

Spacing in Orthodontics: Ass.Prof.Dr.Zaid Al.Dewachi

Spacing is a common condition in deciduous dentition and constitutes a very important feature of the dentition, as it is an indicator for the favorable development of permanent teeth. Lack of spacing suggests Severe risk for crowding in the permanent dentition (Foster and Grundy, 1986),

The **incidence** of spacing in primary was reported around 90% Spacing is more common in the maxilla rather than the mandible And in boys rather than girls, Arch size seems to play a more important role than teeth size; Spacing is more common in wider arches beside that found that mandibular incisors and canines were smaller in children with spacing, whereas in children who had only primate spaces, only mandibular incisors were statistically smaller. However, a general finding was that children with any type of spacing in the primary dentition Had wider jaws.

SPACING IN THE PERMANENT DENTITION:

A dentition with spaces is considered a normal type of occlusion, which is found in almost one third of the population, (21.4%) of the general Population presented spacing in both arches,(50%) of the population had spacing in one arch and In individuals with spacing in only one of the arches, the condition was twice as frequent in the maxillary arch.

Maxillary spacing is more common in the anterior part of the maxilla In studies of young populations, spacing in both arches was more common in boys than in girls.

However, more thorough observation of gender differences reveals that, in ages older than 16-18 years, spacing incidence is the same in both boys and girls. Concerning the median maxillary diastema, found that its incidence is 36.8%. Median diastema was the only spacing present in a mere 1.6% of individuals with spacing, Most large spaces are mesial and distal to the canines, followed by the diastema located between central and lateral incisors . It is true that spacing tends to decrease in the permanent dentition as age increases.

It is reported that during dental maturation spaces distal to the canines tend to close, while new spaces, mesial to this tooth, usually appear. This may be due to third molar eruption or to molar tendency for mesial migration and premolar and canine tendency for distal migration. The stability of the space mesial to first premolars is greater than that of the distal one, while the maxillary median diastema seems to be the most stable.

ETIOLOGY OF SPACING

The causes of spacing may be hereditary, acquired or functional. Hereditary causes include tooth size - arch size discrepancies, congenitally missing teeth, Macroglossia, supernumerary teeth, small teeth and hypertrophic upper lip frenum. Functional causes include bad oral habits, whereas acquired causes include pathologic conditions. Increasing tongue size, missing teeth, delayed eruption of permanent teeth and periodontal disease.

Tooth size - jaw size discrepancy

In spacing cases caused by tooth size - jaw size discrepancy), the problem lies with jaw size. It has been found that individuals with bigger faces and jaws usually have spacing and not crowding, in male patients with spacing:

- a.) intercanine and interpremolar distances were greater only in the maxilla.
- b) Mean dental width in men did not differ between those with and those without spacing.
- c) In contrast, in female patients with spacing, central incisors, canines and all posterior teeth were found to be significantly narrower.
- d) In women, dental arch size was not related to spacing. Thus, it may be concluded that most frequently spacing is mainly due to greater jaw size and not to smaller teeth.

Congenitally missing teeth

Regarding the congenitally missing teeth, several genetic and environmental factors have been implicated as the cause of Spacing. Existing teeth are often smaller, with an atypical conical shape and create esthetic and functional problems worsening the spacing problem; congenitally missing teeth may be either an isolated clinical sign or a syndromic feature, especially in cases of more than 6 missing teeth, thus resulting in extensive spacing.

Second mandibular premolars are the most common congenitally missing teeth, followed by maxillary lateral incisors and second Maxillary premolars, other teeth, such as upper central incisors, upper and lower canines or first molars are rarely missing congenitally and, if so, this is usually a syndromic feature.



Macroglossia

True macroglossia is a condition where the tongue is bigger than normal. Macroglossia constitutes an etiological factor for spacing, open bite and protrusion of both jaws. A large tongue may also compromise the stability of orthodontic treatment outcome and cause masticatory, swallowing, respiratory and speech problems, the causes of true macroglossia may be hereditary or acquired, Macroglossia diagnosis may be performed when the tongue occupies the entire oral cavity, when impressions of the lingual surfaces of mandibular teeth are present at the lateral tongue margins or when the patient is capable of touching the chin or the nose tip with her/his tongue. Tongue size can be estimated with direct measurement, indirect measurement through an impression and, finally, with magnetic tomography. Certain cephalometric measurements may also aid in diagnosing macroglossia, however, due to lack of practical methods for measuring tongue size, it is sometimes difficult to assess to what extent macroglossia is responsible for malocclusion.

Pseudomacroglossia is also an etiologic factor for spacing. Tongue size is normal, but it appears larger than other anatomical features because certain causes force the tongue to an anterior position. This condition results in spacing, which is more pronounced in the anterior dental arch



(Macroglossia)

Supernumerary teeth

Supernumerary teeth constitute one of the causes for local interdental spaces, as they interfere with the eruption of neighboring teeth or displace them out of the arch. Incidence in the permanent dentition ranges between 0.5% and 3.8%, whereas in the deciduous dentition The condition is rarer with an incidence of 0.35- 0.6%, approximately

75% of supernumerary teeth are located in the maxilla, the most common supernumerary teeth are maxillary mesiodontes (46.9%), followed by premolars (24.1%) and molars (18%). It was also found that patients with supernumerary teeth have larger teeth in general. This leads to lack of space for the eruption of the remaining teeth even after the supernumerary one is removed.

Small teeth and teeth with crown anomalies

Small teeth usually result in generalized spacing. Small teeth and teeth with smaller and anomalous crowns may also be the cause of localized spacing. Approximately 5% of the population presents some degree of discrepancy concerning tooth sizes. It has also been found that oligodontia and microdontia occur more often in women, whereas megalodontia and supernumerary teeth are more common in men. Developmental anomalies that result in changes of tooth shape and size are found in all permanent teeth ranking in the following order of frequency: third molars, maxillary lateral incisors and mandibular second premolars. The cause of dental shape or size anomaly may be congenital or acquired.



Hypertrophic upper lip frenum

Hypertrophic upper lip frenum has long been held responsible for median diastema, however, diastemata, which sometimes create severe esthetic problems due to their location, may also be due to other causes. The latter include incomplete fusion of the two osseous parts of the premaxilla at the suture, congenitally missing lateral incisors, supernumerary teeth at the midline, small teeth or even the combination of suture deficiency at the midincisor area and congenitally

missing lateral incisors. It must be stressed, however, that the median diastema is often a normal feature of the stomatognathic system development, especially during the initial phase of permanent upper Central incisor eruption (the “ugly duckling” stage)



Deleterious oral habits

Harmful oral habits constitute another cause of generalized spacing or localized interdental spaces usually appearing among anterior teeth

Pathological causes of tongue augmentation

The main pathological conditions leading to tongue augmentation are acromegaly, myxedema, lymphangioma, amyloidosis, tertiary syphilis, cysts or tumors affecting the tongue and nerve injury.

Lost teeth – Permanent teeth extractions

It is well known that the percentage of individuals with spacing is clearly higher among people with a dental history of permanent teeth extractions.

The residual spaces after first molar extraction are distributed mainly at the posterior and partially at the anterior dental arches in both jaws. On the other hand, the residual spaces after first molar extractions are distributed over the whole of the dental arch in the mandible, whereas in the maxillary arch these spaces are limited between canines and second permanent molars. In the anterior maxillary area, a correlation has been found between spacing and extractions of permanent teeth mesial to first molars.

Delayed eruption of permanent teeth

Chronic and Aggressive periodontitis

Treatment of spacing:

Factors to be considered in a comprehensive treatment plan for spacing include

1. Initial cause of the problem
2. Patient age
3. Location and extent of spacing,
4. Number and status of existing teeth,
5. Periodontal tissue condition,
6. Free inter-maxillary space,
7. Possible malocclusion,
8. Patient expectations
9. Certain socioeconomic factors

Alternative therapeutic approaches for spacing include:

- (1) No treatment or esthetic restoration with composite resins
Individuals with few; small spaces who feel their dental appearance is satisfactory may be left without any treatment. This is usually the case when spaces are distal to the canine or when they are not visible during speech and smiling, these cases are acceptable when the risk for malocclusion development due to tooth migration is excluded. In other cases it is possible to close small spaces with tooth reshaping using composite resins. It should be noted that, within treatment context, a small residual space, especially distal to the lateral incisors, may be considered acceptable in certain cases.

- (2). Orthodontic space closure :Orthodontic space closure has always been considered the most appropriate treatment alternative, as prosthetic restorations used for spacing treatment may sometimes create periodontal problems .). Furthermore, fixed prostheses always involve the loss of healthy dental tissue. Finally, finances should also be considered, since there may be a

need to replace the prosthetic restoration two or three times during a patient's life.

