

## Review Article

# Dental crowding: a review

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### ABSTRACT

Dental crowding is a frequent characteristic of dental malocclusion and is the reduction in the perimeter of the arch that can manifest as space closure, rotation and/or movement of the teeth. The temporary dentition is important as it guides the eruption of the permanent teeth, thus establishing the ideal occlusion; the lack of spaces can cause disproportionate sizes between the jaws and the permanent teeth. Treatment options include the orthopedic phase and orthodontic phase in which the extraction of teeth may or may not be necessary. Timely treatment with personalized planning helps us achieve correct dental occlusion, which is essential for good chewing and correct passage of the bolus, in addition to playing an important role for phonation and the aesthetic results for the patient.

**Keywords:** Dental crowding, Dental malocclusion, Tooth eruption, Temporary dentition, Orthopedic phase, Orthodontic phase

### INTRODUCTION

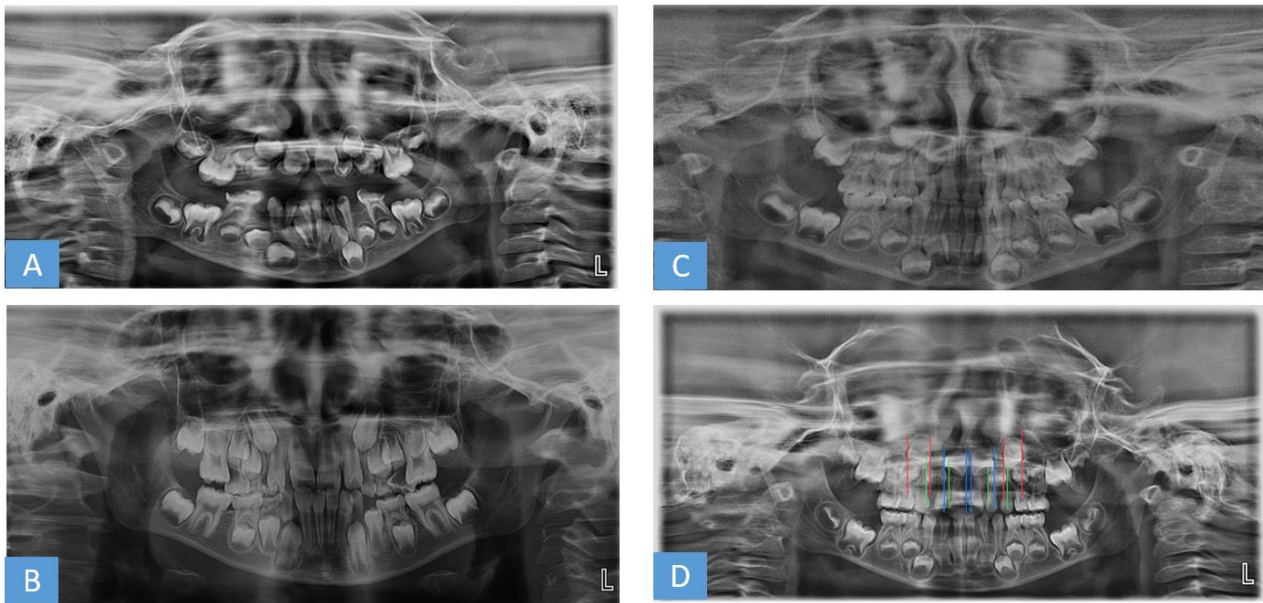
Dental crowding is a frequent characteristic of dental malocclusion; this dental characteristic does not discriminate between sex, race, education, socioeconomic status/age.<sup>1</sup> Some authors consider it normal physiological phenomenon for all dentitions; temporary, mixed and permanent, however, late mixed dentition is when the most severe degree of crowding occurs, which is why it becomes one of main reasons for dental consultation.<sup>2,3</sup>

Dental crowding is the reduction in the perimeter of the arch that can manifest as space closure, rotation and/or movement of the teeth.<sup>4</sup> Dental crowding is a common problem and is one of the main causes of dental consultations worldwide. It is considered a public health

problem due to the high prevalence with which it occurs. According to the world health organization (WHO), it occupies the third place among the most prevalent oral disorders.<sup>5,6</sup> Within the spectrum of malocclusion, dental crowding stands out, which is described as the discrepancy between the available space and the required space according to the size and anatomy of the teeth. If the space is reduced, this can produce crowding and dental rotations (Figure 1) therefore, the temporary dentition in this pathology is crucial since it guides the eruption of the permanent teeth, thus establishing the ideal occlusion.<sup>7,8</sup> The lack of spaces can cause disproportionate sizes between the jaws and the permanent teeth.<sup>9</sup> The etiology is multifactorial and its prevalence among growing children and adolescents is 56% and can vary from 31-96% according to geographic areas and an association has been found with premature

loss of teeth and even when tooth replacement does not occur.<sup>10</sup> Eruption sequence is essential for correct development of biomechanical aspects of occlusion, directly influencing facial growth pattern, skeletal size

relationship, dental morphology, physiological dental mesialization, dimension of arches, size of apical bone, perioral muscles, inclination of molars and incisors, position and inclination of teeth during eruption.<sup>11,12</sup>



**Figure 1: (A) A six-year-old male patient with mixed dentition, premature loss of temporary organs is observed together with the lack of space for the eruption of permanent teeth; (B) eight-year-old male patient presents with mixed dentition and dental crowding along with lack of space for tooth eruption; (C) two-year-old male patient, has temporary dentition, lack of space for tooth eruption is observed; and (D) four-year-old male patient has temporary dentition, it is observed that he does not have enough space for dental eruption, the space required for the central teeth is marked with lines in blue, in green for sides and red for canines, without space for premolars.**

Researchers from the Kent school of anthropology and conservation studied 11 globally distributed populations and discovered that as humans transitioned from a hunting lifestyle to an agricultural lifestyle, their jaws became shorter and wider, explaining the high incidence of crowding. in the modern population.<sup>13</sup> Other possible reasons that have been investigated are crowding in the anterior area related to lack of space in the dental arch, premature loss or excessive retention of primary teeth, excessive length of the canine crown, hereditary factors, functional alterations of the endocrine glands, tumors, cysts. To resolve such malocclusion and crowding originating from space discrepancy, various degrees of orthodontic treatment can be planned, from simple minor tooth movement to orthognathic surgery.<sup>14</sup>

## CLASSIFICATION

According to its severity, it is classified as mild, moderate or severe.

### *Mild crowding*

The dental alveolar discrepancy is 1 to 3 mm, it occurs during the temporary transition to the permanent one with greater prevalence in the anterior sector, there is buccolingual displacement or rotation of some dental organ.

### *Moderate crowding*

The dental alveolus discrepancy is 3.1 to 5 mm, they have a pronounced irregularity in the alignment of the incisors.

### *Severe crowding*

The dental socket discrepancy is 5.1 millimeters or more, generally one or more teeth will be found outside the arch.<sup>15</sup>

However, Vander Linden classified crowding according to the moment in which it appeared in the dentition, thus establishing the classification into primary, secondary and tertiary or late crowding since it occurs in the mandibular incisors during adolescence.<sup>16</sup>

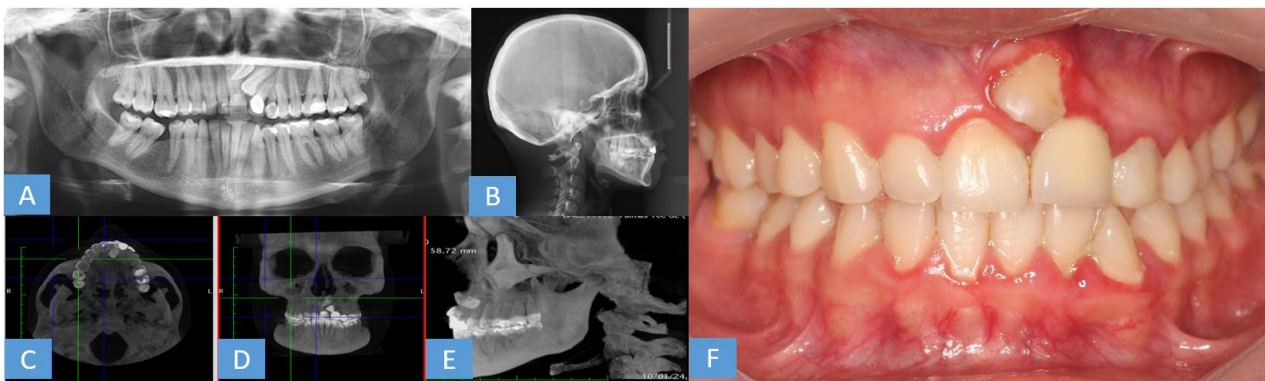
Little's irregularity index was proposed by Robert Little in 1975, to quantify the dental crowding that each individual presents. This method consists of measuring the linear distance present between the vertical projection of the anatomical contact points of each of the lower anterior teeth. The sum of these 5 measures represents the irregularity index. The instrument used to make the measurements must be a caliper with a minimum precision of tenths of a millimeter and its tips must be fine enough to allow adequate access and precise measurements. To carry out the measurements, a study

model of the lower jaw must be obtained, which is placed on a board to be able to observe the incisal edges by viewing it from top to bottom. The caliper is then placed parallel to the occlusal plane while its 9 tips are aligned with the anatomical contact points of two adjacent teeth.<sup>15</sup>

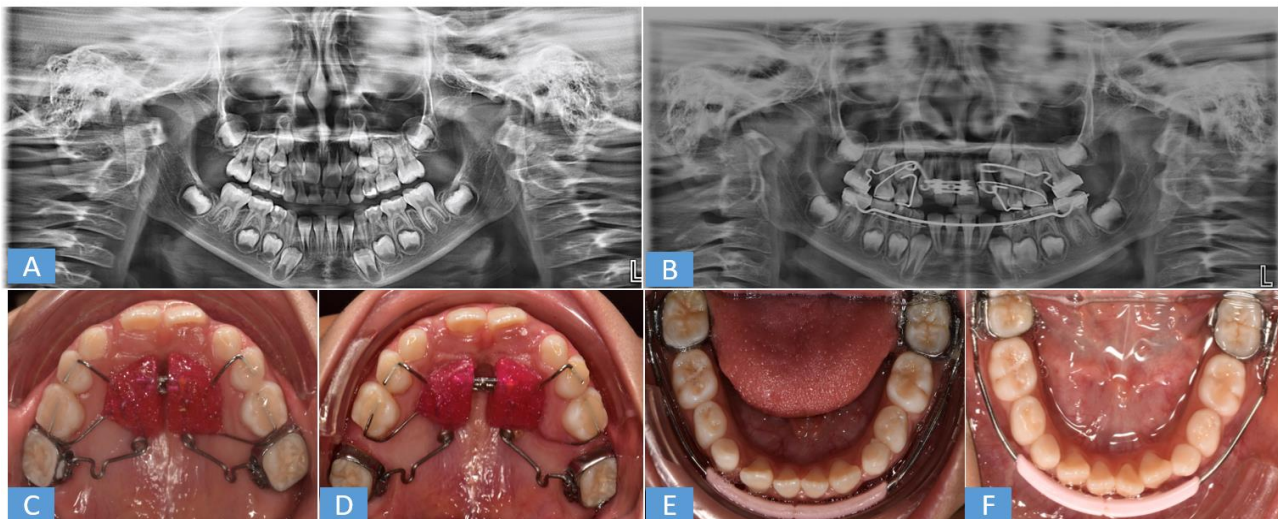
### CLINICAL MANIFESTATION

Malocclusion is a condition that is characterized by dental and skeletal components, generally related to poor position and various local and systemic factors that can cause problems in chewing, pronunciation, swallowing, aesthetics, dental caries, impaired facial growth and therefore a lower quality of life (Figure 2).<sup>17</sup> In temporary teeth, crowding may be a tendency due to the deficiency of diastemas, primate space, existence of habits and other anomalies that worsen in permanent teeth. Severity of

crowding can be related to poor oral hygiene, gingivitis, periodontal disease, dental cavities, tooth mobility, and tooth loss. These conditions cause functional, emotional and social conditions in the individual.<sup>18</sup> If crowding is related to poor dental position, it can be treated with dental movements, which can take multiple phases. Generally, in orthopedic phase, which consists of expansion if patient's conditions warrant it and they are a candidate; with maxillary expansion and an orthodontic phase through alignment, leveling and detailing with brackets (Figure 3). An excellent treatment option in patients with severe crowding and bilateral posterior crossbite is rapid expansion of the maxilla, this in cases where correction cannot be achieved through interproximal smoothing and dental proclination, due to degree of dental crowding.<sup>19</sup>



**Figure 2 (A-F):** A 30-year-old female patient comes to the clinic due to recurrent canker sores in the vestibular fold of labial mucosa. Upon complete analysis, the central incisor is found to have ectopic eruption and the canine erupting around the central incisor. She presents reconstructions in the permanent and temporary lateral incisor, the patient is asked to perform the extractions of 21 and 62, to later give the morphology to canine as central and to lateral incisor.



**Figure 3 (A-F):** Nine-year-old female patient presents mixed dentition. Radiographic examination shows lack of space for the eruption of permanent teeth. We wait for the root formation of the first molars to begin distalization and expansion of the maxilla with Pendex and in the mandible with lip bumper. Initial orthopantomography, orthopantomography during distalization, placement of Pendex, sixth activation appointment to pendex, placement of lip bumper fixed with ligature and sixth activation appointment, the patient now presents class I molar.

As the spaces are limited, it is important to compensate for the discrepancy between the sizes of the temporary and permanent dentition. These spaces can be subdivided into:

#### **Primate space**

They are located between the lateral incisors and the canines of the upper arch and between the first molars and canines of the lower arch.<sup>20</sup>

#### **Development space**

It is located between the upper and lower incisors. It is related to the change in the dimensions of the arch and going from a temporary to a permanent dentition, together with the size of the arch and the width of the permanent one, there is a need to generate spaces that are approximately 2 mm per quadrant.<sup>21</sup>

Therefore, timely attention is important to perform treatments (Figure 2) and avoid the inclusion of the canine or the loss of permanent teeth (Figure 3). An association has been found where maxillary canines are impacted buccally with discrepancies in tooth size and arch length.<sup>22-24</sup> Padma Kumari and collaborators reported a greater loss of space in patients where the primary canines presented premature exfoliation compared to control groups.<sup>25</sup>

Etiological factors have been identified with a positive correlation with anteroinferior crowding and its recurrences, such as the presence of lower third molars, labial closure force, maximum lingual pressure, arch dimension, tooth size, skeletal parameters.<sup>15</sup> Although the association between the presence of third molars and dental crowding has not been fully established, there are research groups and reports where an association has been found. Dr. Palikaraki and collaborators in their research report that the lower third molars can generate mesial pressure that moves the lower posterior teeth forward, causing the mandibular anterior tooth to suffer from crowding, present in adolescent and young adult patients in a range of ages. from 13 to 26 years during the time of eruption of the third molars, however other authors affirm that this pressure is not capable of showing crowding, which is why they evaluated patients after receiving orthodontic treatment and with the extraction of the lower third molars, the degree of lower anterior dental crowding is greater in patients with the presence of mandibular third molars, as well as post-orthodontic patients with third molars presented a shorter arch length.<sup>26</sup>

If crowding is caused by poor positioning of the teeth, it can be treated with a movement of the teeth, although there is a possibility that extraction of the teeth will be necessary to allow enough space when all the dental organs cannot be properly aligned. in the basal arch. It is essential to evaluate with individualized protocols and

decide the best therapeutic option, especially in those patients who are candidates for tooth extractions since this is irreversible and in the case of using orthodontics it can prolong the treatment. Therefore, determining the severity of dental crowding and the decision to perform an orthodontic extraction are essential factors to plan orthodontic treatment in terms of time and manage irreversibility.<sup>27</sup>

#### **CONCLUSION**

Timely treatment of dental crowding improves the quality of life of patients in biological, functional and aesthetic aspects. Treatment options include the orthopedic phase and orthodontic phase in which the extraction of teeth may or may not be necessary.

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