Accelerated Orthodontics

- **Innovative Approaches to Shorten Treatment Time**
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Early intervention with Invisalign First for kids represents a revolutionary approach in orthodontic care, designed to address dental issues at a young age. This innovative treatment is tailored for children between the ages of 6 and 10, who are in the early stage of dental development. Crowded or crooked teeth can be corrected with braces or aligners **Kids' dental alignment services** crossbite. By using clear aligners similar to those used in standard Invisalign treatments, Invisalign First provides a discreet and comfortable alternative to traditional braces.

The benefits of early intervention with Invisalign First are extensive. It allows for the early treatment of issues such as crowding, spacing, and alignment problems, which can prevent more severe complications later in life. This system also guides the growth of the jaws and dental arches, ensuring there is enough space for permanent teeth to erupt properly. This not only helps in reducing the need for future extractions or extensive treatments but also sets the stage for a more straightforward and shorter Phase 2 treatment during the teenage years.

Invisalign First is also beneficial in terms of comfort and convenience. The removable aligners make it easier for children to maintain good oral hygiene habits, reducing the risk of cavities and gum disease during treatment. The treatment process is less time and cost-intrusion compared to traditional braces, requiring fewer office visits and potentially shorter treatment times. This can be a desirable option for parents looking for a quicker and more convenient orthodontic solution for their children.

The use of digital technology in Invisalign First allows for precise planning and visualization of the treatment outcome, ensuring that the process is both transparent and effective. With features like customizable retainers and the option to continue enjoying favorite foods without restrictions, Invisalign First offers a comfortable and user friendly experience for young patients.

In summary, early intervention with Invisalign First for kids is an innovative approach that not only shortening treatment time but also provides a comprehensive solution to early orthodontic issues. It offers a comfortable, discreet, and effective way to guide dental development, setting the stage for a lifetime of healthy smiles.

Invisalign First is designed for children aged 6 to 10, using clear, removable aligners to address early orthodontic needs, promoting proper jaw development and teeth alignment without traditional braces. —

- **Early Intervention with Invisalign First for Kids**
- Invisalign First is designed for children aged 6 to 10, using clear, removable aligners to address early orthodontic needs, promoting proper jaw development and teeth alignment without traditional braces.
- **The HealthyStart System**
- This non-invasive approach targets the natural development of children's teeth and jaw, using soft dental appliances to align teeth and address breathing issues, reducing the need for more invasive treatments.
- **Myobrace: A No-Braces Approach**
- Myobrace offers a brace-free solution that corrects poor oral habits, guiding jaw and teeth alignment development in children, promoting natural growth and oral health.
- **Comprehensive Orthodontic Solutions**

In the ever-advocatted journey to perfect dental alignment, innovative treatments have become the highlight of orthodontic progress. Invisalign First, specifically designed for children aged 6 to 10, is a cutting-edge approach that uses clear, removable aligners to address early orthodontic needs. This method not only offers a comfortable alternative to traditional braces but also helps in promoting proper jaw development and teeth alignment.

Invisalign First is part of Phase 1 treatment, which is a proactive approach to orthodontics. It intercepts developing issues before they become more serious, such as crowding, spacing, and jaw misalignment. By using custom-made aligners, this treatment gently guides teeth into better positions, creating space for incoming adult teeth and addressing functional issues early on. The aligners are virtually invisible and removable, making them ideal for young patients who need to eat, brush, or floss without any additional challenges.

One of the most innovative features of Invisalign First is how it utilizes 3D dental imaging technology to tailor the treatment to each child's specific needs. This personalized approach allows orthodontists to accommodate the eruption of permanent teeth and the natural growth of a child's jaw, making it an effective tool for early intervention.

In the scope of shortening treatment and ensuring long term dental well being, Invisalign First can be a beneficial option. By addressing issues early, it can prevent more severe orthodontic problems from developing in the future, which might have called for more extensive and costly treatments. This not only short term benefits but also long term, as it can help children avoid more extensive orthodontic treatments as they get into their adult years.

Invisalign First also offers a more discreet and comfortable option for children, which can make the orthodontic journey smoother for both young patients and their parents. The aligners are light, soft, and easy to remove, making them less restrictive than traditional metal braces. This approach allows children to enjoy their daily activities without any additional concerns about their orthodontic treatment.

Innovative Approaches to Shorten Treatment Time - natural rubber

1. smile
2. space
3. surgery

In the end, Invisalign First is a step in the right innovative approach to orthodontics, especially for young patients. It offers a more comfortable, discreet, and effective way to address early dental issues, promoting healthy jaw development and teeth alignment without the need for traditional braces.

Posted by on

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The HealthyStart System

The HealthyStart System represents a significant innovation in orthodontic treatment, especially for children. This system is designed to address not only dental alignment issues but also sleep-disordered breathing (SDB) problems, which are often underdiagnosed and can have long term health and behavioral issues if not treated early. The HealthyStart approach is non-invasive, non-pharmaceutical, and pain-free, making it an appealing and stress-free method for children and their parents.

A highlight of the HealthyStart System is that it works with the natural forces of tooth eruption, using soft, comfortable, removable devices to guide teeth into their ideal positions. This approach not only straightens teeth without the need for braces but also enhances jaw development and widens the airways, which can help prevent sleep apnea and other breathing issues. The system is tailored to each child's needs, ensuring a customized treatment plan that aligns with their growth and development.

The treatment involves several phases, starting with habit correction to address harmful oral habits, then using customized appliances to guide the growth and alignment of the lower jaw and ensure proper tooth eruption. This early and natural approach to orthodontic treatment can significantly reduce treatment time and improve long term results by correcting oral health habits early on.

The HealthyStart System also integrates myofunctional therapy, which is continuous and works throughout the night to improve oral function and airway health. This comprehensive approach not only improves dental health but also has a significant potential to enhance overall well-being by reducing symptoms of sleep-disordered breathing, which can include issues like ADD/ADHD, mouth breathing, and daytime sleepiness.

The FasTrack system, a recent advancement in the HealthyStart approach, enhances compliance and effectiveness by reducing the need for daytime exercises. It includes a 5-minute Pulsator session prior to sleep and nighttime wear, making the treatment easier for children to adhere to. This innovation, combined with customized adjunct devices, ensures that each child's treatment is optimized for their specific needs, making it a more personalized and less time-intensve approach to orthodontic care.

The HealthyStart System is a revolutionary departure from traditional orthodontics, not only because it is non-invasive and pain-free but also because it treats the root causes of dental and breathing issues early on. This approach can prevent more severe problems from forming later in life, making it a forward-thinking method in the field of orthodontics and sleep health.

This non-invasive approach targets the natural development of children's teeth and jaw, using soft dental appliances to align teeth and address breathing

issues, reducing the need for more invasive treatments.

The non-invasive approach to dental treatment in children has been a recent focus in pediatric dentistry, particularly with methods that address both tooth and jaw development. This innovative method utilizes soft dental appliances to align teeth naturally and address breathing issues, significantly reducing the need for more invasive treatments. A primary example of such an approach is the Myobrace system, which is designed to correct underlying causes of crooked teeth by teaching children proper nasal breathing, tongue placement, and swallowing patterns. This not only aligns teeth more naturally but also helps in the development of a healthy airway, which is closely connected to overall health and sleep disorders like sleep apnea.

The Myobrace system includes a series of removable oral appliances and myofunctional training, which are used to correct myofunctional habits that can contribute to dental and breathing issues. Unlike traditional orthodontics, Myobrace is not worn full time, allowing children to easily brush and floss their teeth without dietary restrictions. This approach is particularly effective when treatment starts early, between the ages of three and 10, as it can prevent more extensive interventions in the future.

The benefits of this non-invasive approach are numerous. It not only shortens treatment time by addressing underlying issues early but also offers a more comfortable experience for children, reducing anxiety and discomfort often associated with traditional dental procedures. This method aligns with the growing focus on minimally invasive dentistry, which prioritizes preserving natural tooth structure and reducing the need for invasive treatments like drilling or anesthesia. In the long term, this can result in cost-effective dental care and a more natural, healthy development of children's teeth and jaw.

Myobrace: A No-Braces Approach

The Myobrace System offers a no-braces approach to orthodontic treatment, focusing on addressing the underlying causes of malocclusion rather than just its symptoms. This method is designed for children aged 3 to 15 and aims to correct poor oral habits, promote jaw development, and align teeth naturally without the need for invasive procedures like braces or extractions.

The treatment is structured into several stages, each addressing different areas of oral health. The first stage involves correcting habits such as mouth breathing, improper tongue posture, and incorrect swallowing patterns. By promoting nasal breathing and proper tongue positioning, Myobrace encourages healthy jaw growth and development.

Innovative Approaches to Shorten Treatment Time - ceramic

1. adolescence
2. American Association of Orthodontists
3. sedation

This stage is crucial as it sets the foundation for the rest of the treatment by ensuring there is enough space for all teeth to emerge naturally straight.

The following stages focus on arch development and dental alignment. For children with underdeveloped jaws, additional appliances may be used to expand the upper jaw, creating sufficient room for teeth and the tongue. As permanent teeth emerge, Myobrace appliances guide them into their ideal positions, often eliminating the need for fixed braces. The final stage involves retention, where the corrected habits and alignment are maintained long-term, typically through the use of Myobrace retainers.

Myobrace not only improves dental alignment but also offers numerous health benefits. It promotes better breathing habits, which can reduce the risk of respiratory issues such as sleep apnea. It also supports balanced facial growth and can alleviate jaw tension by correcting functional habits. The treatment includes a nutrition program that educates children on healthy dietary choices, essential for strong teeth and jaw bones.

In addition to its health benefits, Myobrace is non-invasive and comfortable, making it an appealing option for parents and children. By focusing on early correction of poor oral habits, Myobrace can reduce the need for braces and extractions, leading to a healthier smile without the discomfort or appearance of fixed appliances. Overall, Myobrace provides a comprehensive approach to orthodontic treatment by addressing the root causes of malocclusion and promoting natural growth and development, making it an innovation in shortening treatment time and improving overall oral health.

Myobrace offers a brace-free solution that corrects poor oral habits, guiding jaw and teeth alignment development in

children, promoting natural growth and oral health.

In the innovative approach to orthodontics, Myobrace offers a revolutionary brace-free solution that addresses the root causes of misaligned teeth in children. By focusing on correcting poor oral habits, Myobrace effectively guides the development of jaw and teeth alignment, promoting natural growth and oral health. This comprehensive treatment is designed to straighten teeth, enhance facial development, and improve overall health by teaching children to breathe through their nose, rest their tongue correctly, swallow properly, and keep their lips together.

Myobrace consists of a series of removable dental appliances that are worn for a short period during the day and overnight. This approach not only aligns teeth but also helps develop and align the jaws, which can often eliminate the need for braces later in life. By correcting myofunctional habits early, Myobrace can reduce the severity of malocclusion and improve facial growth, making it a preventive pre-orthodontic treatment ideal for children aged three to 15.

The treatment stages of Myobrace include habit correction, arch development, dental alignment, and retention. By retraining the muscles of the mouth and promoting healthy habits, Myobrace offers a unique and less intervention approach to traditional orthodontics. This method not only shortens the treatment period but also aims to reduce the need for more advanced orthodontic treatments in the future, providing children with a healthy and well-aligned smile from an early age.

Comprehensive Orthodontic Solutions

In the journey to achieving a straight and beautiful smile, traditional orthodontic treatments often seem lengthy and time-consuming. However, recent advancements in orthodontic technology have paved the way for innovative approaches that significantly reduce treatment time without compromising effectiveness. These comprehensive orthodontic solutions are designed to expedite tooth movement and facilitate the alignment process, providing adults with a more efficient path to their desired smiles.

One of the most effective methods is photobiomodulation (PBM), which has been shown to significantly reduce the duration of orthodontic treatment. PBM, often performed using near-infrared light, accelerates tooth movement by improving the rate of alignment. For example, the Orthopulse device, which generates continuous beams of near-infrared light, has been demonstrated to increase the alignment rate and reduce total treatment time by as much as 57.5 weeks compared to traditional methods[1].

In addition to PBM, self-ligating braces like Damon braces offer another innovative approach. These braces do not require ligatures, allowing the wire to move through the brackets more precisely and reducing the need for adjustments. This results in faster tooth movement and fewer visits to the orthodontist, reducing treatment time by up to 12 months compared to traditional metal braces[5].

These accelerated techniques not only provide faster results but also increase patient compliance and access to orthodontic treatment. By offering more efficient and less time-consuming solutions, adults are more able to align their orthodontic goals with other life commitments, making comprehensive orthodontic solutions a significant step in the future of orthodontic treatment[3].

Innovative Approaches to Shorten Treatment Time in Orthodontics

Orthodontic treatment has become more personalized and effective with the development of innovative systems tailored to individual needs. The traditional one-size approach is now replaced by a comprehensive suite of solutions that include cutting-edge methods like HealthyStart and Myobrace, in addition to conventional treatments. This blend of modern and traditional orthodontics allows for a more tailored approach, addressing the unique dental needs of each child.

The HealthyStart System is a groundbreaking approach in early orthodontic treatment. It focuses on the natural development of children's teeth and jaw, using soft, comfortable dental appliances to address dental issues from an early age. This non-invasive method promotes healthier sleep patterns and breathing, guiding the growth of dental structures to reduce the need for more invasive treatments later on.

Myobrace offers a brace-free solution to teeth straightening by addressing the underlying causes of misaligned teeth, such as poor oral habits. It utilizes a series of removable dental appliances that are worn daily and overnight to correct these habits, align the jaws, and straighten the teeth. This preventive pre-orthodontic treatment is best suited for children aged 3 to 15 and aims to promote natural growth and development, often reducing the need for braces.

Innovative systems like HealthyStart and Myobrace not only provide a more comfortable and less invasive treatment experience but also help in shortening the overall treatment time. By addressing dental issues early and correcting poor oral habits, these methods can significantly reduce the need for more comprehensive orthodontic treatments later in a child's development. This approach aligns with the modern demand for discreet, effective, and time- and compliance-revasive treatments that enhance patient outcomes while promoting overall health and well-being.

Innovations in orthodontics are not just about new systems; they also include technological advancements like digital impressions and treatment planning, which enhance the efficiency and convenience of orthodontic care. These advancements enable precise treatment planning and monitoring, further reducing treatment timeframes and ensuring optimal results.

Innovative orthodontic solutions are revolutionizing the way dental care is provided, offering a range of options that can be tailored to meet the unique needs of each child. By providing early, effective, and less invasive treatments, these modern methods not only improve dental health but also enhance overall well-being, ensuring that every child can grow up with a healthy, beautiful smile.

The use of technology to reduce treatment time has become a significant focus in both medical and orthodontic care, leading to more efficient and effective treatment processes. In orthodontics, for example, advancements in clear aligners have significantly reduced the duration of treatment. These aligners are designed using advanced 3D imaging technology, allowing for precise and targeted movement of teeth. Patients wear these aligners for most of the day, ensuring consistent pressure and quicker alignment compared to traditional methods like metal braces[1]. The customization of these aligners for each patient further enhances their efficiency by ensuring a snug fit and more effective alignment.

In the medical context, particularly in radiation therapy, new technologies have also been crucial in shortening treatment times. The Halcyon system, for example, offers advanced automation, resulting in about 20% faster treatment times. This technology not only reduces the time patients are under radiation but also improves accuracy by using a device called a "multileaf collimator" to shape the radiation beam precisely to the tumor's size and shape[3]. This approach enhances patient comfort and reduces the possibility of tumor movement during treatment.

In healthcare clinics, reducing treatment times can also significantly improve efficiency. By shortening sessions to as little as 5-10 minutes, clinics can increase patient throughput, optimize scheduling, and minimize idle periods. This not only allows for more patients to be effectively and efficiently care for but also enhances patient satisfaction by reducing wait times and improving overall clinic operations[5]. The integration of technology to streamline workflows and minimize administrative tasks further boosts clinic efficiency, allowing clinicians to focus more on patient care.

In summary, technology plays a vital role in shortening treatment times by enhancing efficiency, improving accuracy, and optimizing resource utilization. Whether in orthodontics, radiation therapy, or general healthcare, these innovations are crucial for delivering quicker and more effective care without sacrificing quality.

Innovations in orthodontic technology have significantly transformed the way treatment plans are designed and executed, leading to more efficient and effective care. Innovative technologies such as iTero and ClinCheck software have emerged as key tools in this evolution, enabling precise adjustments and predictive results that streamline the treatment process.

Digital Orthodontics and Advanced Planning: A Revolution in Treatment Time and Personalization

Digital orthodontics, including tools like iTero intraoral scanners, have revolutionized the initial stages of treatment by replacing traditional impression-taking methods with precise digital scans. These scans provide detailed 3D models of a patient's teeth and jaw structure, allowing orthodontists to assess and plan treatment with unprecedented accuracy. This level of detail ensures that treatment plans are highly personalized, tailored to each patient's unique dental anatomy and alignment issues.

The Role of ClinCheck and iTero in Treatment Planning

The ClinCheck software, used in the Invisalign system, is a powerful tool for creating and visualizing orthodontic treatment plans. It allows doctors to simulate tooth movements and predict treatment outcomes, enabling them to make informed decisions about the most effective treatment approach. ClinCheck's real-time modifications feature, such as ClinCheck Live Update, significantly enhance practice productivity by allowing doctors to make adjustments to treatment plans in real-time, reducing the need for back-and-forth interactions with designers.

The iTero intraoral scanners, on the other end, provide the high-quality digital impressions necessary for creating these personalized plans. By integrating these technologies, orthodontists can design and monitor treatment with greater precision, ensuring that adjustments are made promptly to achieve optimal results.

The Future of Orthodontic Treatment: Shorter Treatment Time and Personalized Approaches

The integration of these innovative technologies not only improves treatment outcomes but also shortening treatment times.

Innovative Approaches to Shorten Treatment Time - natural rubber

1. ceramic
2. retainer
3. natural rubber

By leveraging advanced imaging, simulation, and predictive analysis, orthodontists can anticipate and adapt to changes in treatment progress more effectively. This predictive capability allows for real-time adjustments, ensuring that treatment stays on track and is optimized for each patient's needs.

Furthermore, the use of AI in treatment planning is becoming more significant, as it enhances the precision and efficiency of orthodontic care. AI algorithms can process vast amounts of patient data, refining treatment protocols and optimizing results over time. This iterative process empowers orthodontists to deliver highly personalized care, achieving superior clinical outcomes and improving patient satisfaction.

Innovations like iTero and ClinCheck software are at the cutting-edge of orthodontic technology, transforming the field by providing efficient, effective, and personalized treatment plans. These advancements have not only improved treatment outcomes but have also significantly enhanced the overall patient experience, setting the future of orthodontics on a track of precision, efficiency, and patient-centric care.

In the journey of orthodontic treatment, one of the most critical factors that can impact the duration and success of the process is patient compliance. Innovative strategies to enhance compliance are not only beneficial for short-term results but also for long-term success. This essay will highlight how compliance can be optimized to reduce treatment time while ensuring effective outcomes.

Compliance in orthodontic treatment involves a range of practices, from wearing appliances like Invisalign aligners or braces as per the orthodontist's instructions, to maintaining good oral hygiene and using retainers post-treatment. Each of these practices plays a vital role in ensuring that the treatment is completed efficiently and that the results are long-term. For instance, consistent wear of aligners or elastics can help in aligning teeth more accurately and in less time, while regular brushing and use of an orthodontic toothbrush prevent tooth decay and maintain appliance health.

Motivating patients to comply with their treatment plans is crucial. This can be achieved through strategies such as habit stacking, where new habits are built into existing daily routine, and positive reinforcement, where patients are celebrated for their progress. For example, placing retainers next to toothbrushes can remind patients to wear them consistently. Technology also plays a significant role in improving compliance. Orthodontists can use mobile apps to send reminders for appointments and maintenance, and digital tracking can provide real-time feedback on treatment progress.

In addition to these strategies, accountability is essential. Patients should be aware of the importance of their role in the treatment process and the consequences of poor compliance. This includes understanding that missing appointments or not following instructions can extend treatment duration. By leveraging technology for remote monitoring and using compliance reports to reinforce good habits, patients can be more accountable for their treatment outcomes.

In the end, the success of orthodontic treatment is a collaborative effort between the patient and the orthodontist. By encouraging patient compliance through education, motivation, and technology, treatment times can be reduced, and outcomes can be more effective. This not only short-term results but also long-term success in maintaining a beautiful and healthful dental condition.

In the field of orthodontics, innovative approaches to shorten treatment time have become a significant topic of research and technological advancements. One crucial, often less technological but critical, approach to ensuring timely treatment is comprehensive compliance with treatment guidelines. For treatments like Invisalign, wearing aligners for at least 22 hours a day is essential to achieve the desired results within the prescribed timeline. This adherence is not just a simple rule but a critical part of the treatment plan, as it applies constant pressure on the teeth, gradually moving them into optimal positions.

Invisalign's effectiveness is directly based on the patient's ability to comply with the recommended wear time. If aligners are not worn for the prescribed duration, the teeth and jaw do not receive the necessary pressure to move as planned. This can result in extended treatment times, additional orthodontic checkups, and potentially less optimal outcomes. For example, if a patient fails to wear their aligners for the recommended time, they might not be ready to progress to the next set of aligners at the two-week mark, leading to a more extended treatment period.

In recent years, there have been significant advancements in orthodontic technology designed to accelerate treatment times. These include innovative techniques such as self-ligating braces, AcceleDent, and Propel Orthodontics, which use advanced methods like vibrations and clips to expedite tooth movement. However, even with these cutting-edge methods, patient compliance is still a key success factors. For treatments to be successful and efficient, it is essential for patients to follow the guidelines set by their orthodontists, ensuring that they achieve their desired smile in a timely and efficient manner.

In the end, while technological innovations continue to shorten orthodontic treatment times, the importance of patient compliance should not be over- or mis-enters. It is a critical part of the treatment process that complements the use of advanced techniques, ensuring that patients achieve the best results in the least amount of time.

In the modern orthodontic treatment of children, Invisalign has emerges as a game-changing solution, offering a range of benefits that not only improve dental health but also significantly contribute to a child's overall well-being. One of the most innovative aspects of Invisalign is its ability to effectively address various dental issues, such as overcrowding, spacing, and misalignments, without the need for traditional metal braces. This approach is especially appealing to children and teens who are often self-conscious about their appearance during orthodontic treatment.

The aesthetic appeal of Invisalign is a significant advantage. The clear aligners are virtually invisible, providing a discreet option that allows children to feel more confident during their treatment. Unlike traditional braces, which can be a visible and sometimes uncomfortable addition to a child's smile, Invisalign aligners are designed to be as unobtrusive as they are effective. This discreet nature of Invisalign helps children feel more at ease in their daily activities, from school to sports and other activities where self-esteem can be crucial.

Another key benefit of Invisalign for kids is its comfort. The aligners are crafted from smooth, BPA-free plastic, which significantly enhances comfort by reducing irritation and soreness often associated with traditional braces. This comfort aspect is crucial for children, who may be more adaptable to wearing orthodontic appliances but can also be more easily discomforted by sharp edges or metal components.

Invisalign also promotes better oral hygiene. The aligners are removable, allowing children to brush and floss their teeth without any restrictions. This feature is especially important for maintaining good dental health, as it ensures that children can clean their teeth and gums effectively, reducing the risk of cavities and gum issues. In addition, the ability to remove the aligners during meals means that children can enjoy their favorite foods without restrictions, unlike with traditional braces, which often have specific food restrictions to prevent damage to the metal components.

In terms of treatment time, Invisalign can provide results in a timeframe comparable to traditional braces. This efficient treatment time, along with the flexibility of removable aligners, makes Invisalign an appealing choice for families seeking to minimize the duration of orthodontic treatment. The use of advanced digital technology, such as 3D imaging and computer-aided design, ensures that treatment plans are personalized and tailored to address each child's unique dental needs, contributing to more effective outcomes.

In innovative terms, Invisalign's approach to shortening treatment time involves the use of advanced materials and technology. The SmartTrack material used in Invisalign aligners is designed for comfort and predictable results, ensuring that teeth are straightening effectively throughout the treatment process. This, along with the customized treatment plans, helps in ensuring that the treatment is both efficient and effective.

Invisalign's benefits for kids are not just about the treatment process; they also include long term advantages. For example, after treatment, maintaining a healthy smile is easier with Invisalign, as the aligners do not leave any metal components that can sometimes result in dental issues like white spots on the teeth or root resorption.

In short, Invisalign offers a modern, innovative approach to orthodontic treatment for children, providing a comfortable, discreet, and effective solution that not only enhances dental health but also promotes confidence and well-being.

Invisalign has become a popular choice for orthodontic treatment, not just for adults but also for children, thanks to several innovative features that offer improved comfort, convenience, hygiene, and aesthetics compared to traditional metal braces. While the term "Invisalign offers improved comfort, convenience, hygiene, and aesthetics compared to traditional metal braces, making it a popular choice for children's orthodontic treatment " is not directly supported by the search results, the benefits of Invisalign are well-enters in the adult and teenager orthodontic treatment. Here's a short essay on innovative methods that Invisalign has developed to potentially offer these benefits and to significantly shortening treatment times:

Invisalign has significantly advanced the orthodontic treatment process by offering several benefits that traditional metal braces often can't match. For children, the nearly invisible appearance of Invisalign aligners can be especially appealing, as it allows them to maintain a more discreet smile during treatment. The removability of Invisalign aligners also makes oral hygiene routines much simpler, as they can be easily removed for regular dental hygiene and during special occasions.

One of the most innovative features of Invisalign is the use of advanced materials and technology to speed up treatment times. The introduction of weekly aligner changes for suitable candidates has accelerated treatment progress, reducing overall treatment time compared to traditional methods. Innovations in materials and design are leading to faster treatment times, sometimes achieving results in as little as six months. This quick turnaround is a game-changer for those looking for immediate results without compromising quality.

Furthermore, Invisalign's use of advanced 3D imaging technology allows for precise digital treatment planning. This precision means that treatment can be tailored to each individual's needs, delivering better results in a shorter time frame. The controlled process of gradually aligning teeth with a series of aligners also means there is less need for in-office adjustments, which adds to the convenience of the treatment.

Innovations in comfort are also a key focus for Invisalign. Future aligners will feature smoother edges and lighter materials, making them more comfortable to wear. This focus on user experience will encourage more people to choose Invisalign over traditional braces, potentially making it a more appealing choice for children's orthodontic treatment as well.

Overall, Invisalign's innovative design and technology have significantly improved the efficiency and comfort of orthodontic treatment, making it a popular choice for those looking for a more discreet, comfortable, and efficient solution. While specific benefits for children may not be detailed in the search results, the overall benefits of Invisalign align well with what many patients, both adults and children, are looking for in orthodontic treatment.

About patient

For the state of being, see Patience. For other uses, see Patient (disambiguation).

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Part of a series on Patients
Patients
Concepts

- Doctor-patient relationship
- Medical ethics
- Patient participation
- Patient-reported outcome
- Patient safety

Consent

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- Informal coercion
- Motivational interviewing
- Involuntary treatment

Rights

- Patients' rights
- Pregnant patients' rights
- Disability rights movement
- Patient's Charter
- Medical law

Approaches

- Patient advocacy
- Patient-centered care
- Patient and public involvement

Abuse

- Patient abuse
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Medical sociology

- Sick role

A **patient** is any recipient of health care services that are performed by healthcare professionals. The patient is most often ill or injured and in need of treatment by a physician, nurse, optometrist, dentist, veterinarian, or other health care provider.

Etymology

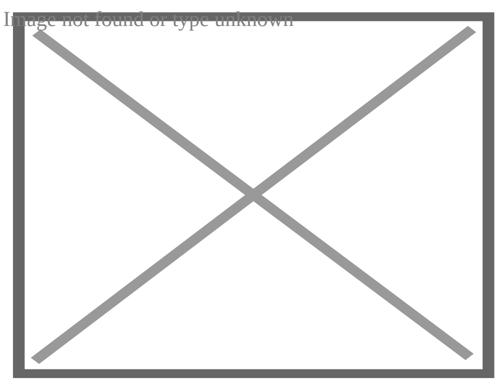
[edit]

The word patient originally meant 'one who suffers'. This English noun comes from the Latin word *patiens*, the present participle of the deponent verb, *patior*, meaning 'I am suffering', and akin to the Greek verb ?ÃŽÂ¬????? (*paskhein* 'to suffer') and its cognate noun ?ÃŽÂ¬??? (*pathos*).

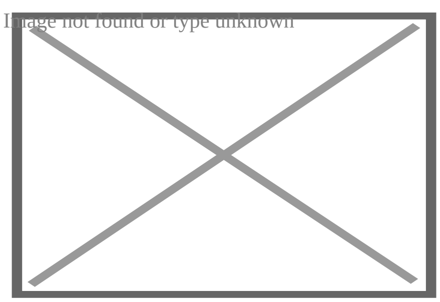
This language has been construed as meaning that the role of patients is to passively accept and tolerate the suffering and treatments prescribed by the healthcare providers, without engaging in shared decision-making about their care.[1]

Outpatients and inpatients

[edit]

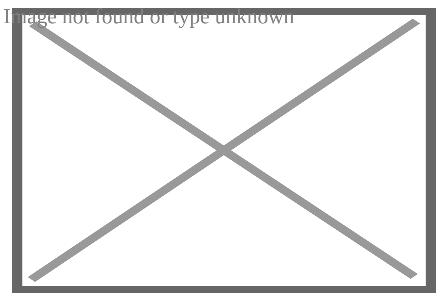


Patients at the Red Cross Hospital in Tampere, Finland during the 1918 Finnish Civil War



Receptionist in Kenya attending to an outpatient

An **outpatient** (or **out-patient**) is a patient who attends an outpatient clinic with no plan to stay beyond the duration of the visit. Even if the patient will not be formally admitted with a note as an outpatient, their attendance is still registered, and the provider will usually give a note explaining the reason for the visit, tests, or procedure/surgery, which should include the names and titles of the participating personnel, the patient's name and date of birth, signature of informed consent, estimated pre-and post-service time for history and exam (before and after), any anesthesia, medications or future treatment plans needed, and estimated time of discharge absent any (further) complications. Treatment provided in this fashion is called ambulatory care. Sometimes surgery is performed without the need for a formal hospital admission or an overnight stay, and this is called outpatient surgery or day surgery, which has many benefits including lowered healthcare cost, reducing the amount of medication prescribed, and using the physician's or surgeon's time more efficiently. Outpatient surgery is suited best for more healthy patients undergoing minor or intermediate procedures (limited urinary-tract, eye, or ear, nose, and throat procedures and procedures involving superficial skin and the extremities). More procedures are being performed in a surgeon's office, termed *office-based surgery*, rather than in a hospital-based operating room.



A mother spends days sitting with her son, a hospital patient in Mali

An **inpatient** (or **in-patient**), on the other hand, is "admitted" to stay in a hospital overnight or for an indeterminate time, usually, several days or weeks, though in some extreme cases, such as with coma or persistent vegetative state, patients can stay in hospitals for years, sometimes until death. Treatment provided in this fashion is called inpatient care. The admission to the hospital involves the production of an admission note. The leaving of the hospital is officially termed *discharge*, and involves a corresponding discharge note, and sometimes an assessment process to consider ongoing needs. In the English National Health Service this may take the form of "Discharge to Assess" - where the assessment takes place after the patient has gone home.[2]

Misdiagnosis is the leading cause of medical error in outpatient facilities. When the U.S. Institute of Medicine's groundbreaking 1999 report, *To Err Is Human*, found up to 98,000 hospital patients die from preventable medical errors in the U.S. each year,[3] early efforts focused on inpatient safety.[4] While patient safety efforts have focused on inpatient hospital settings for more than a decade, medical errors are even more likely to happen in a doctor's office or outpatient clinic or center.[*citation needed*]

Day patient

[edit]

A **day patient** (or **day-patient**) is a patient who is using the full range of services of a hospital or clinic but is not expected to stay the night. The term was originally used by psychiatric hospital services using of this patient type to care for people needing support to make the transition from in-patient to out-patient care. However, the term is now also heavily used for people attending hospitals for day surgery.

Alternative terminology

[edit]

Because of concerns such as dignity, human rights and political correctness, the term "patient" is not always used to refer to a person receiving health care. Other terms that are sometimes used include **health consumer**, **healthcare consumer**, **customer** or **client**. However, such terminology may be offensive to those receiving public health care, as it implies a business relationship.

In veterinary medicine, the **client** is the owner or guardian of the patient. These may be used by governmental agencies, insurance companies, patient groups, or health care facilities. Individuals who use or have used psychiatric services may alternatively refer to themselves as consumers, users, or survivors.

In nursing homes and assisted living facilities, the term **resident** is generally used in lieu of *patient*.[5] Similarly, those receiving home health care are called *clients*.

Patient-centered healthcare

[edit]
See also: Patient participation

The doctor–patient relationship has sometimes been characterized as silencing the voice of patients.[6] It is now widely agreed that putting patients at the centre of healthcare[7] by trying to provide a consistent, informative and respectful service to patients will improve both outcomes and patient satisfaction.[8]

When patients are not at the centre of healthcare, when institutional procedures and targets eclipse local concerns, then patient neglect is possible.[9] Incidents, such as the Stafford Hospital scandal, Winterbourne View hospital abuse scandal and the Veterans Health Administration controversy of 2014 have shown the dangers of prioritizing cost control over the patient experience.[10] Investigations into these and other scandals have recommended that healthcare systems put patient experience at the center, and especially that patients themselves are heard loud and clear within health services.[11]

There are many reasons for why health services should listen more to patients. Patients spend more time in healthcare services than regulators or quality controllers, and can recognize problems such as service delays, poor hygiene, and poor conduct.[12] Patients are particularly good at identifying soft problems, such as attitudes, communication, and 'caring neglect',[9] that are difficult to capture with institutional monitoring.[13]

One important way in which patients can be placed at the centre of healthcare is for health services to be more open about patient complaints.[14] Each year many hundreds of thousands of patients complain about the care they have received, and these complaints contain valuable information for any health services which want to learn about and improve patient experience.[15]

See also

[edit]

- Casualty
- e-Patient
- Mature minor doctrine
- Nurse-client relationship
- Patient abuse
- Patient advocacy
- Patient empowerment
- Patients' Bill of Rights
- Radiological protection of patients
- Therapeutic inertia
- Virtual patient
- Patient UK

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[edit]

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External links

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- "Time Magazine's Dr. Scott Haig Proves that Patients Need to Be Googlers!" – Mary Shomons response to the Time Magazine article "When the Patient is a Googler"

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Articles about hospitals

History of hospitals, Hospital network, Category:Hospitals

Common hospital components

- Accreditation
- Bed
- Coronary care unit
- Emergency department
- Emergency codes
- Hospital administrators
- Hospital information system
- Hospital medicine
- Hospital museum
- Hospitalist
- Intensive care unit
- Nocturnist
- On-call room
- Operating theater
- Orderly
- Patients
- Pharmacy
- Wards

Archaic forms	○ Almshouse ○ Asclepeion (Greece) ○ Bimaristan (Islamic) ○ Cottage hospital (England) ○ Hôtel-Dieu (France) ○ Valetudinaria (Roman) ○ Vaishya lying in houses (India) ○ Xenodochium (Middle Ages)
Geographic service area	○ Base hospital (Australia) ○ Community hospital ○ General hospital ○ Regional hospital or District hospital ○ Municipal hospital
Complexity of services	○ Day hospital ○ Secondary hospital ○ Tertiary referral hospital ○ Teaching hospital ○ Specialty hospital
Unique physical traits	○ Hospital ship ○ Hospital train ○ Mobile hospital ○ Underground hospital ○ Virtual Hospital
Limited class of patients	○ Military hospital ○ Combat support hospital ○ Field hospital ○ Prison hospital ○ Veterans medical facilities ○ Women's hospital

Funding

- Charitable hospital
- For-profit hospital
- Non-profit hospital
- State hospital
- Private hospital
- Public hospital
- Voluntary hospital
- Defunct

Condition treated

- Cancer
- Children's hospital
- Eye hospital
- Fever hospital
- Leper colony
- Lock hospital
- Maternity hospital
- Psychiatric hospital
- Rehabilitation hospital
- Trauma center
- Verterinary hospital

Century established

- 5th
- 6th
- 7th
- 8th
- 9th
- 10th
- 11th
- 12th
- 13th
- 14th
- 15th
- 16th
- 17th
- 18th
- 19th
- 20th
- 21st

Lists of hospitals in: Africa, Asia, Europe, North America, Oceania, South America

Authority control databases: National

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About dentistry

- Sub-Millimeter Surgical Dexterity
- Knowledge of human health, disease, pathology, and anatomy
- Communication/Interpersonal Skills
- Analytical Skills
- Critical Thinking
- Empathy/Professionalism

- Private practices
- Primary care clinics
- Hospitals

- Physician
- dental assistant
- dental technician
- dental hygienist
- various dental specialists

Dentistry

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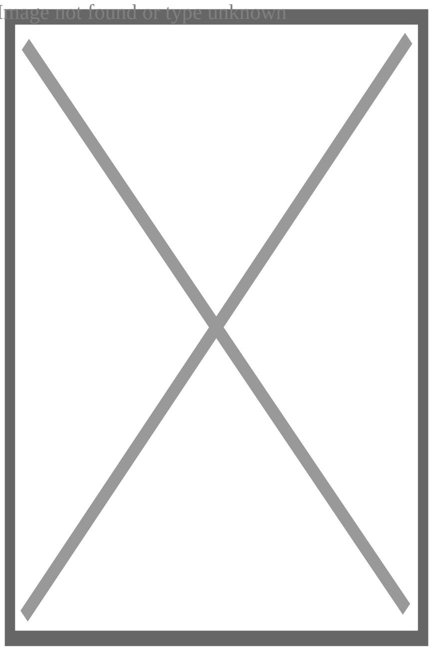

A dentist treats a patient with the help of a dental assistant.

Occupation

Names	○ Dentist ○ Dental Surgeon ○ Doctor [1][nb 1]
Occupation type	Profession
Activity sectors	Health care, Anatomy, Physiology, Pathology, Medicine, Pharmacology, Surgery

Description

Competencies	
Education required	Dental Degree
Fields of employment	
Related jobs	

ICD-9-CM	23-24
MeSH	D003813

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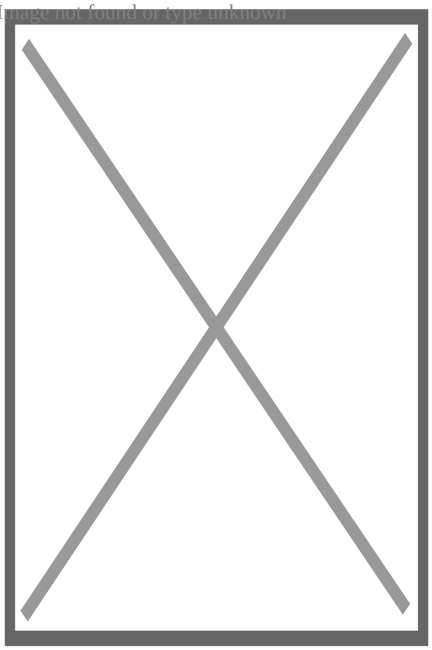


An oral surgeon and dental assistant removing a wisdom tooth

Dentistry, also known as **dental medicine** and **oral medicine**, is the branch of medicine focused on the teeth, gums, and mouth. It consists of the study, diagnosis, prevention, management, and treatment of diseases, disorders, and conditions of the mouth, most commonly focused on dentition (the development and arrangement of teeth) as well as the oral mucosa.[2] Dentistry may also encompass other aspects of the craniofacial complex including the temporomandibular joint. The practitioner is called a dentist.

The history of dentistry is almost as ancient as the history of humanity and civilization, with the earliest evidence dating from 7000 BC to 5500 BC.[3] Dentistry is thought to have been the first specialization in medicine which has gone on to develop its own accredited degree with its own specializations.[4] Dentistry is often also understood to subsume the now largely defunct medical specialty of stomatology (the study of the mouth and its disorders and diseases) for which reason the two terms are used interchangeably in certain regions. However, some specialties such as oral and maxillofacial surgery (facial reconstruction) may require both medical and dental degrees to accomplish. In European history, dentistry is considered to have stemmed from the trade of barber surgeons.[5]

Dental treatments are carried out by a dental team, which often consists of a dentist and dental auxiliaries (such as dental assistants, dental hygienists, dental technicians, and dental therapists). Most dentists either work in private practices (primary care), dental hospitals, or (secondary care) institutions (prisons, armed forces bases, etc.).

The modern movement of evidence-based dentistry calls for the use of high-quality scientific research and evidence to guide decision-making such as in manual tooth conservation, use of fluoride water treatment and fluoride toothpaste, dealing with oral diseases such as tooth decay and periodontitis, as well as systematic diseases such as osteoporosis, diabetes, celiac disease, cancer, and HIV/AIDS which could also affect the oral cavity. Other practices relevant to evidence-based dentistry include radiology of the mouth to inspect teeth deformity or oral malaises, haematology (study of blood) to avoid bleeding complications during dental surgery, cardiology (due to various severe complications arising from dental surgery with patients with heart disease), etc.

Terminology

[edit]

The term dentistry comes from *dentist*, which comes from French *dentiste*, which comes from the French and Latin words for tooth.[6] The term for the associated scientific study of teeth is **odontology** (from Ancient Greek: Ã¡Â½â‚¬??Ã•Â•?, romanized: *odoús*, lit. 'tooth') – the study of the structure, development, and abnormalities of the teeth.

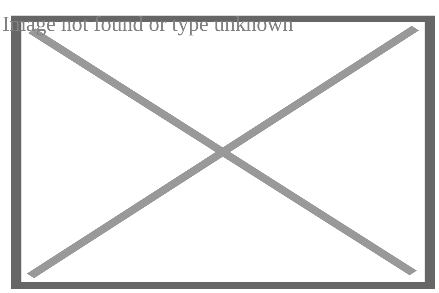
Dental treatment

[edit]

Dentistry usually encompasses practices related to the oral cavity.[7] According to the World Health Organization, oral diseases are major public health problems due to their high incidence and prevalence across the globe, with the disadvantaged affected more than other socio-economic groups.[8]

The majority of dental treatments are carried out to prevent or treat the two most common oral diseases which are dental caries (tooth decay) and periodontal disease (gum disease or pyorrhea). Common treatments involve the restoration of teeth, extraction or surgical removal of teeth, scaling and root planing, endodontic root canal treatment, and cosmetic dentistry[9]

By nature of their general training, dentists, without specialization can carry out the majority of dental treatments such as restorative (fillings, crowns, bridges), prosthetic (dentures), endodontic (root canal) therapy, periodontal (gum) therapy, and extraction of teeth, as well as performing examinations, radiographs (x-rays), and diagnosis. Dentists can also prescribe medications used in the field such as antibiotics, sedatives, and any other drugs used in patient management. Depending on their licensing boards, general dentists may be required to complete additional training to perform sedation, dental implants, etc.

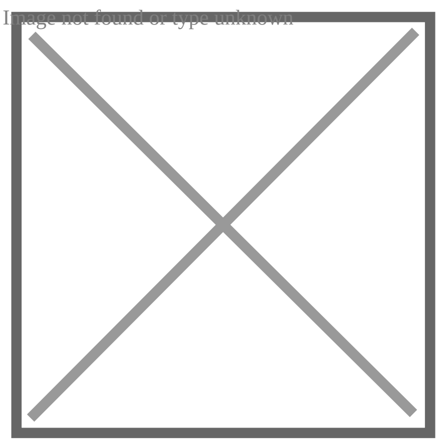


Irreversible enamel defects caused by an untreated celiac disease. They may be the only clue to its diagnosis, even in absence of gastrointestinal symptoms, but are often confused with fluorosis, tetracycline discoloration, acid reflux or other causes.[10][11][12] The National Institutes of Health include a dental exam in the diagnostic protocol of celiac disease.[10]

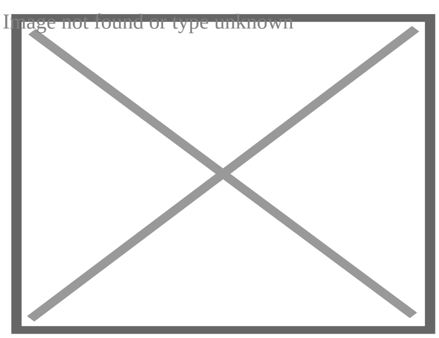
Dentists also encourage the prevention of oral diseases through proper hygiene and regular, twice or more yearly, checkups for professional cleaning and evaluation. Oral infections and inflammations may affect overall health and conditions in the oral cavity may be indicative of systemic diseases, such as osteoporosis, diabetes, celiac disease or cancer.[7][10][13][14] Many studies have also shown that gum disease is associated with an increased risk of diabetes, heart disease, and preterm birth. The concept that oral health can affect systemic health and disease is referred to as "oral-systemic health".

Education and licensing

[edit]
Main article: Dentistry throughout the world



A sagittal cross-section of a molar tooth; 1: crown, 2: root, 3: enamel, 4: dentin and dentin tubules, 5: pulp chamber, 6: blood vessels and nerve, 7: periodontal ligament, 8: apex and periapical region, 9: alveolar bone



Early dental chair in Pioneer West Museum in Shamrock, Texas

John M. Harris started the world's first dental school in Bainbridge, Ohio, and helped to establish dentistry as a health profession. It opened on 21 February 1828, and today is a dental museum.[15] The first dental college, Baltimore College of Dental Surgery, opened in

Baltimore, Maryland, US in 1840. The second in the United States was the Ohio College of Dental Surgery, established in Cincinnati, Ohio, in 1845.[16] The Philadelphia College of Dental Surgery followed in 1852.[17] In 1907, Temple University accepted a bid to incorporate the school.

Studies show that dentists that graduated from different countries,[18] or even from different dental schools in one country,[19] may make different clinical decisions for the same clinical condition. For example, dentists that graduated from Israeli dental schools may recommend the removal of asymptomatic impacted third molar (wisdom teeth) more often than dentists that graduated from Latin American or Eastern European dental schools.[20]

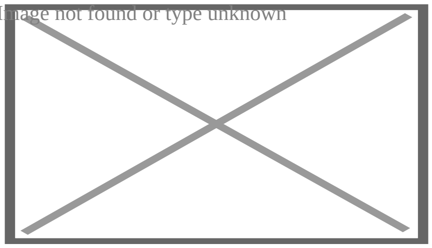
In the United Kingdom, the first dental schools, the London School of Dental Surgery and the Metropolitan School of Dental Science, both in London, opened in 1859.[21] The British Dentists Act of 1878 and the 1879 Dentists Register limited the title of "dentist" and "dental surgeon" to qualified and registered practitioners.[22][23] However, others could legally describe themselves as "dental experts" or "dental consultants".[24] The practice of dentistry in the United Kingdom became fully regulated with the 1921 Dentists Act, which required the registration of anyone practising dentistry.[25] The British Dental Association, formed in 1880 with Sir John Tomes as president, played a major role in prosecuting dentists practising illegally.[22] Dentists in the United Kingdom are now regulated by the General Dental Council.

In many countries, dentists usually complete between five and eight years of post-secondary education before practising. Though not mandatory, many dentists choose to complete an internship or residency focusing on specific aspects of dental care after they have received their dental degree. In a few countries, to become a qualified dentist one must usually complete at least four years of postgraduate study;[26] Dental degrees awarded around the world include the Doctor of Dental Surgery (DDS) and Doctor of Dental Medicine (DMD) in North America (US and Canada), and the Bachelor of Dental Surgery/Baccalaureus Dentalis Chirurgiae (BDS, BDent, BChD, BDSc) in the UK and current and former British Commonwealth countries.

All dentists in the United States undergo at least three years of undergraduate studies, but nearly all complete a bachelor's degree. This schooling is followed by four years of dental school to qualify as a "Doctor of Dental Surgery" (DDS) or "Doctor of Dental Medicine" (DMD). Specialization in dentistry is available in the fields of Anesthesiology, Dental Public Health, Endodontics, Oral Radiology, Oral and Maxillofacial Surgery, Oral Medicine, Orofacial Pain, Pathology, Orthodontics, Pediatric Dentistry (Pedodontics), Periodontics, and Prosthodontics.[27]

Specialties

[edit]
Main article: Specialty (dentistry)



A modern dental clinic in Lappeenranta, Finland

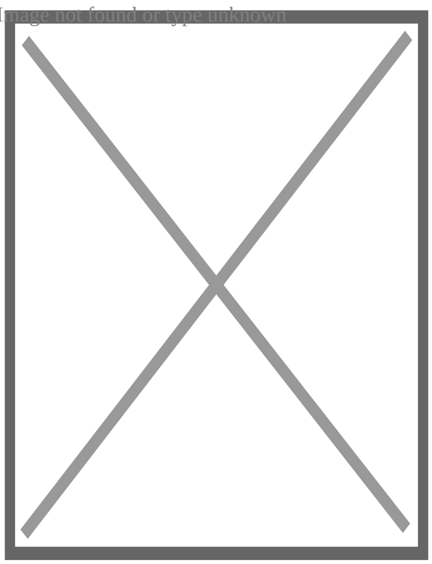
Some dentists undertake further training after their initial degree in order to specialize. Exactly which subjects are recognized by dental registration bodies varies according to location. Examples include:

- Anesthesiology[28] – The specialty of dentistry that deals with the advanced use of general anesthesia, sedation and pain management to facilitate dental procedures.
- Cosmetic dentistry – Focuses on improving the appearance of the mouth, teeth and smile.
- Dental public health – The study of epidemiology and social health policies relevant to oral health.
- Endodontics (also called *endodontology*) – Root canal therapy and study of diseases of the dental pulp and periapical tissues.
- Forensic odontology – The gathering and use of dental evidence in law. This may be performed by any dentist with experience or training in this field. The function of the forensic dentist is primarily documentation and verification of identity.
- Geriatric dentistry or *geriodontics* – The delivery of dental care to older adults involving the diagnosis, prevention, and treatment of problems associated with normal aging and age-related diseases as part of an interdisciplinary team with other health care professionals.
- Oral and maxillofacial pathology – The study, diagnosis, and sometimes the treatment of oral and maxillofacial related diseases.
- Oral and maxillofacial radiology – The study and radiologic interpretation of oral and maxillofacial diseases.
- Oral and maxillofacial surgery (also called *oral surgery*) – Extractions, implants, and surgery of the jaws, mouth and face.[nb 2]
- Oral biology – Research in dental and craniofacial biology
- Oral Implantology – The art and science of replacing extracted teeth with dental implants.
- Oral medicine – The clinical evaluation and diagnosis of oral mucosal diseases
- Orthodontics and dentofacial orthopedics – The straightening of teeth and modification of midface and mandibular growth.
- Pediatric dentistry (also called *pedodontics*) – Dentistry for children
- Periodontology (also called *periodontics*) – The study and treatment of diseases of the periodontium (non-surgical and surgical) as well as placement and maintenance of dental implants
- Prosthodontics (also called *prosthetic dentistry*) – Dentures, bridges and the restoration of implants.

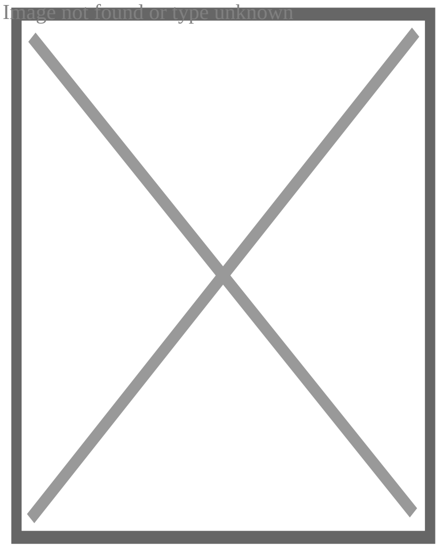
    - Some prosthodontists super-specialize in maxillofacial prosthetics, which is the discipline originally concerned with the rehabilitation of patients with congenital facial and oral defects such as cleft lip and palate or patients born with an underdeveloped ear (microtia). Today, most maxillofacial prosthodontists return function and esthetics to patients with acquired defects secondary to surgical removal of head and neck tumors, or secondary to trauma from war or motor vehicle accidents.
- Special needs dentistry (also called *special care dentistry*) – Dentistry for those with developmental and acquired disabilities.
- Sports dentistry – the branch of sports medicine dealing with prevention and treatment of dental injuries and oral diseases associated with sports and exercise.[29] The sports dentist works as an individual consultant or as a member of the Sports Medicine Team.
- Veterinary dentistry – The field of dentistry applied to the care of animals. It is a specialty of veterinary medicine.[30][31]

History

[edit]
See also: History of dental treatments



A wealthy patient falling over because of having a tooth extracted with such vigour by a fashionable dentist, c. 1790. History of Dentistry.



Farmer at the dentist, Johann Liss, c. 1616–17

Tooth decay was low in pre-agricultural societies, but the advent of farming society about 10,000 years ago correlated with an increase in tooth decay (cavities).[32] An infected tooth from Italy partially cleaned with flint tools, between 13,820 and 14,160 years old, represents the oldest known dentistry,[33] although a 2017 study suggests that 130,000 years ago the Neanderthals already used rudimentary dentistry tools.[34] In Italy evidence dated to the Paleolithic, around 13,000 years ago, points to bitumen used to fill a tooth[35] and in Neolithic Slovenia, 6500 years ago, beeswax was used to close a fracture in a tooth.[36] The Indus valley has yielded evidence of dentistry being practised as far back as 7000 BC, during the Stone Age.[37] The Neolithic site of Mehrgarh (now in Pakistan's south western province of Balochistan) indicates that this form of dentistry involved curing tooth related disorders with bow drills operated, perhaps, by skilled bead-crafters.[3] The reconstruction of this ancient form of dentistry showed that the methods used were reliable and effective.[38] The earliest dental filling, made of beeswax, was discovered in Slovenia and dates from 6500 years ago.[39] Dentistry was practised in prehistoric Malta, as evidenced by a skull which had a dental abscess lanced from the root of a tooth dating back to around 2500 BC.[40]

An ancient Sumerian text describes a "tooth worm" as the cause of dental caries.[41] Evidence of this belief has also been found in ancient India, Egypt, Japan, and China. The legend of the worm is also found in the *Homeric Hymns*,[42] and as late as the 14th century AD the surgeon Guy de Chauliac still promoted the belief that worms cause tooth decay.[43]

Recipes for the treatment of toothache, infections and loose teeth are spread throughout the Ebers Papyrus, Kahun Papyri, Brugsch Papyrus, and Hearst papyrus of Ancient Egypt.[44] The Edwin Smith Papyrus, written in the 17th century BC but which may reflect previous manuscripts from as early as 3000 BC, discusses the treatment of dislocated or fractured jaws.[44][45] In the 18th century BC, the Code of Hammurabi referenced dental extraction twice as it related to punishment.[46] Examination of the remains of some ancient Egyptians and Greco-Romans reveals early attempts at dental prosthetics.[47] However, it is possible the prosthetics were prepared after death for aesthetic reasons.[44]

Ancient Greek scholars Hippocrates and Aristotle wrote about dentistry, including the eruption pattern of teeth, treating decayed teeth and gum disease, extracting teeth with forceps, and using wires to stabilize loose teeth and fractured jaws.[48] Use of dental appliances, bridges and dentures was applied by the Etruscans in northern Italy, from as early as 700 BC, of human or other animal teeth fastened together with gold bands.[49][50][51] The Romans had likely borrowed this technique by the 5th century BC.[50][52] The Phoenicians crafted dentures during the 6th–4th century BC, fashioning them from gold wire and incorporating two ivory teeth.[53] In ancient Egypt, Hesy-Ra is the first named "dentist" (greatest of the teeth). The Egyptians bound replacement teeth together with gold wire. Roman medical writer Cornelius Celsus wrote extensively of oral diseases as well as dental treatments such as narcotic-containing emollients and astringents.[54] The earliest dental amalgams were first documented in a Tang dynasty medical text written by the Chinese physician Su Kung in 659, and appeared in Germany in 1528.[55][56]

During the Islamic Golden Age Dentistry was discussed in several famous books of medicine such as The Canon in medicine written by Avicenna and Al-Tasreef by Al-Zahrawi who is considered the greatest surgeon of the Middle Ages,[57] Avicenna said that jaw fracture should be reduced according to the occlusal guidance of the teeth; this principle is still valid in modern times. Al-Zahrawi invented over 200 surgical tools that resemble the modern kind.[58]

Historically, dental extractions have been used to treat a variety of illnesses. During the Middle Ages and throughout the 19th century, dentistry was not a profession in itself, and often dental procedures were performed by barbers or general physicians. Barbers usually limited their practice to extracting teeth which alleviated pain and associated chronic tooth infection. Instruments used for dental extractions date back several centuries. In the 14th century, Guy de Chauliac most probably invented the dental pelican[59] (resembling a pelican's beak) which was used to perform dental extractions up until the late 18th century. The pelican was replaced by the dental key[60] which, in turn, was replaced by modern forceps in the 19th century.[61]

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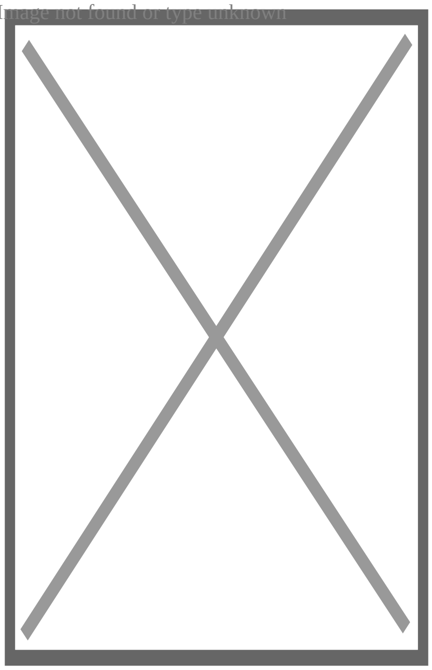

Dental needle-nose pliers designed by Fauchard in the late 17th century to use in prosthodontics

The first book focused solely on dentistry was the "Artzney Buchlein" in 1530,[48] and the first dental textbook written in English was called "Operator for the Teeth" by Charles Allen in 1685.[23]

In the United Kingdom, there was no formal qualification for the providers of dental treatment until 1859 and it was only in 1921 that the practice of dentistry was limited to those who were professionally qualified. The Royal Commission on the National Health Service in 1979 reported that there were then more than twice as many registered dentists per 10,000 population in the UK than there were in 1921.[62]

Modern dentistry

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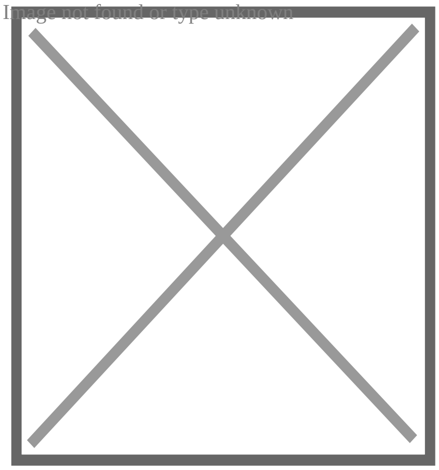
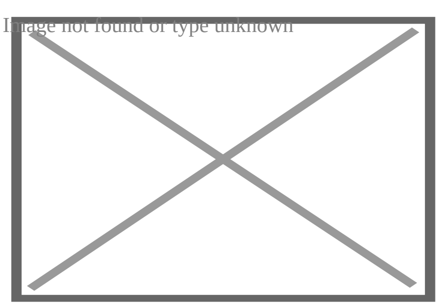


A microscopic device used in dental analysis, c. 1907

It was between 1650 and 1800 that the science of modern dentistry developed. The English physician Thomas Browne in his *A Letter to a Friend* (c. 1656 pub. 1690) made an early dental observation with characteristic humour:

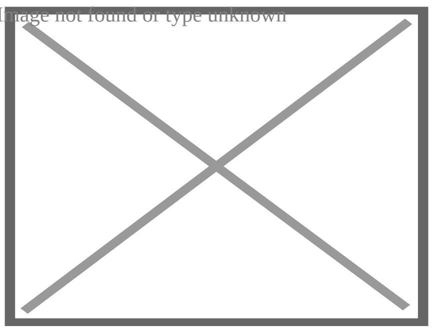
> The Egyptian Mummies that I have seen, have had their Mouths open, and somewhat gaping, which affordeth a good opportunity to view and observe their Teeth, wherein 'tis not easie to find any wanting or decayed: and therefore in Egypt, where one Man practised but one Operation, or the Diseases but of single Parts, it must needs be a barren Profession to confine unto that of drawing of Teeth, and little better than to have been Tooth-drawer unto King Pyrrhus, who had but two in his Head.

The French surgeon Pierre Fauchard became known as the "father of modern dentistry". Despite the limitations of the primitive surgical instruments during the late 17th and early 18th century, Fauchard was a highly skilled surgeon who made remarkable improvisations of dental instruments, often adapting tools from watchmakers, jewelers and even barbers, that he thought could be used in dentistry. He introduced dental fillings as treatment for dental cavities. He asserted that sugar-derived acids like tartaric acid were responsible for dental decay, and also suggested that tumors surrounding the teeth and in the gums could appear in the later stages of tooth decay.[[63]][[64]]



Panoramic radiograph of historic dental implants, made 1978

Fauchard was the pioneer of dental prosthesis, and he invented many methods to replace lost teeth. He suggested that substitutes could be made from carved blocks of ivory or bone. He also introduced dental braces, although they were initially made of gold, he discovered that the teeth position could be corrected as the teeth would follow the pattern of the wires. Waxed linen or silk threads were usually employed to fasten the braces. His contributions to the world of dental science consist primarily of his 1728 publication Le chirurgien dentiste or The Surgeon Dentist. The French text included "basic oral anatomy and function, dental construction, and various operative and restorative techniques, and effectively separated dentistry from the wider category of surgery".[63][64]



A modern dentist's chair

After Fauchard, the study of dentistry rapidly expanded. Two important books, *Natural History of Human Teeth* (1771) and *Practical Treatise on the Diseases of the Teeth* (1778), were published by British surgeon John Hunter. In 1763, he entered into a period of collaboration with the London-based dentist James Spence. He began to theorise about the possibility of tooth transplants from one person to another. He realised that the chances of a successful tooth transplant (initially, at least) would be improved if the donor tooth was as fresh as possible and was matched for size with the recipient. These principles are still used in the transplantation of internal organs. Hunter conducted a series of pioneering operations, in which he attempted a tooth transplant. Although the donated teeth never properly bonded with the recipients' gums, one of Hunter's patients stated that he had three which lasted for six years, a remarkable achievement for the period.[65]

Major advances in science were made in the 19th century, and dentistry evolved from a trade to a profession. The profession came under government regulation by the end of the 19th century. In the UK, the Dentist Act was passed in 1878 and the British Dental Association formed in 1879. In the same year, Francis Brodie Imlach was the first ever dentist to be elected President of the Royal College of Surgeons (Edinburgh), raising dentistry onto a par with clinical surgery for the first time.[66]

Hazards in modern dentistry

[edit]

Main article: Occupational hazards in dentistry

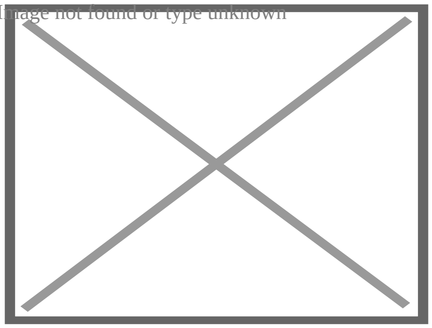
Long term occupational noise exposure can contribute to permanent hearing loss, which is referred to as noise-induced hearing loss (NIHL) and tinnitus. Noise exposure can cause excessive stimulation of the hearing mechanism, which damages the delicate structures of the inner ear.[67] NIHL can occur when an individual is exposed to sound levels above 90 dBA according to the Occupational Safety and Health Administration (OSHA). Regulations state that the permissible noise exposure levels for individuals is 90 dBA.[68] For the National Institute for Occupational Safety and Health (NIOSH), exposure limits are set to 85 dBA. Exposures below 85 dBA are not considered to be hazardous. Time limits are placed on how long an individual can stay in an environment above 85 dBA before it causes hearing loss. OSHA places that limitation at 8 hours for 85 dBA. The exposure time becomes shorter as the dBA level increases.

Within the field of dentistry, a variety of cleaning tools are used including piezoelectric and sonic scalers, and ultrasonic scalers and cleaners.[69] While a majority of the tools do not exceed 75 dBA,[70] prolonged exposure over many years can lead to hearing loss or complaints of tinnitus.[71] Few dentists have reported using personal hearing protective devices,[72][73] which could offset any potential hearing loss or tinnitus.

Evidence-based dentistry

[edit]
Main article: Evidence-based dentistry

There is a movement in modern dentistry to place a greater emphasis on high-quality scientific evidence in decision-making. Evidence-based dentistry (EBD) uses current scientific evidence to guide decisions. It is an approach to oral health that requires the application and examination of relevant scientific data related to the patient's oral and medical health. Along with the dentist's professional skill and expertise, EBD allows dentists to stay up to date on the latest procedures and patients to receive improved treatment. A new paradigm for medical education designed to incorporate current research into education and practice was developed to help practitioners provide the best care for their patients.[74] It was first introduced by Gordon Guyatt and the Evidence-Based Medicine Working Group at McMaster University in Ontario, Canada in the 1990s. It is part of the larger movement toward evidence-based medicine and other evidence-based practices, especially since a major part of dentistry involves dealing with oral and systemic diseases. Other issues relevant to the dental field in terms of evidence-based research and evidence-based practice include population oral health, dental clinical practice, tooth morphology etc.



A dental chair at the University of Michigan School of Dentistry

Ethical and medicolegal issues

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Dentistry is unique in that it requires dental students to have competence-based clinical skills that can only be acquired through supervised specialized laboratory training and direct patient care.[75] This necessitates the need for a scientific and professional basis of care with a foundation of extensive research-based education.[76] According to some experts, the accreditation of dental schools can enhance the quality and professionalism of dental education.[77][78]

See also

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- Dental aerosol
- Dental instrument
- Dental public health
- Domestic healthcare:
  - Dentistry in ancient Rome
  - Dentistry in Canada
  - Dentistry in the Philippines
  - Dentistry in Israel
  - Dentistry in the United Kingdom
  - Dentistry in the United States
- Eco-friendly dentistry
- Geriatric dentistry
- List of dental organizations
- Pediatric dentistry
- Sustainable dentistry
- Veterinary dentistry

Notes

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1. **^** Whether Dentists are referred to as "Doctor" is subject to geographic variation. For example, they are called "Doctor" in the US. In the UK, dentists have traditionally been referred to as "Mister" as they identified themselves with barber surgeons more than physicians (as do surgeons in the UK, see Surgeon#Titles). However more UK dentists now refer to themselves as "Doctor", although this was considered to be potentially misleading by the British public in a single report (see Costley and Fawcett 2010).
2. **^** The scope of oral and maxillofacial surgery is variable. In some countries, both a medical and dental degree is required for training, and the scope includes head and neck oncology and craniofacial deformity.

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Dentistry

Specialties	Endodontics Oral and maxillofacial pathology Oral and maxillofacial radiology Oral and maxillofacial surgery Orthodontics and dentofacial orthopedics Pediatric dentistry Periodontics Prosthodontics Dental public health Cosmetic dentistry Dental implantology Geriatric dentistry Restorative dentistry Forensic odontology Dental traumatology Holistic dentistry
Dental surgery	Dental extraction Tooth filling Root canal therapy Root end surgery Scaling and root planing Teeth cleaning Dental bonding Tooth polishing Tooth bleaching Socket preservation Dental implant

Organisations	○ American Association of Orthodontists ○ British Dental Association ○ British Dental Health Foundation ○ British Orthodontic Society ○ Canadian Association of Orthodontists ○ Dental Technologists Association ○ General Dental Council ○ Indian Dental Association ○ National Health Service
By country	○ Canada ○ Philippines ○ Israel ○ United Kingdom ○ United States
See also	○ Index of oral health and dental articles ○ Outline of dentistry and oral health ○ Dental fear ○ Dental instruments ○ Dental material ○ History of dental treatments ○ Ancient Rome ○ Infant oral mutilation ○ Mouth assessment ○ Oral hygiene

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Cleft lip and cleft palate

Related specialities	◦ Advance practice nursing ◦ Audiology ◦ Dentistry ◦ Dietetics ◦ Genetics ◦ Oral and maxillofacial surgery ◦ Orthodontics ◦ Orthodontic technology ◦ Otolaryngology ◦ Pediatrics ◦ Pediatric dentistry ◦ Physician ◦ Plastic surgery ◦ Psychiatry ◦ Psychology ◦ Respiratory therapy ◦ Social work ◦ Speech and language therapy
Related syndromes	◦ Hearing loss with craniofacial syndromes ◦ Pierre Robin syndrome ◦ Popliteal pterygium syndrome ◦ Van der Woude syndrome
National and international organisations	◦ Cleft Lip and Palate Association ◦ Craniofacial Society of Great Britain and Ireland ◦ Interplast ◦ North Thames Regional Cleft Lip and Palate Service ◦ Operation Smile ◦ Overseas Plastic Surgery Appeal ◦ Shriners Hospitals for Children ◦ Smile Train ◦ Transforming Faces Worldwide ◦ Smile Angel Foundation (China)

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Dental schools

American dental schools

- UAB
- Arizona
- Augusta (DCG)
- Boston U (Goldman)
- California (UCLA, UCSF)
- Case Western Reserve
- Colorado
- Columbia
- Connecticut
- Creighton
- Detroit Mercy
- East Carolina
- Florida
- Harvard
- Howard
- Illinois–Chicago
- Indiana
- Iowa
- Kentucky
- Lake Erie
- Loma Linda
- Louisville
- LSU Health–New Orleans
- Marquette
- Maryland–Baltimore
- Meharry
- Michigan
- Midwestern
- Minnesota
- Mississippi
- Missouri–Kansas City
- Nebraska–Medical Center
- Nevada–Las Vegas
- New England
- NYU
- SUNY (Buffalo, Stony Brook)
- North Carolina
- Nova
- Ohio State
- Oklahoma
- Oregon
- Pacific (Dugoni)

- Penn
- Pitt
- Puerto Rico
- Rochester
- Pacific Northwest

Defunct American dental schools	○ Emory ○ Fairleigh Dickinson ○ Georgetown ○ Harris ○ Loyola ○ Northwestern ○ Ohio College ○ Oral Roberts ○ Pennsylvania College ○ Wash U
Canadian dental schools	○ Alberta ○ British Columbia ○ Dalhousie ○ Laval ○ Manitoba ○ McGill ○ Montréal ○ Saskatchewan ○ Toronto ○ Western
British dental schools	○ Aberdeen ○ Barts and The London School of Medicine and Dentistry ○ Glasgow ○ Guy's, King's & St Thomas's ○ Liverpool ○ Newcastle ○ Peninsula College of Medicine and Dentistry ○ UCL Eastman Dental Institute
Australian and New Zealand dental schools	○ Sydney ○ Melbourne ○ Adelaide ○ Charles Sturt University ○ Griffith University ○ James Cook ○ La Trobe ○ Queensland ○ Western Australia ○ University of Otago

South Korean dental schools

- Chonbuk
- Chonnam
- Chosun
- Dankook
- Gangneung-Wonju
- Kyung Hee
- Kyungpook
- Pusan
- Seoul
- Wonkwang
- Yonsei

Medicine

Surgery	◦ Cardiac surgery
	◦ Cardiothoracic surgery
	◦ Endocrine surgery
	◦ Eye surgery
	◦ General surgery
	    ◦ Colorectal surgery
	    ◦ Digestive system surgery
	◦ Neurosurgery
	◦ Oral and maxillofacial surgery
	◦ Orthopedic surgery
	◦ Hand surgery
	◦ Otolaryngology
	    ◦ ENT
	◦ Pediatric surgery
	◦ Plastic surgery
	◦ Reproductive surgery
	◦ Surgical oncology
	◦ Transplant surgery
	◦ Trauma surgery
	◦ Urology
	    ◦ Andrology
	◦ Vascular surgery

Internal medicine	◦ Allergy / Immunology ◦ Angiology ◦ Cardiology ◦ Endocrinology ◦ Gastroenterology ◦ Hepatology ◦ Geriatrics ◦ Hematology ◦ Hospital medicine ◦ Infectious diseases ◦ Nephrology ◦ Oncology ◦ Pulmonology ◦ Rheumatology
Obstetrics and gynaecology	◦ Gynaecology ◦ Gynecologic oncology ◦ Maternal–fetal medicine ◦ Obstetrics ◦ Reproductive endocrinology and infertility ◦ Urogynecology

Medical education	○ Medical school ○ Bachelor of Medicine, Bachelor of Surgery ○ Bachelor of Medical Sciences ○ Master of Medicine ○ Master of Surgery ○ Doctor of Medicine ○ Doctor of Osteopathic Medicine ○ MD–PhD ○ Medical Scientist Training Program
Related topics	○ Alternative medicine ○ Allied health ○ Molecular oncology ○ Nanomedicine ○ Personalized medicine ○ Public health ○ Rural health ○ Therapy ○ Traditional medicine ○ Veterinary medicine ○ Physician ○ Chief physician ○ History of medicine

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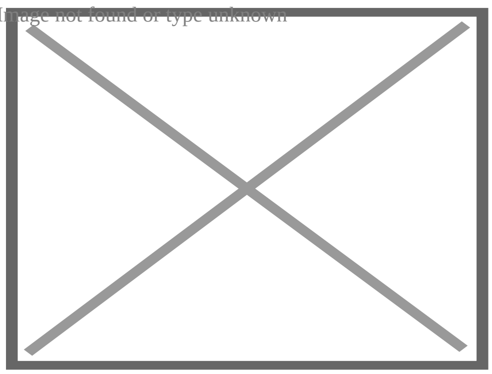
National	○ Germany ○ United States ○ France ○ BnF data ○ Czech Republic ○ Latvia ○ Israel

Other	○ Historical Dictionary of Switzerland ○ NARA

About orthodontics

Orthodontics



Connecting the arch-wire on brackets with wire

	Occupation
Names	Orthodontist
Occupation type	Specialty
Activity sectors	Dentistry
	Description
Education required	Dental degree, specialty training
Fields of employment	Private practices, hospitals

Orthodontics[a][b] is a dentistry specialty that addresses the diagnosis, prevention, management, and correction of mal-positioned teeth and jaws, as well as misaligned bite patterns.[2] It may also address the modification of facial growth, known as **dentofacial orthopedics**.

Abnormal alignment of the teeth and jaws is very common. The approximate worldwide prevalence of malocclusion was as high as 56%.[3] However, conclusive scientific evidence for the health benefits of orthodontic treatment is lacking, although patients with completed treatment have reported a higher quality of life than that of untreated patients undergoing orthodontic treatment.[4][5] The main reason for the prevalence of these malocclusions is diets with less fresh fruit and vegetables and overall softer foods in childhood, causing smaller jaws with less room for the teeth to erupt.[6] Treatment may require several months to a few years and entails using dental braces and other appliances to gradually adjust tooth position and jaw alignment. In cases where the malocclusion is severe, jaw surgery may be incorporated into the treatment plan. Treatment usually begins before a person reaches adulthood, insofar as pre-adult bones may be adjusted more easily before adulthood.

History

[edit]

Though it was rare until the Industrial Revolution,[7] there is evidence of the issue of overcrowded, irregular, and protruding teeth afflicting individuals. Evidence from Greek and Etruscan materials suggests that attempts to treat this disorder date back to 1000 BC, showcasing primitive yet impressively well-crafted orthodontic appliances. In the 18th and 19th centuries, a range of devices for the "regulation" of teeth were described by various dentistry authors who occasionally put them into practice.[8] As a modern science, orthodontics dates back to the mid-1800s.[9] The field's influential contributors include Norman William Kingsley[9] (1829–1913) and Edward Angle[10] (1855–1930). Angle created the first basic system for classifying malocclusions, a system that remains in use today.[9]

Beginning in the mid-1800s, Norman Kingsley published *Oral Deformities*, which is now credited as one of the first works to begin systematically documenting orthodontics. Being a major presence in American dentistry during the latter half of the 19th century, not only was Kingsley one of the early users of extraoral force to correct protruding teeth, but he was also one of the pioneers for treating cleft palates and associated issues. During the era of orthodontics under Kingsley and his colleagues, the treatment was focused on straightening teeth and creating facial harmony. Ignoring occlusal relationships, it was typical to remove teeth for a variety of dental issues, such as malalignment or overcrowding. The concept of an intact dentition was not widely appreciated in those days, making bite correlations seem irrelevant.[8]

In the late 1800s, the concept of occlusion was essential for creating reliable prosthetic replacement teeth. This idea was further refined and ultimately applied in various ways when dealing with healthy dental structures as well. As these concepts of prosthetic occlusion progressed, it became an invaluable tool for dentistry.[8]

It was in 1890 that the work and impact of Dr. Edwards H. Angle began to be felt, with his contribution to modern orthodontics particularly noteworthy. Initially focused on prosthodontics, he taught in Pennsylvania and Minnesota before directing his attention towards dental occlusion and the treatments needed to maintain it as a normal condition, thus becoming known as the "father of modern orthodontics".[8]

By the beginning of the 20th century, orthodontics had become more than just the straightening of crooked teeth. The concept of ideal occlusion, as postulated by Angle and incorporated into a classification system, enabled a shift towards treating malocclusion, which is any deviation from normal occlusion.[8] Having a full set of teeth on both arches was highly sought after in orthodontic treatment due to the need for exact relationships between them. Extraction as an orthodontic procedure was heavily opposed by Angle and those who followed him. As occlusion became the key priority, facial proportions and aesthetics were neglected. To achieve ideal occlusals without using external forces, Angle postulated that having perfect occlusion was the best way to gain optimum facial aesthetics.[8]

With the passing of time, it became quite evident that even an exceptional occlusion was not suitable when considered from an aesthetic point of view. Not only were there issues related to aesthetics, but it usually proved impossible to keep a precise occlusal relationship achieved by forcing teeth together over extended durations with the use of robust elastics, something Angle and his students had previously suggested. Charles Tweed[11] in America and Raymond Begg [12] in Australia (who both studied under Angle) re-introduced dentistry extraction into orthodontics during the 1940s and 1950s so they could improve facial esthetics while also ensuring better stability concerning occlusal relationships.[13]

In the postwar period, cephalometric radiography[14] started to be used by orthodontists for measuring changes in tooth and jaw position caused by growth and treatment.[15] The x-rays showed that many Class II and III malocclusions were due to improper jaw relations as opposed to misaligned teeth. It became evident that orthodontic therapy could adjust mandibular development, leading to the formation of functional jaw orthopedics in Europe and extraoral force measures in the US. These days, both functional appliances and extraoral devices are applied around the globe with the aim of amending growth patterns and forms. Consequently, pursuing true, or at least improved, jaw relationships had become the main objective of treatment by the mid-20th century.[8]

At the beginning of the twentieth century, orthodontics was in need of an upgrade. The American Journal of Orthodontics was created for this purpose in 1915; before it, there were no scientific objectives to follow, nor any precise classification system and brackets that lacked features.[16]

Until the mid-1970s, braces were made by wrapping metal around each tooth.[9] With advancements in adhesives, it became possible to instead bond metal brackets to the teeth.[9]

In 1972, Lawrence F. Andrews gave an insightful definition of the ideal occlusion in permanent teeth. This has had meaningful effects on orthodontic treatments that are administered regularly,[16] and these are: 1. Correct interarchal relationships 2. Correct crown angulation (tip) 3. Correct crown inclination (torque) 4. No rotations 5. Tight contact points 6. Flat Curve of Spee (0.0–2.5 mm),[17] and based on these principles, he discovered a treatment system called the straight-wire appliance system, or the pre-adjusted edgewise system. Introduced in 1976, Larry Andrews' pre-adjusted edgewise appliance, more commonly known as the straight wire appliance, has since revolutionized fixed orthodontic treatment. The advantage of the design lies in its bracket and archwire combination, which requires only minimal wire bending from the orthodontist or clinician. It's aptly named after this feature: the angle of the slot and thickness of the bracket base ultimately determine where each tooth is situated with little need for extra manipulation.[18][19][20]

Prior to the invention of a straight wire appliance, orthodontists were utilizing a non-programmed standard edgewise fixed appliance system, or Begg's pin and tube system. Both of these systems employed identical brackets for each tooth and necessitated the bending of an archwire in three planes for locating teeth in their desired positions, with these bends dictating ultimate placements.[18]

Evolution of the current orthodontic appliances

[edit]

When it comes to orthodontic appliances, they are divided into two types: removable and fixed. Removable appliances can be taken on and off by the patient as required. On the other hand, fixed appliances cannot be taken off as they remain bonded to the teeth during treatment.

Fixed appliances

[edit]

Fixed orthodontic appliances are predominantly derived from the edgewise appliance approach, which typically begins with round wires before transitioning to rectangular archwires for improving tooth alignment. These rectangluar wires promote precision in the positioning of teeth following initial treatment. In contrast to the Begg appliance, which was based solely on round wires and auxiliary springs, the Tip-Edge system emerged in the early 21st century. This innovative technology allowed for the utilization of rectangular archwires to precisely control tooth movement during the finishing stages after initial treatment with round wires. Thus, almost all modern fixed appliances can be considered variations on this edgewise appliance system.

Early 20th-century orthodontist Edward Angle made a major contribution to the world of dentistry. He created four distinct appliance systems that have been used as the basis for many orthodontic treatments today, barring a few exceptions. They are E-arch, pin and tube, ribbon arch, and edgewise systems.

E-arch

[edit]

Edward H. Angle made a significant contribution to the dental field when he released the 7th edition of his book in 1907, which outlined his theories and detailed his technique. This approach was founded upon the iconic "E-Arch" or 'the-arch' shape as well as inter-maxillary elastics.[21] This device was different from any other appliance of its period as it featured a rigid framework to which teeth could be tied effectively in order to recreate an arch form that followed pre-defined dimensions.[22] Molars were fitted with braces, and a powerful labial archwire was positioned around the arch. The wire ended in a thread, and to move it forward, an adjustable nut was used, which allowed for an increase in circumference. By ligation, each individual tooth was attached to this expansive archwire.[8]

Pin and tube appliance

[edit]

Due to its limited range of motion, Angle was unable to achieve precise tooth positioning with an E-arch. In order to bypass this issue, he started using bands on other teeth combined with a vertical tube for each individual tooth. These tubes held a soldered pin, which could be repositioned at each appointment in order to move them in place.[8] Dubbed the "bone-growing appliance", this contraption was theorized to encourage healthier bone growth due to its potential for transferring force directly to the roots.[23] However, implementing it proved troublesome in reality.

Ribbon arch

[edit]

Realizing that the pin and tube appliance was not easy to control, Angle developed a better option, the ribbon arch, which was much simpler to use. Most of its components were already prepared by the manufacturer, so it was significantly easier to manage than before. In order to attach the ribbon arch, the occlusal area of the bracket was opened. Brackets were only added to eight incisors and mandibular canines, as it would be impossible to insert the arch into both horizontal molar tubes and the vertical brackets of adjacent premolars. This lack of understanding posed a considerable challenge to dental professionals; they were unable to make corrections to an excessive Spee curve in bicuspid teeth.[24] Despite the complexity of the situation, it was necessary for practitioners to find a resolution. Unparalleled to its counterparts, what made the ribbon arch instantly popular was that its archwire had remarkable spring qualities and could be utilized to accurately align teeth that were misaligned. However, a major drawback of this device was its inability to effectively control root position since it did not have enough resilience to generate the torque movements required for setting roots in their new place.[8]

Edgewise appliance

[edit]

In an effort to rectify the issues with the ribbon arch, Angle shifted the orientation of its slot from vertical, instead making it horizontal. In addition, he swapped out the wire and replaced it with a precious metal wire that was rotated by 90 degrees in relation—henceforth known as Edgewise.[25] Following extensive trials, it was concluded that dimensions of 22 × 28 mils were optimal for obtaining excellent control over crown and root positioning across all three planes of space.[26] After debuting in 1928, this appliance quickly became one of the mainstays for multibanded fixed therapy, although ribbon arches continued to be utilized for another decade or so beyond this point too.[8]

Labiolingual

[edit]

Prior to Angle, the idea of fitting attachments on individual teeth had not been thought of, and in his lifetime, his concern for precisely positioning each tooth was not highly appraised. In addition to using fingersprings for repositioning teeth with a range of removable devices, two main appliance systems were very popular in the early part of the 20th century. Labiolingual appliances use bands on the first molars joined with heavy lingual and labial archwires affixed with soldered fingersprings to shift single teeth.

Twin wire

[edit]

Utilizing bands around both incisors and molars, a twin-wire appliance was designed to provide alignment between these teeth. Constructed with two 10-mil steel archwires, its delicate features were safeguarded by lengthy tubes stretching from molars towards canines. Despite its efforts, it had limited capacity for movement without further modifications, rendering it obsolete in modern orthodontic practice.

Begg's Appliance

[edit]

Returning to Australia in the 1920s, the renowned orthodontist, Raymond Begg, applied his knowledge of ribbon arch appliances, which he had learned from the Angle School. On top of this, Begg recognized that extracting teeth was sometimes vital for successful outcomes and sought to modify the ribbon arch appliance to provide more control when dealing with root positioning. In the late 1930s, Begg developed his adaptation of the appliance, which took three forms. Firstly, a high-strength 16-mil round stainless steel wire replaced the original precious metal ribbon arch. Secondly, he kept the same ribbon arch bracket but inverted it so that it pointed toward the gums instead of away from them. Lastly, auxiliary springs were added to control root movement. This resulted in what would come to be known as the Begg Appliance. With this design, friction was decreased since contact between wire and bracket was minimal, and binding was minimized due to tipping and uprighting being used for anchorage control, which lessened contact angles between wires and corners of the bracket.

Tip-Edge System

[edit]

Begg's influence is still seen in modern appliances, such as Tip-Edge brackets. This type of bracket incorporates a rectangular slot cutaway on one side to allow for crown tipping with no incisal deflection of an archwire, allowing teeth to be tipped during space closure and then uprighted through auxiliary springs or even a rectangular wire for torque purposes in finishing. At the initial stages of treatment, small-diameter steel archwires should be used when working with Tip-Edge brackets.

Contemporary edgewise systems

[edit]

Throughout time, there has been a shift in which appliances are favored by dentists. In particular, during the 1960s, when it was introduced, the Begg appliance gained wide popularity due to its efficiency compared to edgewise appliances of that era; it could produce the same results with less investment on the dentist's part. Nevertheless, since then, there have been advances in technology and sophistication in edgewise appliances, which led to the opposite conclusion: nowadays, edgewise appliances are more efficient than the Begg appliance, thus explaining why it is commonly used.

Automatic rotational control

[edit]

At the beginning, Angle attached eyelets to the edges of archwires so that they could be held with ligatures and help manage rotations. Now, however, no extra ligature is needed due to either twin brackets or single brackets that have added wings touching underneath the wire (Lewis or Lang brackets). Both types of brackets simplify the process of obtaining moments that control movements along a particular plane of space.

Alteration in bracket slot dimensions

[edit]

In modern dentistry, two types of edgewise appliances exist: the 18- and 22-slot varieties. While these appliances are used differently, the introduction of a 20-slot device with more precise features has been considered but not pursued yet.[27]

Straight-wire bracket prescriptions

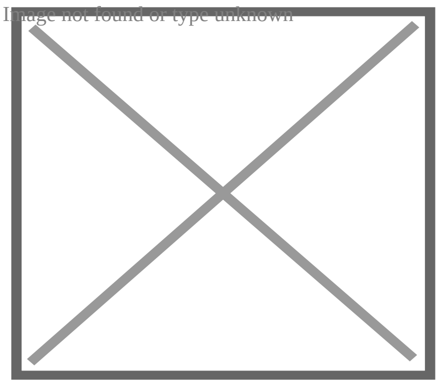
[edit]

Rather than rely on the same bracket for all teeth, L.F. Andrews found a way to make different brackets for each tooth in the 1980s, thanks to the increased convenience of bonding.[28] This adjustment enabled him to avoid having multiple bends in archwires that would have been needed to make up for variations in tooth anatomy. Ultimately, this led to what was termed a "straight-wire appliance" system – an edgewise appliance that greatly enhanced its efficiency.[29] The modern edgewise appliance has slightly different construction than the original one. Instead of relying on faciolingual bends to accommodate variations among teeth, each bracket has a correspondingly varying base thickness depending on the tooth it is intended for. However, due to individual differences between teeth, this does not completely eliminate the need for compensating bends.[30] Accurately placing the roots of many teeth requires angling brackets in relation to the long axis of the tooth. Traditionally, this mesiodistal root positioning necessitated using second-order, or tip, bends along the archwire. However, angling the bracket or bracket slot eliminates this need for bends.

Given the discrepancies in inclination of facial surfaces across individual teeth, placing a twist, otherwise known as third-order or torque bends, into segments of each rectangular archwire was initially required with the edgewise appliance. These bends were necessary for all patients and wires, not just to avoid any unintentional movement of suitably placed teeth or when moving roots facially or lingually. Angulation of either brackets or slots can minimize the need for second-order or tip bends on archwires. Contemporary edgewise appliances come with brackets designed to adjust for any facial inclinations, thereby eliminating or reducing any third-order bends. These brackets already have angulation and torque values built in so that each rectangluar archwire can be contorted to form a custom fit without inadvertently shifting any correctly positioned teeth. Without bracket angulation and torque, second-order or tip bends would still be required on each patient's archwire.

Methods

[edit]



Upper and lower jaw functional expanders

A typical treatment for incorrectly positioned teeth (malocclusion) takes from one to two years, with braces being adjusted every four to 10 weeks by orthodontists,[31] while university-trained dental specialists are versed in the prevention, diagnosis, and treatment of dental and facial irregularities. Orthodontists offer a wide range of treatment options to straighten crooked teeth, fix irregular bites, and align the jaws correctly.[32] There are many ways to adjust malocclusion. In growing patients, there are more options to treat skeletal discrepancies, either by promoting or restricting growth using functional appliances, orthodontic headgear, or a reverse pull facemask. Most orthodontic work begins in the early permanent dentition stage before skeletal growth is completed. If skeletal growth has completed, jaw surgery is an option. Sometimes teeth are extracted to aid the orthodontic treatment (teeth are extracted in about half of all the cases, most commonly the premolars).[33]

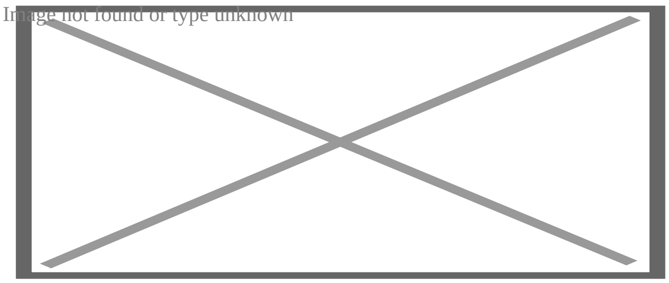
Orthodontic therapy may include the use of fixed or removable appliances. Most orthodontic therapy is delivered using appliances that are fixed in place,[34] for example, braces that are adhesively bonded to the teeth. Fixed appliances may provide greater mechanical control of the teeth; optimal treatment outcomes are improved by using fixed appliances.

Fixed appliances may be used, for example, to rotate teeth if they do not fit the arch shape of the other teeth in the mouth, to adjust multiple teeth to different places, to change the tooth angle of teeth, or to change the position of a tooth's root. This treatment course is not preferred where a patient has poor oral hygiene, as decalcification, tooth decay, or other complications may result. If a patient is unmotivated (insofar as treatment takes several months and requires commitment to oral hygiene), or if malocclusions are mild.

The biology of tooth movement and how advances in gene therapy and molecular biology technology may shape the future of orthodontic treatment.[35]

Braces

[edit]



Dental braces

Braces are usually placed on the front side of the teeth, but they may also be placed on the side facing the tongue (called lingual braces). Brackets made out of stainless steel or porcelain are bonded to the center of the teeth using an adhesive. Wires are placed in a slot in the brackets, which allows for controlled movement in all three dimensions.

Apart from wires, forces can be applied using elastic bands,[36] and springs may be used to push teeth apart or to close a gap. Several teeth may be tied together with ligatures, and different kinds of hooks can be placed to allow for connecting an elastic band.[37][36]

Clear aligners are an alternative to braces, but insufficient evidence exists to determine their effectiveness.[38]

Treatment duration

[edit]

The time required for braces varies from person to person as it depends on the severity of the problem, the amount of room available, the distance the teeth must travel, the health of the teeth, gums, and supporting bone, and how closely the patient follows instructions. On average, however, once the braces are put on, they usually remain in place for one to three years. After braces are removed, most patients will need to wear a retainer all the time for the first six months, then only during sleep for many years.[39]

Headgear

[edit]

Orthodontic headgear, sometimes referred to as an "extra-oral appliance", is a treatment approach that requires the patient to have a device strapped onto their head to help correct malocclusion—typically used when the teeth do not align properly. Headgear is most often used along with braces or other orthodontic appliances. While braces correct the position of teeth, orthodontic headgear—which, as the name suggests, is worn on or strapped onto the patient's head—is most often added to orthodontic treatment to help alter the alignment of the jaw, although there are some situations in which such an appliance can help move teeth, particularly molars.

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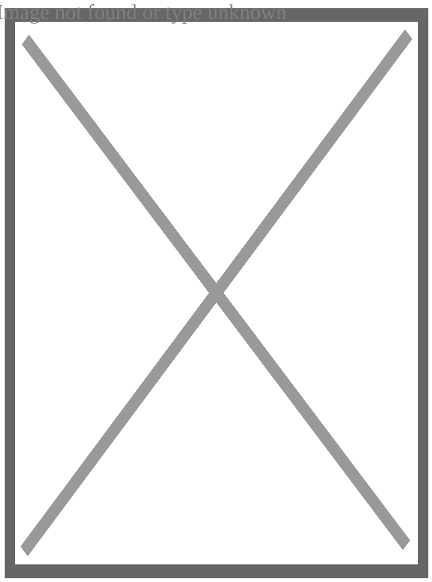

Full orthodontic headgear with headcap, fitting straps, facebow, and elastics

Whatever the purpose, orthodontic headgear works by exerting tension on the braces via hooks, a facebow, coils, elastic bands, metal orthodontic bands, and other attachable appliances directly into the patient's mouth. It is most effective for children and teenagers because their jaws are still developing and can be easily manipulated. (If an adult is fitted with headgear, it is usually to help correct the position of teeth that have shifted after other teeth have been extracted.) Thus, headgear is typically used to treat a number of jaw alignment or bite problems, such as overbite and underbite.[40]

Palatal expansion

[edit]

Palatal expansion can be best achieved using a fixed tissue-borne appliance. Removable appliances can push teeth outward but are less effective at maxillary sutural expansion. The effects of a removable expander may look the same as they push teeth outward, but they should not be confused with actually expanding the palate. Proper palate expansion can create more space for teeth as well as improve both oral and nasal airflow.[41]

Jaw surgery

[edit]

Jaw surgery may be required to fix severe malocclusions.[42] The bone is broken during surgery and stabilized with titanium (or bioresorbable) plates and screws to allow for healing to take place.[43] After surgery, regular orthodontic treatment is used to move the teeth into their final position.[44]

During treatment

[edit]

To reduce pain during the orthodontic treatment, low-level laser therapy (LLLT), vibratory devices, chewing adjuncts, brainwave music, or cognitive behavioral therapy can be used. However, the supporting evidence is of low quality, and the results are inconclusive.[45]

Post treatment

[edit]

After orthodontic treatment has been completed, there is a tendency for teeth to return, or relapse, back to their pre-treatment positions. Over 50% of patients have some reversion to pre-treatment positions within 10 years following treatment.[46] To prevent relapse, the majority of patients will be offered a retainer once treatment has been completed and will benefit from wearing their retainers. Retainers can be either fixed or removable.

Removable retainers

[edit]

Removable retainers are made from clear plastic, and they are custom-fitted for the patient's mouth. It has a tight fit and holds all of the teeth in position. There are many types of brands for clear retainers, including Zendura Retainer, Essix Retainer, and Vivera Retainer.[47] A Hawley retainer is also a removable orthodontic appliance made from a combination of plastic and metal that is custom-molded to fit the patient's mouth. Removable retainers will be worn for different periods of time, depending on the patient's need to stabilize the dentition.[48]

Fixed retainers

[edit]

Fixed retainers are a simple wire fixed to the tongue-facing part of the incisors using dental adhesive and can be specifically useful to prevent rotation in incisors. Other types of fixed retainers can include labial or lingual braces, with brackets fixed to the teeth.[48]

Palatal expander

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  Palatal expander

Orthodontic headgear

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  Orthodontic headgear

An X-ray taken for skull analysis

○

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An X-ray taken for skull analysis
Top (left) and bottom retainers

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Top (left) and bottom retainers

Clear aligners

[edit]

Clear aligners are another form of orthodontics commonly used today, involving removable plastic trays. There has been controversy about the effectiveness of aligners such as Invisalign or Byte; some consider them to be faster and more freeing than the alternatives.[49]

Training

[edit]

There are several specialty areas in dentistry, but the specialty of orthodontics was the first to be recognized within dentistry.[50] Specifically, the American Dental Association recognized orthodontics as a specialty in the 1950s.[50] Each country has its own system for training and registering orthodontic specialists.

Australia

[edit]

In Australia, to obtain an accredited three-year full-time university degree in orthodontics, one will need to be a qualified dentist (complete an AHPRA-registered general dental degree) with a minimum of two years of clinical experience. There are several universities in Australia that offer orthodontic programs: the University of Adelaide, the University of Melbourne, the University of Sydney, the University of Queensland, the University of Western Australia, and the University of Otago.[51] Orthodontic courses are accredited by the Australian Dental Council and reviewed by the Australian Society of Orthodontists (ASO). Prospective applicants should obtain information from the relevant institution before applying for admission.[52] After completing a degree in orthodontics, specialists are required to be registered with the Australian Health Practitioner Regulation Agency (AHPRA) in order to practice.[53][54]

Bangladesh

[edit]

Dhaka Dental College in Bangladesh is one of the many schools recognized by the Bangladesh Medical and Dental Council (BM&DC) that offer post-graduation orthodontic courses.[55][56] Before applying to any post-graduation training courses, an applicant must have completed the Bachelor of Dental Surgery (BDS) examination from any dental college.[55] After application, the applicant must take an admissions test held by the specific college.[55] If successful, selected candidates undergo training for six months.[57]

Canada

[edit]

In Canada, obtaining a dental degree, such as a Doctor of Dental Surgery (DDS) or Doctor of Medical Dentistry (DMD), would be required before being accepted by a school for orthodontic training.[58] Currently, there are 10 schools in the country offering the orthodontic specialty.[58] Candidates should contact the individual school directly to obtain the most recent pre-requisites before entry.[58] The Canadian Dental Association expects orthodontists to complete at least two years of post-doctoral, specialty training in orthodontics in an accredited program after graduating from their dental degree.

United States

[edit]

Similar to Canada, there are several colleges and universities in the United States that offer orthodontic programs. Every school has a different enrollment process, but every applicant is required to have graduated with a DDS or DMD from an accredited dental school.[59][60] Entrance into an accredited orthodontics program is extremely competitive and begins by passing a national or state licensing exam.[61]

The program generally lasts for two to three years, and by the final year, graduates are required to complete the written American Board of Orthodontics (ABO) exam.[61] This exam is also broken down into two components: a written exam and a clinical exam.[61] The written exam is a comprehensive exam that tests for the applicant's knowledge of basic sciences and clinical concepts.[61] The clinical exam, however, consists of a Board Case Oral Examination (BCOE), a Case Report Examination (CRE), and a Case Report Oral Examination (CROE).[61] Once certified, certification must then be renewed every ten years.[61] Orthodontic programs can award a Master of Science degree, a Doctor of Science degree, or a Doctor of Philosophy degree, depending on the school and individual research requirements.[62]

United Kingdom

[edit]

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Throughout the United Kingdom, there are several Orthodontic Specialty Training Registrar posts available.[63] The program is full-time for three years, and upon completion, trainees graduate with a degree at the Masters or Doctorate level.[63] Training may take place within hospital departments that are linked to recognized dental schools.[63] Obtaining a Certificate of Completion of Specialty Training (CCST) allows an orthodontic specialist to be registered under the General Dental Council (GDC).[63] An orthodontic specialist can provide care within a primary care setting, but to work at a hospital as an orthodontic consultant, higher-level training is further required as a post-CCST trainee.[63] To work within a university setting as an academic consultant, completing research toward obtaining a Ph.D. is also required.[63]

See also

[edit]

- Orthodontic technology
- Orthodontic indices
- List of orthodontic functional appliances
- Molar distalization
- Mouth breathing
- Obligate nasal breathing

Notes

[edit]

1. **^** Also referred to as *orthodontia*
2. **^** "Orthodontics" comes from the Greek *orthos* ('correct, straight') and *-odont-* ('tooth').[1]

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Orthodontics

Diagnosis	○ Bolton analysis ○ Cephalometric analysis ○ Cephalometry ○ Dentition analysis ○ Failure of eruption of teeth ○ Little's Irregularity Index ○ Malocclusion ○ Scissor bite ○ Standard anatomical position ○ Tooth ankylosis ○ Tongue thrust
Conditions	○ Overbite ○ Overjet ○ Open bite ○ Crossbite ○ Dental crowding ○ Dental spacing ○ Bimaxillary Protrusion ○ Prognathism ○ Retrognathism ○ Maxillary hypoplasia ○ Condylar hyperplasia ○ Overeruption ○ Mouth breathing ○ Temperomandibular dysfunction

Appliances	◦ ACCO appliance ◦ Archwire ◦ Activator appliance ◦ Braces ◦ Damon system ◦ Elastics ◦ Frankel appliance ◦ Invisalign ◦ Lingual arch ◦ Lip bumper ◦ Herbst Appliance ◦ List of orthodontic functional appliances ◦ List of palatal expanders ◦ Lingual braces ◦ Headgear ◦ Orthodontic technology ◦ Orthodontic spacer ◦ Palatal lift prosthesis ◦ Palatal expander ◦ Quad helix ◦ Retainer ◦ SureSmile ◦ Self-ligating braces ◦ Splint activator ◦ Twin Block Appliance
Procedures	◦ Anchorage (orthodontics) ◦ Cantilever mechanics ◦ Fiberotomy ◦ Interproximal reduction ◦ Intrusion (orthodontics) ◦ Molar distalization ◦ SARPE ◦ Serial extraction

Materials	○ Beta-titanium ○ Nickel titanium ○ Stainless steel ○ TiMolium ○ Elgiloy ○ Ceramic ○ Composite ○ Dental elastics

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- Edward Angle
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- Albin Oppenheim
- Herbert A. Pullen
- Earl W. Renfroe
- Robert M. Ricketts
- Alfred Paul Rogers
- Ronald Roth
- Everett Shapiro
- L. F. Andrews

Organizations

- American Association of Orthodontists
- American Board of Orthodontics
- British Orthodontic Society
- Canadian Association of Orthodontists
- Indian Orthodontic Society
- Italian Academy of Orthodontic Technology
- Society for Orthodontic Dental Technology (Germany)

Journals

- American Journal of Orthodontics and Dentofacial Orthopedics
- The Angle Orthodontist
- Journal of Orthodontics

Institution

- Angle School of Orthodontia

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Dentistry

Specialties

- Endodontics
- Oral and maxillofacial pathology
- Oral and maxillofacial radiology
- Oral and maxillofacial surgery
- Orthodontics and dentofacial orthopedics
- Pediatric dentistry
- Periodontics
- Prosthodontics
- Dental public health
- Cosmetic dentistry
- Dental implantology
- Geriatric dentistry
- Restorative dentistry
- Forensic odontology
- Dental traumatology
- Holistic dentistry

Dental surgery	◦ Dental extraction ◦ Tooth filling ◦ Root canal therapy ◦ Root end surgery ◦ Scaling and root planing ◦ Teeth cleaning ◦ Dental bonding ◦ Tooth polishing ◦ Tooth bleaching ◦ Socket preservation ◦ Dental implant
Organisations	◦ American Association of Orthodontists ◦ British Dental Association ◦ British Dental Health Foundation ◦ British Orthodontic Society ◦ Canadian Association of Orthodontists ◦ Dental Technologists Association ◦ General Dental Council ◦ Indian Dental Association ◦ National Health Service
By country	◦ Canada ◦ Philippines ◦ Israel ◦ United Kingdom ◦ United States
See also	◦ Index of oral health and dental articles ◦ Outline of dentistry and oral health ◦ Dental fear ◦ Dental instruments ◦ Dental material ◦ History of dental treatments ◦ Ancient Rome ◦ Infant oral mutilation ◦ Mouth assessment ◦ Oral hygiene

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Cleft lip and cleft palate

Related specialities	Advance practice nursing Audiology Dentistry Dietetics Genetics Oral and maxillofacial surgery Orthodontics Orthodontic technology Otolaryngology Pediatrics Pediatric dentistry Physician Plastic surgery Psychiatry Psychology Respiratory therapy Social work Speech and language therapy
Related syndromes	Hearing loss with craniofacial syndromes Pierre Robin syndrome Popliteal pterygium syndrome Van der Woude syndrome
National and international organisations	Cleft Lip and Palate Association Craniofacial Society of Great Britain and Ireland Interplast North Thames Regional Cleft Lip and Palate Service Operation Smile Overseas Plastic Surgery Appeal Shriners Hospitals for Children Smile Train Transforming Faces Worldwide Smile Angel Foundation (China)

- Germany
- United States

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