Chapter 1

What is Orthodontics?

Gizem Yazdan Özen[1]

Abstract

Orthodontics is a specialized branch of dentistry that examines the harmony of the teeth, jaw, and facial system. It involves the diagnosis, prevention, and treatment of issues such as misaligned teeth, jaw discrepancies, and malocclusion (bite disorders). Orthodontic treatment not only provides an aesthetically pleasing smile but also helps improve functions such as chewing, speaking, and breathing.

Depending on the time of the patient's application, preventive, interceptive, and/or corrective procedures can be implemented in orthodontic treatments. Preventive orthodontic treatments include fissure-sealant applications, space maintainers, and the preservation of primary tooth contacts. Interceptive orthodontic treatments involve techniques such as serial extractions and eruption guidance appliances (EAG).

Orthodontic treatments are not limited to brackets applied to teeth but also include various intra-oral and extra-oral appliances that create orthopedic effects, as well as orthognathic treatments for adult patients.

Oral and dental health is among the most common health issues worldwide, with individuals encountering these problems at least once in their lifetime. Along with dental caries, gum diseases, and fluorosis, malocclusions are among the most prevalent problems (Zakirulla et al., 2019).

In society, malocclusion (bite disorders) is often perceived as purely dental issues. However, malocclusion also involves skeletal discrepancies between the jaws (Siddegowda & Rani, 2013). Individuals with malocclusion may experience speech disorders, aesthetic concerns, and issues within the chewing system (Babu et al., 2005). Addressing these problems through orthodontic treatment is crucial for individuals to lead healthier lives (Muqtadir Quadri et al., 2015; Zakirulla et al., 2019).

1 Asst.Prof.Dr, Kafkas University Faculty of Dentistry, Department of Orthodontics
dtgzmyazdan@gmail.com, ORCID ID: 0000-0002-8875-8267

https://doi.org/10.58830/ozgur.pub733.c3053

Orthodontics aims to diagnose and treat disorders in the teeth, jaw, and facial system and prevent malocclusions (Erhamza & Ciğerim, 2021). Orthodontists intervene at different developmental stages of individuals to prevent these disorders. In preventive orthodontics, treatment is conducted without using any orthodontic mechanics. Interceptive orthodontic treatments aim to prevent problems through simple guidance, while active orthodontic interventions are applied based on the severity of the anomaly and the individual's developmental stage.

1.Preventive Orthodontics

The primary and fundamental goal of orthodontic treatment is to prevent the development of orthodontic problems (malocclusions/anomalies) in children. Preventive orthodontics aims to carry out treatments without the use of orthodontic mechanics (Meriç, 2018).

Preventive orthodontic treatments include: fissure-sealant applications, fixed or removable space maintainers, preservation of mesiodistal dimensions and primary tooth contacts.

The risk of cavities in the pits and fissures of primary and permanent posterior teeth is quite high. Resin-based materials applied to these surfaces to protect them are called fissure sealants (Meriç, 2018). These materials act as a physical barrier against acids produced by bacterial plaque (Ferracane, 2001). The application of fissure sealants, combined with good brushing habits, can prevent early childhood cavities and, consequently, premature tooth loss.

Early loss of primary teeth can lead to space loss in the dental arch, which may result in crowding. Space maintainers are used to prevent space loss in the dental arch due to early tooth loss. These maintainers can be fixed or removable, with several variations available. When designing space maintainers, factors such as root development, alveolar ridge, and the distance between permanent teeth should be considered (Kanellis, 2001). Incorrect applications intended to help individuals may, in fact, cause harm.

In the mixed and primary dentition periods, deviations from the ideal mandibular occlusion can occur due to primary contacts. This adaptation makes the correction of malocclusion more difficult. In cases involving the primary canines, minor modifications such as selective grinding can be applied as preventive orthodontic measures (Ülgen, 1993). Incorrect fillings on primary teeth during early stages may disrupt primary contacts, leading to space loss in the dental arch.

2.Interceptive Orthodontics

If an anomaly and/or malocclusion cannot be prevented in its early stages, interceptive orthodontic treatments are applied to prevent further severity (Ülgen, 2001).

Interceptive orthodontic treatments include: serial extractions, eruption guidance, prevention of harmful habits, and habit-breaking appliances.

Thumb-sucking in infancy and early childhood can be considered normal outside of feeding (Johnson & Larson, 1993). However, persistent habits such as thumb-sucking, lip-sucking, tongue-sucking, and swallowing disorders can lead to malocclusions and/or various anomalies. The severity and duration of these habits determine the extent of the resulting anomalies. If these habits are identified early and disappear naturally, problems may resolve without the need for treatment. However, if intervention is necessary, the recommended period is between 4 years of age and the eruption of permanent incisors (Johnson & Larson, 1993; Nanda, 1972). While it is a fact that bad habits can be solved with early intervention, if intervention is not made on time, various negativities may occur depending on the type and severity of the anomaly. For example, as a result of finger sucking habit, prolonged use of pacifiers, deepening in the maxillary palatinal region, vestibular angulation in the upper incisors, lingual angulation in the lower incisors and narrowing of the respiratory tract can be seen. With the habit of nail biting, intrusions and abrasions on the incisal/occlusal edges can be seen in teeth and/or tooth groups where the habit is practiced continuously. In the case of lip sucking, the mucous membrane of the lips on the sucking side is redder and more swollen than the other half.

The concept of eruption guidance was introduced into the literature by Hotz. While the technique of serial extraction was already known, Hotz provided a new perspective on the topic. Hotz categorized space stenosis into three groups: true space stenosis, symptomatic space stenosis and the combination of these two. In true space stenosis, he talks about the incompatibility between the mesio-distal dimension of the teeth and the jaw bone, while in symptomatic space stenosis, he talks about the loss of arch length and the resulting space stenosis that occurs as a result of interdental caries in deciduous teeth or early deciduous tooth extraction. In the third group, a combination of these two is mentioned (Hotz, 1970). The main purpose of eruption guidance is to solve dental problems with early intervention in individuals who are likely to develop crowding in the future. Erosion guidance is examined in three groups: eruption guidance without considering permanent tooth extraction, eruption guidance with

space constraints, eruption guidance with space constraints and permanent tooth extraction (orthodontic serial extraction), and eruption guidance performed in congenital tooth deficiency (Ülgen, 2001).

One step beyond sliding guidance is serial extraction treatments. Serial extractions were first introduced by Bunon (Bunon, 1746) and developed by Kjellgren (Kjellgren, 2007). Serial extraction is a treatment method that includes extraction of deciduous and permanent teeth without orthodontic appliances when the molar relationship is class I and the space stenosis is 7 mm or more. (Yoshihara et al., 2000)

3.Corrective Orthodontics

In our region, orthodontic problems often go unnoticed until they become visibly severe, leading individuals and parents to neglect the need for treatment. However, if these problems are addressed at an early age, they can be effectively treated.

The goals of orthodontic treatment include (Ülgen, 2001):

- Improving chewing, speech, and breathing functions
- Enhancing the teeth, jaw, and facial system
- Ensuring the long-term stability of treatment results
- Positively affecting the patient's psychological well-being

Corrective orthodontic treatments can be categorized into dental corrections, orthopedic treatments planned during pubertal growth and development, and orthognathic treatments for adult patients with severe skeletal anomalies.

Today, orthodontic treatments can be performed not only with metal bracket systems but also with clear aligners. While treatment mechanics and planning remain similar, the materials used differ. The most important rule in orthopedic treatments is that patients should not have completed their pubertal growth spurt.

A separate and significant area in orthodontics involves treating individuals with cleft lip and palate (CLP) and syndromic conditions. CLP patients require long-term follow-up from birth, with treatment starting with feeding plates.

4.The Beginning of Orthodontics in Dentistry

Dentistry and orthodontics have been included in general medicine for many years. It is known that the first book on dentistry was the book titled 'Arznei Buchlein' (1530), the author of which is unknown, and that this book was published in Leipzig and was printed and used many times until 1576. In this book, some orthodontic anomalies were described (Perkün, 1973).

In 1860, Angell published the first article on maxillary expansion in 'Dental Cosmos' (Angell, 1860).

In 1872, Kingsley introduced the use of headgear to apply posterior force to the maxilla in the orthodontic literature (Ülgen, 2001).

Edward H. Angell is the most famous person in orthodontics (Ülgen, 2001). The classification he created with his own name is still actively used today.

It was Tweed, also one of Angell's students, who came after Angell and recommended and practiced gravitational treatment as an alternative to Angell's non-gravitational treatment method (Tweed).

Begg, also one of Angell's students, introduced the Begg technique, which requires extraction in all treatments, to the literature (Begg, 1961).

The first orthodontic applications were initiated by Pierre Fauchard in 1728 (Fauchard, 1746).

Cellier applied extraoral force to the mandible with the chin-cup in 1802 (Wahl, 2005).

REFERENCES

Angell, E. (1860). Treatment of irregularity of the permanent or adult teeth. *Dental Cosmos*, *1*, 599-600.

Babu, A. S., Chandu, G., & Shafiulla, M. (2005). Prevalence of malocclusion and orthodontic treatment needs among 13-15 year old school going children of Davangere city, Karnataka. *Journal of Indian association of Public health Dentistry*, *5*(6), 32-35.

Begg, P. (1961). Light arch wire technique: Employing the principle of differential force. *American journal of orthodontics*, *47*(1), 30-48.

Bunon, R. (1746). *Essay Sur Les Maladies Des Dents Ou L'On Propose Les moyens de leur procurer une bonne conformation dès la plus tendre Enfance & d'en assurer la conservation pendant tout le cours de la vie: avec une Lettre où l'on discute quelques opinions particulieres de l'Auteur de l'Orthopedie. Experiences Et Demonstrations Faites à l'Hópital de la Salpêtriere & à S. Côme en présence de l'Académie Royale de Chirurgie: Pour servir de suite et de preuves À L'Essai Sur Les Maladies Des Dents &c. Et Une Pharmacie Odontalgique ou Traité des Médicamens, simples & composś propres aux maladies des Dents & des différentes parties de la bouche à l'usage des Dentistes* (Vol. 2). Briasson.

Erhamza, T. S., & Ciğerim, S. Ç. (2021). Diş Hekimliği Fakültesi Öğrencilerinin Ortodonti Uzmanlığına Bakış Açıları.

Fauchard, P. (1746). *Le Chirurgien-dentiste ou traité des dents* (Vol. 1). chez PJ Mariette.

Ferracane, J. L. (2001). *Materials in dentistry: principles and applications*. Lippincott Williams & Wilkins.

Hotz, R. P. (1970). Guidance of eruption versus serial extraction. *American journal of orthodontics*, *58*(1), 1-20.

Johnson, E., & Larson, B. (1993). Thumb-sucking: literature review. *ASDC journal of dentistry for children*, *60*(4), 385-391.

Kanellis, M. (2001). *Orthodontic Treatment in the primary dentition In: Bishara SE, ed: Textbook of Orthodontics*.

Kjellgren, B. (2007). Serial extraction as a corrective procedure in dental orthopaedic therapy. *The European Journal of Orthodontics*, *29*(suppl_1), i37-i50.

MERİÇ, P. (2018). Koruyucu ve Durdurucu Ortodontik Uygulamalar. *Türkiye Klinikleri*, 1-4.

Muqtadir Quadri, S., Thilagrani, P., Dhanyasi, A., Mongia, J., & Agrawal, A. (2015). Awareness towards orthodontic treatment in central Indian school children. *Sch J Dent Sci*, *2*(1), 45-48.

Nanda, R. (1972). Effect of oral habits on the occlusion in preschool children. *J Dent Child*, *39*, 449-452.

Perkün, F. (1973). Çene Ortopedisi (Ortodonti) Cilt 1 Giriş, Nokta ve Düzlemler. *Perkün, F. editör. Gençlik Basımevi, İstanbul*, 32-48.

Siddegowda, R., & Rani, M. (2013). An epidemiological survey on awareness towards orthodontic treatment in South Indian school children. *Open J Dent Oral Med*, *1*(1), 5-8.

Tweed, C. Clinical Orthodontics. 1966. *Volume One*, 1-54.

Ülgen, M. (1993). *Ortodontik Tedavi Prensipleri* (Vol. 4. Baskı). Dilek-Örünç Matbaası.

Ülgen, M. (2001). *Ortodonti anomaliler, sefalometri, etioloji, büyüme ve gelişim, tanı*.

Wahl, N. (2005). Orthodontics in 3 millennia. Chapter 6: More early 20th-century appliances and the extraction controversy. *American journal of orthodontics and dentofacial orthopedics*, *128*(6), 795-800.

Yoshihara, T., Matsumoto, Y., Suzuki, J., Sato, N., & Oguchi, H. (2000). Effect of serial extraction alone on crowding: spontaneous changes in dentition after serial extraction. *American journal of orthodontics and dentofacial orthopedics*, *118*(6), 611-616.

Zakirulla, M., Almubarak, H., Fageeh, S. N., Alghothimi, A. A., Alqahtani, S. K., Alqahtani, F. M., & Alshahrani, F. T. (2019). Awareness and behaviour related to orthodontic treatment among school children in Aseer region, Kingdom of Saudi Arabia. *Open Journal of Stomatology*, *9*(4), 87-94.