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Original Article

Epidemiological and clinical characterization of Moyers class II division 1 syndrome

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Epidemiological and clinical characterization of Moyers class II syndrome, division 1

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SUMMARY

The development of an occlusion is the result of interactions between genetically determined and environmental factors. Malocclusions constitute a current oral health problem of importance, which is the motivation for the present study. Its objective was to characterize Moyers class II division 1 syndrome in patients with permanent dentition from an epidemiological and clinical perspective. The study was conducted using a descriptive, observational, cross-sectional study method. The universe consisted of 103 patients who met the inclusion criteria; the observed variables were operationalized and



summarized using descriptive statistics. The results obtained showed that the population with Moyers class II division 1 syndrome was predominantly bilateral, between 12 and 14 years of age, and female. Clinically, the following prevailing characteristics were: deforming muscle function in the bilateral type and mentalis muscle hyperactivity in the unilateral type, affecting (100%) respectively, vestibuloversion of upper incisors (98.06%), and convex profile (81.55%), increased overjet, mandibular retrognathism, increased overjet and V-shaped arch (67.96%; 60.19%; 56.31% and 38.83% respectively). It was concluded that Moyers class II division 1 syndrome in patients with permanent dentition was characterized by a predominance in the ages between 12 and 14 years and female sex. Clinically, based on the distal molar relationship, it was characterized by the superiority of the bilateral type with deforming muscle function and mentalis muscle hyperactivity in the unilateral type. The rest of the syndromic characteristics described by the author were inconstant and rare.

Keywords: Moyers class II division 1 syndrome; Epidemiology; Clinical features.

SUMMARY

The development of an occlusion is the result of interactions between genetically determined factors and environmental factors. Malocclusions are an oral health problem of current importance, the motivation for this study. Its objective is to characterize from an epidemiological and clinical perspective Moyers class II syndrome division 1 in patients with permanent dentition. The cross-sectional descriptive observational study method was taken into account. The universe consisted of 103 patients, who met the inclusion criteria, the observed variables were operationalized and summarized based on descriptive statistics. In order to obtain results, in the population with class II Moyers syndrome division 1, bilateral predominated, ages between 12 and 14 years and the female sex. Clinically, characteristics such as deforming muscle function in the bilateral type and unilateral hyperactivity of the mental muscle (100%) affected (100%), respectively, vestibuloversion of the upper incisors (98.06%), and convex profile (81.55%), increased overhang, mandibular retrognathism, increased protrusion and V-arching (67.96%; 60.19%; 56.31% and 38.83% respectively). Reaching the conclusions that Moyers class II syndrome division 1 in patients with permanent dentition was characterized by the predominance in the ages



between 12 and 14 years and the female sex. Clinically, from the distal molar relationship, it was characterized by the superiority of the bilateral type with deforming muscle function and the hyperactivity of the mental muscle in the unilateral one. The rest of the syndromic features described by the author were inconstant and infrequent.

Key Words: Moyers class II syndrome division 1; Epidemiology; Clinic.

SUMMARY

The development of an occlusion is the result of interactions between genetically determined factors and environmental factors. As more occlusions are an oral health problem of current importance, the motivation for this study. Its objective is to characterize, from an epidemiological and clinical perspective, Moyers syndrome class II, division 1, in patients with permanent dentition. Considerou-se or cross-sectional descriptive observational study method. The universe was composed of 103 patients, who met the inclusion criteria, the observed variables were operationalized and summarized based on descriptive statistics. To obtain two results, in the population with Moyers syndrome class II division 1, bilateral predominance, ages between 12 and 14 years and female sex. Clinically, characteristics such as bilateral deforming muscle function and unilateral hyperativity of the mental muscle (100%) attacks (100%), respectively, vestibuloversion of the upper incisors (98.06%) and convex profile (81.55%), increased protrusion, mandibular retrognathism, increased protrusion and arching in V (67.96%; 60.19%; 56.31% and 38.83%, respectively). It is concluded that Moyers syndrome class II division 1 in patients with permanent dentition was characterized by a predominance in people between 12 and 14 years of age and of the female sex. Clinically, from the distal molar relationship, the superiority of the bilateral type with deforming muscle function and hyperativity of the non-unilateral mental muscle is characterized. The remaining syndromic characteristics described by the author were inconstant and infrequent.

Keywords: Moyers syndrome class II division 1; Epidemiology; Clinic.

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Introduction

The specialty responsible for the definitive treatment of malocclusions is Orthodontics. Etymologically, this word comes from a term introduced by Lefoulon in 1841, derived from the Greek words ortho (straight) and odontos (tooth) and which translates its purpose of correcting irregularities in dental positions. (1,2)

The development of an occlusion is the result of interactions between genetically determined factors and extrinsic environmental factors including orofacial functions that act constantly at certain times. (3,4)

Class II, also called distocclusion or postnormal occlusion, is an unfortunate generalization that groups malocclusions of widely varying morphologies, which often have only one common feature: their abnormal molar relationship. (5-7)

Moyers' syndromic classification brings together a set of clinical characteristics based on facial and oral elements of the patients, from which divisions and subdivisions are established, constituting a comprehensive classification of the patient, unlike Angle's, which only takes into account occlusive elements. (6,7)

The prevalence of malocclusions indicates that approximately one third of the population has an occlusion that can be considered within the parameters of a normal occlusion, while approximately two thirds have some degree of malocclusion, with Moyers class II malocclusion being considered the most frequent dento-skeletal disharmony in the white-skinned population and the one that most frequently comes to the consultation in search of treatment. (8-10)

In the Bayamo population, a high morbidity rate due to malocclusion has been observed in patients between 12 and 18 years of age. These patients generate a high demand for treatment in orthodontic services. A predominance of Moyers class II, division 1 syndrome with different epidemiological patterns has been observed. The aforementioned elements indicated the need to pose the following scientific



question for the present investigation: What are the characteristics of Moyers class II, division 1 syndrome from an epidemiological and clinical perspective in patients with permanent dentition?

This study supports its usefulness and relevance in response to the demand for a deeper search for new knowledge for a better characterization and diagnosis of malocclusions represented by Moyers class II division 1 syndrome. It emphasized the particularities of an epidemiological pattern determined by time and the specific environment. The contribution of elements that will enrich those described by Otaño (8) for this syndrome, which could result in greater efficiency, efficacy and effectiveness in the management of this nosological entity. The objective is to characterize epidemiologically and clinically Moyers class II division 1 syndrome in patients with permanent dentition.

Methods

A cross-sectional, descriptive, observational study was conducted. The study universe consisted of 103 patients from Bayamo who were treated at the Orthodontic Service of the Manuel Cedeño University Clinic of Stomatological Specialties during 2020, with a diagnosis of Moyers class II division 1 syndrome. All were included.

Criteria for clinical diagnosis: The presence of Moyers class II division 1 syndrome was considered when the mesiobuccal groove of the lower first molar was in a distal relationship with respect to the mesiobuccal cusp of the upper first molar, which may be bilateral or unilateral, the lower dentition was distal to the upper dentition, the incisors were over-erupted with a tendency to "flattening", the upper arch was generally "V" shaped, the upper incisors were vestibuloverted, deforming muscle function and abnormal muscle activity of the chin muscles, increased overjet and convex profile. (6)

Inclusion criteria: Patients with permanent dentition between 12 and 18 years of age from Bayamo, treated at the Orthodontic Service of the University Clinic of Stomatological Specialties "Manuel Cedeño" of Bayamo during 2019 with Moyers class II division 1 syndrome, with distal relationship in first



permanent molars and at least three of the characteristics mentioned in the criteria for clinical diagnosis and authorization of parent or representative to be part of the study.

Exclusion criteria: Patients with medical records that do not have the information and complementary tests necessary for the study or without diagnostic confirmation of general diseases

Operationalization of variables

The variables studied were related to:

Demographic factors such as age group according to years completed (ordinal qualitative) grouped in the intervals 12–14 years and 15–18 years, in addition to biological sex (dichotomous nominal qualitative) in male and female.

Clinical features of Moyers class II division 1 syndrome according to type of laterality (nominal qualitative dichotomous) from the distocclusion at the level of the first permanent molars: bilateral (distocclusion-distocclusion) or unilateral (distocclusion - neutroclusion) and clinical picture (nominal qualitative polytomous): deforming muscle function, vestibuloversion of upper incisors, overactivity of the mentalis muscle, convex profile, mandibular retrognathism, increased overjet and V-shaped arch.

Ethical aspects of research: All procedures in this biomedical research were in strict compliance with established ethical standards, primarily those stipulated in the Nuremberg Code (1947) and the Declaration of Helsinki (1964, 1975, 1983, 1989). In this case, since the study involved minors, informed consent was requested from the parent or representative with whom the patient attended the consultation. This consent was recorded in writing.

Techniques and procedures: Once the object and the study variables were defined, a structured form designed for research purposes was applied to collect data. To complete this, instructions were created to standardize and reduce bias in the collection of information and save resources in printing it. These instructions were only used as a coder for each variable, scale, and criteria to be evaluated. In each space created below each variable, the established code was reflected according to the findings found in the interrogation, physical examination, radiographic analysis, or model measurements.

After the information was collected, it was entered into a database, which allowed for the determination of frequencies for each variable. These were reflected in output tables for analysis, supported by



descriptive statistics, determining relative frequencies through percentages. Finally, the most significant results were interpreted and discussed through comparisons with other studies and the authors' opinions. This allowed for conclusions to be drawn and recommendations to be proposed.

Results

Table 1 shows that the study population consisted of 103 patients admitted to the Orthodontic Service during the study period, 81 (78.64%) aged 12 to 14 years and the remaining 22 (21.36%) aged 15 to 18 years. Moyers class II division 1 syndrome was characterized by a bilateral predominance in 82 (79.61%) patients, most of them (74.07%) aged 12-14 years; it was significant that in the 15-18 age group all patients presented the bilateral type. Only 21, or 20.39% of the total, presented the unilateral type, representing 25.93% of the 12-14 age group.

Table 1.Characterization of Moyers class II division 1 syndrome according to type and age groups.

Age groups (years)	Moyers class II division 1 syndrome					
	Guyof laterality				Total	
	Bilateral (distoclusion - distoclusion)		Unilateral (distoclusion - neutroclusion)			
	No.	%	No.	%	No.	%
12 - 14	60	74.07	21	25.93	81	78.64
15 - 18	22	100.0	0	0.00	22	21.36
Total	82	79.61	21	20.39	103	100.00

Fountain: Medical records from the Orthodontic Service

The distribution of Moyers class II division 1 syndrome by sex was the criterion for admission to the Service in 43 male patients (41.75%) and 60 female patients (58.25%). In this case, bilateral syndrome



was predominant in both sexes; (88.37%) for males and (73.33%) for females; unilateral syndrome was more frequent (26.67%) in females (Table 2).

Table 2. Characterization of Moyers class II division 1 syndrome by type and sex.

Sex	Moyers class II division 1 syndrome					
	Type of laterality				Total	
	Bilateral (distocclusion - distocclusion)		Unilateral (distocclusion - neutroclusion)			
	No.	%	No.	%	No.	%
Male	38	88.37	5	11.63	43	41.75
Female	44	73.33	16	26.67	60	58.25
Total	82	79.61	21	20.39	103	100.00

Fountain: Medical records from the Orthodontic Service

The clinical characteristics of Moyers class II division 1 syndrome (Table 3) were most frequently: deforming muscle function (98.06%), vestibuloversion of upper incisors (96.12%), mentalis muscle overactivity (96.12%) and convex profile (81.55%); to a lesser extent: increased overjet, mandibular retrognathism, increased overjet and V-shaped arch (67.96%; 60.19%; 56.31% and 38.83% respectively). The clinical pattern for both types of laterality was similar, with the particularity that in the bilateral type the deforming muscle function and in the unilateral type, mentalis muscle overactivity affected 100% respectively.

Table 3. Clinical characteristics of Moyers class II division 1 syndrome by type.

Clinical features	Moyers class II division 1 syndrome					
	Type of laterality				Total N=103	
	Bilateral (distocclusion - distocclusion) N=82		Unilateral (distocclusion - neutroclusion) N=21			
	No.	%	No.	%	No.	%
Deforming muscle function	82	100.00	19	90.48	101	98.06



Vestibuloverision of upper incisors	80	97.56	19	90.48	99	96.12
Hyperactivity of the mentalis muscle	78	95.12	21	100.00	99	96.12
Convex profile	72	87.80	12	57.14	84	81.55
Increased overshoot	57	69.51	13	61.90	70	67.96
Mandibular retrognathism	53	64.63	9	42.86	62	60.19
Increased highlight	48	58.54	10	47.62	58	56.31
V-shaped arcade	32	39.02	8	38.10	40	38.83

Fountain:Medical records from the Orthodontic Service

Discussion

Authors such as Lombardo (9) suggest that the worldwide prevalence of malocclusion is 56%, with no differences by sex. Skeletal class II is an anomaly that frequently occurs in orthodontic clinics; it represents approximately 51% of all patients who attend consultations; its worldwide prevalence is 19%, with variations from 15% to 30% depending on the population.

Rosero Mendoza, (10) reported in Brazil that class II division 1 malocclusion is found in 17.8 to 25% of its population and in Portugal, 39.7% of its population has this malocclusion.

Benedi García and collaborators, (11) observed as a fundamental characteristic that at the beginning of treatment 100% of the patients had a class II molar relationship in different magnitudes and Herrero Solano and collaborators, (12) refer to 36.6% with unilateral molar relationship.

Herrero Solano et al., (12) consider the greatest affectation between 7 and 9 years (73.33%), Lima Arteaga et al., (13) in terms of age, consider the most affected those from 7 to 9 years (46.8%); followed by the group between 10 and 12 years (35.1%), while for Benedi García et al., (11) they are 70% of the population from 11 to 14 years of age.

Morán Naranjo, (14) quotes Reyes who states that this malocclusion occurs in 23% of children aged 8 to 11 years, 15% of young adults aged 12 to 17 years and 13% of adults aged 18 to 50 years, making it the most common skeletal malformation, which coincides with our study, where the main manifestations of this disease were found in the younger ages of the range studied.



Most of the studies were consistent with the results obtained in the present investigation, suggesting that at early ages there is a greater possibility of the appearance of Moyers class II division 1 syndrome, elements that encourage further research into the possible correlation of this entity with the development and growth of the child, which proposes as a possible theory that the biological evolution of the individual over time favors the establishment or not of malocclusion.

The authors of this research believe that the early onset of this malocclusion could be related to the origins of its clinical and radiographic manifestations, such as heredity, poor habits, or chronic respiratory diseases, since these factors are generally present from a very early age, leading to the appearance of various clinical conditions.

Benedi García and collaborators, (11) describe that the morbidity for the entity studied presented similar frequencies for both sexes, unlike Herrero Solano, (12) Infante Argüelles, (15) Lima Arteaga (13) and his collaborators, who expose in their investigations the predominance of female patients (60%, 58.98% and 55.3% respectively).

Benedi García and collaborators, (11) attribute the high frequency of female patients in Orthodontic Services to the usual concern of women for aesthetics and oral care, even from an early age.

Regarding gender, we adhere to the criterion that the predominance of females in orthodontic services is due to psychosocial rather than biological reasons. Aesthetic concerns are the main reason for consultation by girls and their families, unlike in the case of men, where this aspect plays a secondary role. This is due to standards imposed over the years by the society in which we live, where women must achieve an often imposed ideal of beauty, especially at the ages included in this study. This consequently increases the severity of the clinical picture.

Rosero Mendoza, (10) states that There are numerous clinical signs that describe it, including, among others, an overactive mentalis muscle, which contracts intensely to elevate the orbicularis oris and create a lip seal, with a hypotonic upper lip and a hypertonic lower lip. The usual posture in the most severe cases is with the upper incisors resting on the lower lip.



Iñiguez-Zúñiga, (16) cites Céspedes who found that this is especially due to the retrusion of the jaw, but it can also be due to the protrusion of the upper jaw, the teeth of the upper jaw are in a forward position or the teeth of the jaw are in a posterior position, it can even be a combination of both.

Angle class II subdivision 1 malocclusion may be related to skeletal and dental alterations and parafunctional habits, having repercussions on facial aesthetics, triggering functional alterations such as: speech, chewing, swallowing and breathing.

Orta, (17) agrees with what was previously stated and exposes in his studies that patients of class II division 1, exhibit the maxilla in a more protrusive position while the mandible is in a normal position and size, other studies report that the maxilla can be found in a normal position in relation to the cranial base, while the mandible would be located more retrusive, other findings refer to a mandibular retrusion and maxillary protrusion.

Moreira and Mazzini, (18) proposed that class II division 1 malocclusion is characterized by a class II molar relationship, increased incisal overjet and proclination of the upper incisors; and may be associated with open or deep bites.

Hurtado Sepúlveda, cited by Rosero Mendoza, (10) states that this type of malocclusion presents a class II molar and canine relationship with vestibuloversion and extrusion of the upper anterior teeth. This malocclusion may be accompanied by an open bite, crossbite, deep bite and crowding.

This type of malocclusion presents proclination of the upper incisors and increased overjet. Dolichofacial or mesofacial biotype, retrognathic profile, hyperactive mentalis muscle, lip incompetence, mouth breathing, hypotonic upper lip, everted and hypertonic lower lip, in severe cases the upper incisors rest on the lower lip, short mandibular ramus, narrow arches with crowding, more vertical mandibular plane, poor postural position of the tongue, increased facial convexity, accentuated curve of Spee. (19)

Infante Argüelles and collaborators, (15) exposes the facial characteristics observed in Moyers Class II Division 1 Syndrome: mandible in a retrognathous position, convex profile, hypotonic upper lip and hypertonic and everted lower lip, hypertonic chin, enlarged lower third, marked nasolabial angle, open mental angle, depression of the malar region, inadequate functional lips produce dentoalveolar



biprotrusion, in these cases the lips do not come into contact which causes generalized hypotonia of the perioral muscles that have to contract strongly for the lips to seal the oral cavity.

Lima Arteaga, (13) identifies the most frequent characteristics in patients with Moyers class II division 1 syndrome as vestibuloversion (73.4%) followed by crowding (21.2%), anterior open bite (6.3%) and tooth rotation (5.3%).

Research on growth and development in numerous cephalometric studies indicates that there is a strong hereditary influence, modified by functional compensation factors, as a basis for most class II division 1 malocclusions. The profile in these cases is convex and although it is generally due to mandibular retrognathism, it may be caused by maxillary prognathism. (6) Clinically, facial and oral anomalies were observed in the present patients, showing a high incidence of the same from an early age, which makes us share these opinions.

Moyers proposes in his classification as characteristic elements of the class II Division 1 syndrome the molar relationship of distoclusion as a determining element to name the syndrome complemented with other clinical characteristics such as: vestibuloversion of incisors, increased overjet, increased overshoot, V-shaped arch, convex profile, incompetent bilabial closure, hyperactive mentalis muscle, mandibular retrognathism. (7) Of these, the most consistent in the present study were: distal molar relationship, deforming muscle function, vestibuloversion of upper incisors, mentalis muscle hyperactivity and convex profile.

The results obtained suggest that the remaining characteristics established by Moyers may be inconsistent when establishing the syndromic classification under study, which could be related to the patient's lifestyle, conditions, and environmental conditions. This emphasizes the importance of individual and comprehensive diagnosis in orthodontics.

The information obtained in this study motivated further investigation into this line of research. These aspects contribute to establishing a higher-quality clinical diagnosis, which favors the application of more effective treatments and a better prognosis for patient outcomes.

Finally, the information described in this work complements the contributions of classical scholars regarding Moyers class II division 1 syndrome. The main scientific contribution of this research was the



new knowledge about the object studied in the health field during the given period of time, which allowed for the stratification of this nosological entity. This information can be used as reference material by other colleagues in their teaching, research, and healthcare activities. This will be reflected in an improvement in the quality of dental care and oral health.

Conclusions

Moyers class II division 1 syndrome in patients with permanent dentition was characterized by a predominance in patients between 12 and 14 years of age and females. Clinically, from the distal molar relationship onward, it was characterized by a predominance of the bilateral type with deforming muscle function and mentalis muscle hyperactivity in the unilateral type. The remaining syndromic features described by the author were inconsistent and infrequent.

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Conflict of interest

The authors declare no conflicts of interest.

Authorship contribution

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