Research, Society and Development, v. 13, n. 10, e92131047067, 2024
(CC BY 4.0) | ISSN 2525-3409 | DOI: http://dx.doi.org/10.33448/rsd-v13i10.47067

Enamel hypoplasia: A defect in the organic matrix

Hipoplasia do esmalte: Um defeito na matriz orgânica

Hipoplasia del esmalte: Un defecto en la matriz orgânica

Received: 09/28/2024 | Revised: 10/13/2024 | Accepted: 10/15/2024 | Published: 10/20/2024

Marcio dos Santos Júnior
ORCID: https://orcid.org/0009-0009-0636-7827
Universidade Metropolitana de Santos, Brazil
E-mail: marciojr1310@outlook.com
Vinicius Santos Martins
ORCID: https://orcid.org/0009-0003-7187-4872
Universidade Metropolitana de Santos, Brazil
E-mail: viniciussantosmg28@gmail.com
Ana Paula Taboada Sobral
ORCID: https://orcid.org/0000-0002-6846-6574
Universidade Metropolitana de Santos, Brazil
E-mail: anapaula@taboada.com.br
Elza Padilha Ferri
ORCID: https://orcid.org/0000-0002-1462-8814
Universidade Metropolitana de Santos, Brazil
E-mail: elzapadferri@gmail.com
Elaine Marcílio Santos
ORCID: https://orcid.org/0000-0003-1084-9940
Universidade Metropolitana de Santos, Brazil
E-mail: elaine.marcilio@unimes.br
Gustavo Duarte Mendes
ORCID: https://orcid.org/0000-0001-8700-5709
Universidade Metropolitana de Santos, Brazil
E-mail: gustavo.mendes@unimes.br
Sandra Kalil Bussadori
ORCID: https://orcid.org/0000-0002-9853-1138
Universidade Metropolitana de Santos, Brazil
E-mail: sandra.skb@gmail.com
Marcela Leticia Leal Gonçalves
ORCID: https://orcid.org/0000-0003-1305-5257
Universidade Metropolitana de Santos, Brazil
E-mail: marcelalleal@hotmail.com

Abstract
Introduction: Aesthetics as an area within Dentistry has become fundamental, making it necessary to acquire knowledge beyond oral health, in order to promote confidence, self-esteem and well-being in patients, directly reflecting on their quality of life. The objective of this article is to present a study on enamel hypoplasia. Methodology: This article addresses dental enamel hypoplasia through a narrative review of the literature. Conclusion: Continuous advancement in knowledge and clinical techniques is crucial to improve the understanding, diagnosis and treatment of this condition, thus promoting better oral health for patients.
Keywords: Dental aesthetics; Hidden enamel hypoplasia; Treatments; Restoration.

Resumo
Introdução: A estética como área dentro Odontologia tem se tornado fundamental, fazendo necessário adquirir conhecimentos além da saúde bucal, com intuito de promover confiança, autoestima e bem-estar ao paciente, refletindo diretamente em sua qualidade de vida. O objetivo deste artigo é mostrar um estudo sobre hipoplasia de esmalte. Metodologia: Este artigo aborda a hipoplasia do esmalte dentário, por meio de uma revisão narrativa da literarura. Conclusão: O avanço contínuo no conhecimento e nas técnicas clínicas é crucial para aprimorar a compreensão, o diagnóstico e o tratamento desta condição, promovendo, assim, uma melhor saúde bucal para os pacientes.
Palavras-chave: Estética dentária; Hipoplasia do esmalte dentário; Tratamentos; Restauração.

Resumen
Introducción: La estética como área dentro de la Odontología se ha vuelto fundamental, siendo necesario adquirir conocimientos más allá de la salud bucal, con el objetivo de promover la confianza, la autoestima y el bienestar del paciente, reflejándose directamente en su calidad de vida. El objetivo de este artículo es mostrar un estudio sobre la hipoplasia del esmalte. Metodología: Este artículo aborda la hipoplasia del esmalte dental, a través de una revisión narrativa de la literatura. Conclusión: El avance continuo en el conocimiento y las técnicas clínicas es crucial para mejorar la comprensión, el diagnóstico y el tratamiento de esta afección, promoviendo así una mejor salud bucal de los pacientes.
Palabras clave: Estética dental; Hipoplasia oculta del esmalte; Tratos; Restauración.

1. Introduction

Dental enamel is a mineralized tissue of ectodermal origin, formed by the activity of ameloblasts and its development occurs in three stages, the first of which is the formative phase, when the organic matrix is deposited on the tooth germ, followed by partial mineralization of the formed organic matrix and finally, the enamel matures through the calcification process. (Passo, 2007) After the complete formation of dental enamel, the structure remains intact (Ferreira, 2014), so that any change during formation remains recorded on the surface of the tissue. (Santos, 2014)

The ameloblasts in the developing tooth germ are very sensitive cells from a metabolic point of view and any exogenous or endogenous factor can easily affect them, which can result in enamel anomalies. (Pinheiro, 2003; Seow, 1991)

As a consequence, these factors can promote focal and transient cessation of enamel synthesis, that is, disorders that occur during the development and maturation stages of enamel will result in a reduction in the quantity or thickness of enamel, resulting in white spots on the tooth structure. (Pinheiro, 2003)

When the enamel surface appears rough, irregular and even softened in these white spots, it means that the causal factor acted in the last phases of amelogenesis, when the last layers of enamel are deposited, characterizing enamel hypoplasia. (Pinheiro, 2003)

Enamel hypoplasia is defined as the incomplete or defective formation of the organic matrix of the developing tooth enamel, which consequently leads to deficiencies and irregularities on the surface of the tooth tissue. (Bendo, 2007)

There are many causes that lead to hypoplasia, including factors that affect the patient's systemic condition, such as low birth weight (Pimlott, 1985) and vitamin deficiencies resulting from the baby's poor nutrition during intrauterine life (Laskaris, 2000); genetic etiological factors, such as amelogenesis imperfecta and hereditary epidermolysis bullosa (Costa, 1997); and etiological factors, such as local infections and trauma. (Campos, 2004)

For Niazie and Pepper (2023), patients who present with this condition usually have a history of chronic excessive fluoride intake during the critical window of amelogenesis, which occurs from birth to eight years of age. Clinically, the severity of dental fluorosis ranges from virtually imperceptible changes in the enamel surface, such as small opaque white spots that the patient may not notice, to eroded and stained dark yellow-brown enamel.

The pathology can cause white, yellowish, brown spots and even discoloration of the teeth. In certain cases, the change can manifest clinically as grooves or depressions, or as partial or total lack of the enamel surface, with dentin exposure in some points, which may present dentin sensitivity, unsatisfactory aesthetics, malocclusion, as well as a predisposition to dental caries. (Santos, 2014; Seow, 1991)

According to its etiology, enamel hypoplasia can be classified as: hereditary, local and systemic. In the hereditary variety, it can be transmitted as a dominant sex-linked or autosomal dominant trait, affecting both dentitions. When the condition occurs due to local or systemic factors, any dentition can be involved. In the systemic case, it involves a group of teeth whose enamel was formed during the metabolic disorder, while in the local type, it affects isolated teeth and, in many

cases, a single tooth. (Seow, 1991; Coutinho, 1995)

There are numerous factors that can lead to systemic hypoplasia, such as: nutritional deficiencies; deficiencies of vitamins A, C, D; caused at birth (premature birth, birth trauma); congenital syphilis; exanthematous diseases (exanthematous fever, measles, chickenpox, scarlet fever, rubella and malnutrition); ingestion of medications (tetracycline and thalidomide); brain trauma; neurological defects and idiopathic factors. And hypoplasia of local origin may be due to periapical infection and dental trauma (mainly intrusive luxation). (Fonseca, 2006; Soares, 2002; Needleman, 1992)

Treatment of this alteration may be required for aesthetic reasons and depends on the severity and the need to improve the functional and psychological conditions of the patient, since a child with a compromised smile may present psychological and behavioral disorders. (Bendo, 2007; Pithan, 2002) Therefore, several treatment protocols can be adopted, from whitening, microabrasion, conservative aesthetic restorations and artificial crowns. (Pithan, 2002)

Adhesive composite resin restorations have been successfully used to treat hypoplasia, since the introduction of acid etching and the increasing improvements in adhesive systems and composite resins have made it possible to perform this technique. Direct restorative techniques provide conservative, esthetic and functional treatment in a single session, minimizing the amount of dental tissue to be removed in a tooth already compromised by enamel alteration. (Maragoni, 1992; Shafer., 1987)

The objective of this this article is to show studies on enamel hypoplasia.

2. Methodology

The study aims to investigate dental enamel hypoplasia, a defect in the organic matrix, in order to understand its causes, clinical manifestations, diagnostic methods and treatment options.

To achieve the proposed objectives, this study will adopt a methodological approach based on literature review and clinical analysis, conducting a comprehensive bibliographic review in scientific databases such as PubMed, Scielo and Google Scholar, searching for articles, reviews and case studies on enamel hypoplasia. (Rother, 2007)

3. Results

Enamel hypoplasia represents a significant challenge in dental practice, requiring a multidisciplinary approach for its effective management. This anomaly is caused by changes in the organic matrix, which compromise the structure and integrity of the enamel, resulting in teeth with irregular surfaces, grooves, stains or cavities. The following study reviews the literature focusing on the causes, clinical manifestations, diagnoses and mainly, the possibilities of treatments for enamel hypoplasia.

As a result of the aforementioned facts, enamel hypoplasia is a very common finding in young patients. Because it has a varied etiology, whether hereditary, localized or systemic, and presents itself clinically in different ways, it primarily requires the dentistry professional to make a correct diagnosis, thus requiring a constant search for knowledge, so that there is theoretical and practical background to meet the diversities imposed on each case, always being prepared for the possibilities, in addition to establishing a treatment plan compatible with the patient's needs, whether they are aesthetic, functional, due to dentin sensitivity or susceptibility to caries.

This work addressed the discussion on the etiology of the pathology, the clinical manifestations of dentistry, the most effective diagnostic approaches, preventive and therapeutic treatments, aiming at improving the oral health and quality of life of affected patients.

3.1 Dental Enamel

Dental enamel is a tissue of ectodermal origin, which covers the anatomical crown of the tooth, being the most mineralized structure in the body and the only one of epithelial origin. (Kramer, 2002) This tissue is the only structure in which remodeling does not occur after the beginning of its formation, with ameloblasts being extremely sensitive cells to systemic disturbances. (Ribas, 2004) Thus, any change in its normal activity will be permanently recorded (Neville, 1998; Chagas, 2007), producing, in many cases, visible defects in the tooth after its eruption. (Seow, 1991)

Dental enamel consists of elongated columns (enamel prisms) that are joined together by interprismatic enamel. Both the prisms and the interprismatic enamel are formed by hydroxyapatite crystals, differing from each other only in the orientation of the crystals. (Neville, 1998)

The formation of dental enamel is a complex but well-coordinated biological process. Its development is regulated by epithelial cells, the ameloblasts, which express an important set of genes that encode the production of proteins essential for the formation of this dental tissue. (Chagas, 2007)

Ameloblasts are tall columnar cells that have numerous mitochondria in the region below the nucleus. Each of these cells has an apical extension, known as the Tomes process, which has numerous secretory granules containing proteins that constitute the enamel matrix. After enamel synthesis is complete, the ameloblasts form a protective epithelium that covers the crown until the tooth erupts. This protective function is very important in preserving various enamel defects. (Junqueira, 1971)

Enamel formation occurs during the bell phase of tooth development. During this phase, the internal epithelium of the dental cap differentiates into ameloblasts, which are the cells responsible for the formation of tooth enamel. Because it is produced by these cells, enamel will have its formation divided into two stages, initial (pre-secretion and secretion) and later (maturation and mineralization). (Bittencourt, 2022)

The enamel formation process (amelogenesis) begins in the crown phase of tooth development and consists basically of two stages: the first, called the secretory phase, where the ameloblasts produce partially mineralized enamel (30%), and the second, called the maturation phase, consists of mineral deposition, and the removal of organic matter and water. (Lunardelli, 2007; Mcdonald, 1977)

Amelogenesis in human dentition begins in the mother's womb and, as mentioned above, develops in two main stages: secretory and maturation. During the secretory phase, the enamel matrix is established and matrix mineralization occurs during the subsequent maturation phase, divided into early and late stages. In the early stage of maturation, the enamel is coarse, white and relatively soft. During the late stage of maturation, this diffuse and opaque enamel is replaced by the final, translucent and hard enamel. Ameloblasts, the enamel-forming cells in the developing tooth germ, are extremely sensitive to external stimuli, and many factors, both local and systemic, can result in enamel anomalies. (Neville, 1998)

When aggression to the ameloblast occurs during the matrix formation phase, there may be a reduction in enamel production, which, after calcification and maturation, will present a reduction in its thickness, thus configuring hypoplasia. When aggression occurs during the maturation or mineralization phase of the matrix, this may result in hypocalcification. (Chagas, 2007) This is defined as a defect where there is no structural loss of enamel, but rather changes in its color and translucency, which can also be called enamel opacity. (Shafer, 1987)

Therefore, dental hypoplasia is defined as an incomplete or defective formation of the organic matrix of dental enamel (Bendo, 2007) in development and may be a consequence of events that interfere with the normal formation of this matrix, causing defects and irregularities on its surface. (Seow, 1991) It may have a genetic or environmental origin and systemic or local etiology. (Lunardelli, 2007)

3.2 Hereditary Hypoplasia

Amelogenesis imperfecta is defined as a hereditary disease that affects the enamel in both dentitions, with teeth that are malformed and stained. (Ribas, 2004)

For Shafer et al. (1987), it is an exclusively ectodermal disorder, since the mesodermal components of the tooth are basically normal.

Williams and Becker (2000) stated that amelogenesis imperfecta is a group of hereditary defects without association with other disorders. It occurs through genetic factors (autosomal dominant, recessive or linked to the X chromosome), and is an exclusively ectodermal alteration. Its prevalence is 1 person affected in 15,000.

In cases of more severe manifestations of amelogenesis imperfecta, clinical impairments of occlusion and aesthetics occur, making it necessary to carry out a meticulous treatment plan, established through an accurate and detailed diagnosis to restore and recover the compromised dental crowns, restoring harmony between occlusion, function and aesthetics. (Willians, 2000) Occlusion and vertical dimension are rapidly affected by tooth wear, often making them extremely sensitive to contact and thermal stimuli. (Ribas, 2004; Neville, 1998)

The structural defect caused by amelogenesis imperfecta makes the affected teeth more susceptible to attrition, causing wear of the dental structures and consequently a decrease in vertical dimension. Another disorder caused by this alteration is poor aesthetics, which can cause psychological problems for patients. (Bendo, 2007)

One of its characteristics is that the white spots can range from white to dark brown, and may present areas with missing enamel. (Rocha, 2022)

Preventive measures such as topical fluoride applications and diet control should be encouraged and recommended to patients affected by amelogenesis imperfecta. They are more susceptible to gum problems, as there is an increase in plaque/calculus retention due to irregularities in the enamel surface, in addition to sensitivity, which also makes it difficult to control biofilm. (Ribas, 2004)

There are three most common manifestations within the clinical picture of the anomaly. The first, hypoplastic amelogenesis imperfecta, is characterized by deficient formation of the matrix, with reduced enamel thickness. The teeth have a color similar to that of dentin, and may later acquire a yellowish-brown color. The risk of caries is higher, but increased abrasion can cause hypersensitivity and irreversible damage to the pulp. The second, hypomineralized amelogenesis imperfecta, occurs when the enamel has a normal thickness at eruption, but is very “soft”, opaque, dull, and the color varies from white to light brown. Due to abrasion and attrition, this enamel will be lost within a few months or will take on a dark yellow to brown color. Radiographically, the enamel appears to have a density equal to or even lower than that of dentin. There is a strong tendency for the formation of dental calculus, for reasons previously explained. (Passo, 2007; Ribas, 2004; Neville, 1998; Willians, 2000)

Hypoplastic lesions related to environmental factors usually affect only one set of teeth. Among the environmental factors responsible for damage to ameloblasts, systemic and local causes stand out. (Ribas, 2004; Shafer, 1987; Willians, 2000)

3.3 Systemic Hypoplasia

Enamel hypoplasia caused by systemic diseases occurs frequently, and the type and form of this hypoplasia depend on the developmental state of the affected teeth, as well as the time, duration and intensity of the influence. (Ribas, 2004)

Changes in pre, peri and postnatal development, involving the secretion and/or maturation of the enamel matrix, can act as permanent marks, due to the structural stability that the enamel presents. Certain clinical conditions related to chemical (fluoride, tetracycline and thalidomide) or pathological factors (Shafer, 1987; Neville, 1998), such as infectious (viral and

bacterial), metabolic (diabetes, hypocalcemia, hypothyroidism and gastrointestinal malabsorption), neurological, nutritional (vitamin A and D deficiency) processes, in addition to respiratory and perinatal disorders (prematurity, low birth weight), and diseases such as rubella, cerebral hypoxia, malnutrition, rickets and measles have a very close association with the appearance of enamel hypoplasia in the pre and postnatal periods of dental enamel development. (Bendo, 2007; Shafer, 1987; Neville, 1998)

Among the most frequently related systemic causes, the following stand out: respiratory tract infections, otitis media, urinary tract infections, asthmatic complications, nutritional deficiencies (vitamins A, C and D, calcium and phosphorus), exanthematous diseases (measles, chickenpox, scarlet fever), congenital syphilis, celiac disease, prematurity at birth, idiopathic causes, among others. (Neville, 1998)

However, enamel hypoplasia only appears if the injury occurs at the time when the teeth are developing, or more specifically, during the enamel formation phase. Once the enamel is mineralized, there is no longer a risk of these defects occurring. (Ribas, 2004)

Nutritional deficiency constitutes an important systemic factor in the formation of hypoplasia. Breast milk is the first vehicle for providing nutrients to an individual, however, this does not always guarantee complete nutrition for the newborn. Calcium and phosphate deficiency in the neonatal period is directly related to enamel hypoplasia in children born prematurely and with a normal weight (less than 2500 grams). (Passo, 2007)

The main objective of treating patients with systemic enamel hypoplasia is to provide them with rehabilitation that promotes the aesthetic reconstruction of the affected teeth, in addition to restoring their masticatory function. (Passo, 2007)

3.4 Local Hypoplasia

Local enamel hypoplasia occurs when the spread of a periapical infection or trauma to a deciduous tooth disrupts the ameloblast-forming activity of the permanent replacement tooth. (Passo, 2007) Local and direct causes determine lesions of asymmetrical distribution, limited to isolated teeth, and are defined as local hypoplasias. (Shafer, 1987; Neville, 1998)

Factors such as the traumatic displacement of a deciduous tooth can cause, due to the close topographical relationships between the root of the deciduous tooth and the germ of its successor, different disturbances in enamel formation, with varying intensity of the lesion, depending on the trauma that occurred. (Ribas, 2004)

The most commonly cited local causes are due to periapical infections, with premolars being the most affected teeth, and to alveolar trauma in the deciduous dentition, with a higher incidence in the upper central incisors, due to the proximity between the deciduous tooth and the germ of the developing permanent tooth. (Shafer, 1987; Neville, 1998)

When infection occurs due to the presence of caries in the deciduous tooth and the permanent successor is in formation, the bacterial infection may involve the periapical tissue of the deciduous tooth, potentially disturbing the ameloblastic layer of the permanent tooth, resulting in the formation of a hypoplastic crown. The severity of hypoplasia fundamentally depends on the severity of the infection of the deciduous tooth in question and the degree of formation of the permanent successor tooth. (Maragoni, 1992; Neville, 1998; Alexandre, 2008)

The most common causes and predisposing factors of dental trauma in children are iatrogenic injuries in newborns, learning to walk and run, falls, abuse, sports and car accidents, as well as mental retardation, convulsive diseases and physical aggression. (Mcdonald, 1977; Alexandre, 2008)

The severity of the sequelae in the successor tooth depends on the age of the child at the time of the trauma, the degree of resorption of the root of the traumatized deciduous tooth, the type and extent of the trauma and the developmental stage of the successor at the time of the trauma. (Andreasen, 1994; Ben- Bassat, 1985) The types of trauma that can cause the

most damage to the permanent tooth are intrusive luxation and avulsion. (Mcdonald, 1977; Alexandre, 2008)

Damage to the successor tooth can occur both at the time of the trauma and in the subsequent period. The younger the patient, the more severe the developmental changes involving the crown of the permanent tooth. (Soares, 2002; Kramer, 2002; Alexandre, 2008)

In 1992, Marangoni and Carvalho evaluated some ways to restore the aesthetics of anterior teeth affected by enamel hypoplasia involving only one tooth. The solutions reported were aesthetic restorations, using adhesive materials; the use of full metal-ceramic crowns; and aesthetic porcelain veneers.

The use of composite resin has the advantage of requiring less wear of tooth structure and being performed in just one session. The authors emphasize the importance of combining materials and adhesive techniques in order to resolve aesthetic cases with minimal wear of tooth tissue. (Ribas, 2004; Marangoni, 1992)

3.5 Diagnosis

Cases of hypoplasia are common in pediatric and adolescent dental clinics and present alterations that compromise aesthetics, sensitivity and susceptibility to tooth decay. The professional must, therefore, be prepared to make a correct diagnosis when faced with alterations in dental enamel. It is indisputable that it is important to have a broad knowledge of the different types of hypoplasia, so that he or she can detect the cause and type of hypoplasia presented, thus determining an appropriate treatment and consequently a more favorable prognosis. (Ribas, 2004)

The ideal conditions for performing the clinical examination, such as adequate lighting, prior prophylaxis of the surfaces and drying, are reported as indispensable tools for establishing the diagnosis. (Passo, 2007; Bendo, 2007)

It is highlighted by Rocha et al. (2022) that special attention is needed to nutrition, breastfeeding, low weight and childhood stress as these can contribute to the development of enamel hypoplasia.

Another tool that can be used to facilitate clinical examination is the transilluminator, which allows the evaluation of the capacity of light propagation through the lesion to identify the depth of the stain and, consequently, the degree of enamel damage, in order to establish the type of treatment. (Ribas, 2004)

In its less pronounced form, it appears as waves or horizontal grooves, of normal color, on the vestibular surfaces of the teeth, making these abnormalities noticeable when a very thorough clinical examination is performed. In more pronounced cases, the striations are deeper, more prominent, changing the color of the normal enamel to a brownish yellow or black, suggesting a prolonged disturbance in the function of the ameloblasts. (Passo, 2007; Bendo, 2007)

3.6 Therapeutic approach

The aesthetics of the smile has increasingly become the focus of attention among the population seeking specialized dental care. The parameters of normality and beauty imposed by society require people to have a perfect smile. (Braga, 2007)

Hypoplastic lesions tend to have a negative impact on the individual's quality of life, since they compromise aesthetics when located in anterior teeth. (Araujo, 2000)

A child with a compromised smile may present psychological and behavioral disorders. Furthermore, the treatment of the affected teeth, restoring aesthetics and facial harmony, is of great importance in reestablishing the child's self-esteem and self-confidence. (Mcdonald, 1977; Araujo, 2000)

In pediatric dental patients, the treatment plan must be carried out in a way that allows a good prognosis in the medium and long term, not only in terms of aesthetics, but also considering biological aspects. (Kabbach, 2010)

The main objective of treating enamel hypoplasia is to restore full anatomical and harmonious recovery between

occlusion, function and aesthetics, restoring the patient's self-esteem and promoting psychological and social benefits. (Ribas, 2004)

Nowadays, following the idea of wearing down less dental structure in cavity preparations, a therapeutic proposal involving minimally invasive techniques has emerged as an alternative in this type of treatment. The evolution of adhesive restorative materials has enabled a series of treatments with little or no wear to healthy and/or affected dental tissues, in addition to the possibility of performing increasingly aesthetic restorations, with a high predictability of success in the medium and long term. (Kabbach, 2010)

The choice of the best therapeutic approach varies according to the severity of each case, and combined with common sense, less invasive techniques should be preferred by the professional, especially in young patients. In cases of less severe stains, dental whitening may be chosen, preceded or not by the enamel microabrasion technique. This technique is minimally invasive, and the wear is restricted to the affected area.

Mondelli et al. (1995) reported that the microabrasion technique using a paste composed of 37% phosphoric acid with pumice stone provides satisfactory clinical results, in addition to being a substance more readily available in dental offices. (Araujo, 2000; Mondelli, 1995) In clinical cases involving moderate and severe hypoplastic stains, with dentin involvement, the recommended treatment is the execution of direct or indirect restorative procedures. (Ribas, 2004; Kabbach, 2010)

Treatment of this alteration may be required for aesthetic reasons and depends on the severity and the need to improve the patient's functional and psychological conditions, since a child with an impaired smile may present psychological and behavioral disorders. (Ferreira, 2014; Pindborg, 1982)

Therefore, several treatment protocols can be adopted, from whitening, microabrasion, conservative aesthetic restorations and artificial crowns. (Soares, 2002) Adhesive composite resin restorations have been used to successfully treat hypoplasia, since the introduction of acid etching and the increasing improvements in adhesive systems and composite resins have made it possible to perform this technique. Direct restorative techniques provide conservative, aesthetic and functional treatment in a single session, minimizing the amount of dental tissue to be removed in a tooth already compromised by the change in the enamel. (Campos, 2004; Pithan, 2002)

4. Discussion

Enamel hypoplasia is defined as the incomplete or defective formation of the organic matrix of the developing tooth enamel, which consequently leads to deficiencies and irregularities in the surface of the tooth tissue. (Passo, 2007)

There are many causes that lead to hypoplasia, among them factors that affect the patient's systemic condition, such as low birth weight (Fonseca, 2006) and vitamin deficiencies resulting from the baby's poor nutrition during intrauterine life (Costa, 1997); genetic etiological factors such as amelogenesis imperfecta and hereditary epidermolysis bullosa (Seow, 1991); and etiological factors such as local infections and trauma. (Santos, 2014)

Dentistry is the gift of caring, going beyond the common sense of automatic practices, seeing the patient's needs as a whole, in their physical and mental state, offering comprehensive care. There has been a continuous advance in the search for aesthetics within Dentistry. A beautiful smile has become important because it can raise an individual's self-esteem, transmitting confidence to those around them. Some anomalies in dental enamel are responsible for affecting the aesthetics of the smile, interfering with physical and mental well-being. The aesthetics of the smile has increasingly been the focus of attention of the population seeking specialized dental care. The parameters of normality and beauty imposed by society require people to have a perfect smile. (Mondelli, 1995)

Treatment of this alteration may be required for aesthetic reasons and depends on the severity and the need to improve the functional and psychological conditions of the patient, since a child with a compromised smile may present psychological and behavioral disorders. (Bendo, 2007; Pithan, 2002)

Knowledge of the anomalies by the dental surgeon is essential for a differential diagnosis, thus providing adequate treatment. Treatment of this alteration may be required for aesthetic reasons and depends on the severity and the need to improve the functional and psychological conditions of the patient. (Ferreira, 2017; Pindborg, 1982)

In agreement, Vidal et al. (2023) show us that the literature recommends several treatment modalities, including dental whitening, microabrasion, conservative aesthetic restorations, and prosthetic rehabilitation. The dentist must evaluate the technique that best meets the patient's aesthetic needs and is least invasive to the dental tissues. The choice of treatment for hypoplastic changes in dental enamel should be made based on the depth of the stain, but this clinical perception can be difficult. Microabrasion is indicated for the vast majority of superficial intrinsic stains of dental enamel, and can be combined with whitening and restoration procedures in cases of deeper and very deep stains.

5. Conclusion

Enamel hypoplasia represents a significant challenge in dental practice, as it is a defect in the organic matrix of dental enamel that compromises the integrity and functionality of the affected teeth, causing aesthetic, physical and psychological sequelae in the patient. An in-depth analysis of this pathology has allowed us to understand its complexity and the multiple variables involved in its development. Furthermore, early identification and understanding of the etiological factors are essential for the implementation of effective preventive and management strategies. Common sense should prevail in choosing the best technique, and particularly in young patients, the decision for less invasive procedures should be considered. According to the study carried out, it is concluded that enamel hypoplasia represents a significant challenge in dental practice, requiring a multidisciplinary approach for its effective management. Continuous advancement in knowledge and clinical techniques is crucial to improve the understanding, diagnosis and treatment of this condition, thus promoting better oral health for patients.

References

Alexandre, G. C., Campos, V., & Oliveira, B. H. (2008). Luxação intrusiva de dentes decíduos. *Stomatos*, 14(27), 74-86.

Andreasen, J. O., & Andreasen, F. M. (1994). Textbook and color atlas of traumatic injuries to the teeth (3rd ed.). *Munksgaard*.

Araujo, F. B., Ziz, V., & Dutra, C. A. V. (2000). Enamel color change by microabrasion and resin- based composite. *American Journal of Dentistry*, 13(1), 6-7.

Ben-Bassat, F., Fuks, A., Brin, I., & Zilberman, Y. (1985). Effect of trauma to the primary incisors on permanent successors in different developmental stages. *Pediatric Dentistry*, 7(1), 37-40.

Bendo, B. C., Scarpelli, C. A., Novaes-Júnior, B. J., Vale, P. P. M., & Paiva, M. S. (2007). Hipoplasia de esmalte em incisivos permanentes: Um acompanhamento de 6 meses. *Revista Gaúcha de Odontologia*, 55(1), 107-112.

Braga, L. C. C., & et al. (2007). Hipoplasia de esmalte localizada: Dente de Turner. *Revista Gaúcha de Odontologia*, 53(4), 329-334.

Campos, V., Cruz, R., & Mello, H. S. A. (2004). Diagnóstico e tratamento das anomalias da odontogênese (83 p.). *Santos*.

Casarin, S. T., Porto, A. R., Gabatz, R. I. B., Bonow, C. A., Ribeiro, J. P., & Mota, M. S. (2020). Tipos de revisão de literatura: Considerações das editoras do *Journal of Nursing and Health* [Types of literature review: Considerations of the editors of the Journal of Nursing and Health]. *Journal of Nursing and Health*, 10(5). https://periodicos.ufpel.edu.br/index.php/enfermagem/article/view/19924.

Cavalcante, L. T. C., & Oliveira, A. A. S. (2020). Métodos de revisão bibliográfica em estudos científicos. *Psicologia Apocalipse*, 26(1), 82-100. https://doi.org/10.5752/P.1678-9563.2020v26n1p82- 100.

Chagas, M. S., Jacomo, D. R. E. S., & Campos, U. R. (2007). Frequency of enamel hypoplasia on anterior permanent teeth after injury in their antecessors. *Arquivo Brasileiro de Odontologia*.

Consolaro, A. (2006). Manchas brancas não cariosas no esmalte. *Revista Dental Press Estética*, 3(2), 125-132.

Costa, C. A. S., Hebling, J., & Montano, T. C. P. (1997). Hipoplasia de esmalte: Revisão de literatura. *Odontologia Clínica*, 7, 39-42.

Coutinho, T. C. L., & Portella, W. (1995). Hipoplasia de esmalte – Tratamento com facetas estéticas e coroas de aço. *Revista Gaúcha de Odontologia*, 43(2), 89-92.

Ferreira, F. V., Zeng, J., Thomson, W. M., Peres, M. A., & Demarco, F. F. (2014). Association between developmental defects of enamel and dental caries in schoolchildren. *Journal of Dentistry*, 42, 540- 546.

Fonseca, R. B., Sobrinho, L. C., Fernandes Neto, A. J., Mota, A. S., & Soares, C. J. (2006). Enamel hypoplasia or amelogenesis imperfecta – A restorative approach. *Brazilian Journal of Oral Sciences*, 5(16), 941-943.

Junqueira, L. C., & Carneiro, J. (1971). Histologia básica (2nd ed.). *Guanabara Koogan*.

Kabbach, W. (2010). Abordagem conservadora para o tratamento da hipoplasia do esmalte. *International Journal of Brazilian Dentistry*, 6(2), 130-141.

Kramer, R. J., & Feldens, C. A. (2002). Traumatismos na dentição decídua. *Ed. Santos*.

Laskaris, G. (2000). Anomalias dentárias: Atlas colorido de doenças bucais da infância e adolescência (Trad. de Elizabete Moraes). *Artes Médicas/Santos*.

Lunardelli, S. E. (2007). Prevalência de defeitos de desenvolvimento de esmalte na dentição decídua e fatores materno-infantis associados [Dissertação de mestrado]. *Universidade Federal de Santa Catarina*.

Mafra, R. P., Vasconcelos, R. G., Vasconcelos, M. G., Queiroz, L. M. G., & Barboza, C. A. G. (2013). Desenvolvimento dental: aspectos morfogenéticos e relações com as anomalias dentárias do desenvolvimento. *Revista Brasileira de Odontologia*, 69(2), 232.

Maragoni, M. H., & Carvalho, R. M. (1992). Dentística cosmética: Em hipoplasia de esmalte. *Revista Gaúcha de Odontologia*, 40(5), 344-345.

McDonald, R. E. (1977). Alterações no desenvolvimento dos dentes e maxilares. In *Odontopediatria* (2nd ed., cap. 4, pp. 40-63). *Guanabara Koogan*.

Mondelli, J., Mondelli, R. F. L., Bastos, M. T. A. A., & Franco, E. B. (1995). Microabrasão com ácido fosfórico. *Revista Brasileira de Odontologia*, 52(3), 20.

Needleman, H. L., Allred, E., Bellinger, D., Leviton, A., Rabinowitz, M., & Iverson, K. (1992). Antecedents and correlates of hypoplastic enamel defects of primary incisors. *Pediatric Dentistry*, 14(3), 158-166.

Neville, B. W., et al. (1998). Anomalias dos dentes. In *Patologia oral e maxilofacial* (Cap. 2, pp. 43-92). *Guanabara Koogan*.

Niazi, F. C., & Pepper, T. (2023). Dental fluorosis. *StatPearls Publishing*.

Passo, I. A., et al. (2007). Defeitos do esmalte: Etiologia, características clínicas e diagnóstico diferencial. *Revista do Instituto de Ciências da Saúde*, 25(2), 187-192.

Pimlott, J. F. L., Howley, T. P., Nikiforuk, G., & Fitzharding, P. M. (1985). Enamel defects in prematurely born, low birth-weight infants. *Pediatric Dentistry*, 7(3).

Pindborg, J. J. (1982). A etiology of developmental enamel defects not related to fluorosis. *International Dental Journal*, 32(2), 123-134.

Pinheiro, I. V. A., Medeiros, M. C., Andrade, A. K. M., & Ruiz, P. A. (2003). Lesões brancas no esmalte dentário: Como diferenciá-las e tratá-las. *Revista Brasileira de Patologia Oral*, 2(1), 11-18.

Pithan, J. C. A., Malmann, A., Pithan, S. A., & Costa, C. C. (2002). Amelogênese perfeita: Revisão de literatura e relato de caso clínico. *Revista da ABO Nacional*, 10(2), 88-92.

Ribas, A. O., & Czlusniak, G. D. (2004). Anomalias do esmalte dental: Etiologia, diagnóstico e tratamento. *Publicações da UEPG: Ciências Biológicas e da Saúde*, 10(1), 23-35.

Rocha, K. I., Teles, L. N., & Sousa, F. D. A. (2020). Restabelecimento da estética do sorriso em paciente com hipoplasia de esmalte. *Archives of Health Investigation*, 9(6), 557-562. Disponível em https://www.archhealthinvestigation.com.br/ArcHI/article/view/5131.

Rocha, V. I. P., et al. (2022). A dental approach to Proteus Syndrome: A case report. *Research, Society and Development*, 11(9), 1-10. Disponível em https://rsdjournal.org/index.php/rsd/article/view/32078.

Rother, E. T. (2007). Revisão sistemática x revisão narrativa. *Acta Paulista de Enfermagem*, 20(2), 75- 80. https://doi.org/10.1590/S0103-21002007000200001.

Ruschel, H. C., Oliveira, S. P. C. O., Parizzotto, L., Amarante, E. C., & Guedes-Pinto, A. C. (2006). Hipoplasia e hipocalcificação de primeiros molares permanentes. *Revista da ABO Nacional*, 14(2), 89- 94.

Santos, C. T., Picini, C., Czlusniak, G. D., & Alves, F. B. T. (2014). Anomalias do esmalte dentário – Revisão de literatura. *Arch Health Invest*, 3(4), 74-81.
Seow, W. K. (1991). Enamel hypoplasia in the primary dentition: A review. *Journal of Dentistry for Children*, 58(6), 441-452.

Shafer, W. G., Hine, M. K., & Levy, B. M. (1987). Distúrbios do desenvolvimento das estruturas bucais e parabucais. In *Tratado de Patologia Bucal* (4th ed., cap. 1, pp. 2-79). *Guanabara Koogan*.

Soares, C. J., Fonseca, R. B., Martins, L. R., & Giannini, M. (2002). Esthetic rehabilitation of anterior teeth affected by enamel hypoplasia: A case report. *Journal of Esthetic and Restorative Dentistry*, 14, 340-348.

Souza, F. A. L., Morais, L. S., Franceschini, C. M. S., & Melo, N. S. (2000). Facetas estéticas diretas - Uma solução para hipoplasia do esmalte. *Revista da Faculdade de Odontologia de Anápolis*, 2(2), 110- 113.

Vidal, A. S., Freitas, M. S., & Lima, T. M. (2023). Micro abrasão em hipoplasia dentária associada a restauração em resina composta: Relato de caso. *Brazilian Journal of Health Review*, 6(1), 728-741.

Watanabe, S. A., Siqueira, F. M., Gomes, A. P. C., Sena, R. E., & Albuquerque, R. C. (2003). Restauração de dilaceração coronária e hipoplasia do esmalte. *JBC*, 7(38), 126-130.

Williams, W. P., & Becker, L. H. (2000). Amelogenesis imperfecta: Functional and esthetic restoration of a severely compromised dentition. *Quintessence International*, 31(6), 397-403.