resins and light cure GIC, MTA have been used to seal such grooves. A case report by Srinivas and Pradeep reported restoration of groove using Glass ionomer cement [10].

In the present case, after eliminating the grooves porcelain laminate veneering was done with 11, a conservative approach to restore the esthetics of the patient, considering the prime concern of the patient.

Conclusion

Labiocervical groove causes accumulation of plaque which can lead to faster breakdown of sulcular attachment in relation to defect that can lead to esthetic defect of gingival marginal contour and destruction of periodontal tissue. It is very important to identify the defect and bring about a preventive correction at the earliest to avoid further periodontic-endodontic involvement of tooth and to restore the esthetics and smile thereby, uplifting the self-esteem of the patient.

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