Accelerated Orthodontics

- **Innovative Approaches to Shorten Treatment Time**
  Innovative Approaches to Shorten Treatment Time The Role of Vibration Devices in Faster Tooth Movement Micro Osteoperforation and Its Effects on Treatment 3D Printing Techniques for Customized Appliances Benefits of Digital Impressions in Modern Orthodontics AI Assisted Treatment Planning for Precise Outcomes Remote Monitoring and Virtual Consultations Incorporating New Tools for Patient Compliance Practical Considerations of Accelerated Techniques Research Trends Shaping Future Orthodontic Practices Combining Traditional Methods With Cutting Edge Solutions Adapting to Technological Shifts in Orthodontic Care
- **Indications for Surgical Alignment of the Jaw**
  Indications for Surgical Alignment of the Jaw Steps in Preparing for Orthognathic Procedures Collaboration Between Orthodontists and Surgeons Recovery Factors That Affect Surgical Outcomes Managing Expectations During Corrective Jaw Treatment Potential Complications of Complex Jaw Adjustments Importance of Skeletal Analysis Before Surgery Combined Orthodontic and Surgical Treatment Timelines Role of Virtual Surgical Planning in Jaw Corrections Functional Improvements After Orthognathic Intervention Support and Care for Post Surgical Recovery Evaluating Long Term Benefits of Jaw Realignment
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Early Intervention with Invisalign First for Kids

In the field of modern orthodontics, digital impressions have revolutionized the way dental procedures are conducted, particularly in terms of patient comfort. One of the most significant advantages of digital impressions is their non-invasive nature, which eliminates the need for uncomfortable trays filled with putty. This traditional method often leads to discomfort, anxiety, and even gagging in some patients, especially children who may have sensitive gag reflexes.

Digital impressions, on the other hand, use advanced intraoral scanners to capture precise 3D images of a patient's teeth and gums. This process is not only quick but also remarkably comfortable, allowing patients to relax during the procedure. The handheld scanners used for digital impressions are slim and less intrusive, reducing the anxiety associated with traditional methods. This improvement in patient comfort is particularly beneficial for young patients or those with sensitive gag reflexes, as it makes the dental experience much more pleasant and stress-free.

Orthodontic check-ups help track the progress of tooth movement **Dental braces for children** tooth.

The enhanced comfort provided by digital impressions also leads to better patient compliance and satisfaction. Patients are more cooperative during the scanning process, which in turn helps orthodontists to obtain accurate and detailed images necessary for effective treatment planning. Moreover, the precision and accuracy of digital impressions ensure that orthodontic appliances fit perfectly, reducing the need for adjustments and remakes. This streamlined process not only benefits patients but also allows orthodontists to provide more efficient and effective care, transforming the overall patient experience in modern orthodontics.

In modern orthodontics, digital impressions have revolutionized the way treatment is structured and outcomes are optimized. One of the most significant benefits of digital impressions is their role in providing greater accuracy and precision. By using intraoral scanners, orthodontists can capture highly detailed three-dimensional models of a patient's teeth and gums. This technology allows for the precise mapping of dental contours, which is crucial for the design and fit of orthodontic appliances such as braces and clear aligners.

The accuracy provided by digital impressions is far more precise than traditional putty impressions. With traditional impressions, small flaws or bubbles in the putty could result in less accurate models, which could then prolong treatment or even cause delays. In addition, the precision offered by digital technology allows orthodontists to simulate treatment outcomes

and visualize tooth movements before the treatment begins. This not only enhances the effectiveness of the treatment but also helps in streamlines the workflow, reducing the need for adjustments and remakes.

Digital impressions also enhance patient comfort and efficiency. The process is less invasive and messy, as it involves no putty or metal trays, which can trigger gagging or discomfort. Moreover, digital models can be easily stored and shareable with dental specialists, ensuring that treatment planning is optimized and communication between health care specialists is more effective. This level of precision and accuracy in digital impressions is a significant step in modern orthodontic care, ensuring that appliances fit perfectly and treatment outcomes are more effective and efficient.

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One of the most significant benefits of digital impressions in modern orthodontics is the reduced need for re-takes. Traditional impression methods often involve using putty-like materials that can be prone to errors, such as air bubbles or distortions, leading to inaccurate models. This can result in ill-fitting orthodontic appliances, necessitating re-takes and extending the treatment timeline. In contrast, digital impressions use advanced scanning technology to create highly accurate 3D models of a patient's teeth and gums. This precision significantly reduces the likelihood of errors, allowing orthodontists to ensure the accuracy of the impressions in real-time.

For children, in particularly, the traditional impression process can be challenging due to discomfort and anxiety. The mess and unpleasant taste of the impression material often require multiple attempts, which can be frustrating for both the child and the orthodontist. Digital impressions eliminate these issues by providing a non-invasive and comfortable experience. The use of a small handheld scanner to capture images of the teeth and gums makes the process quick and hassle-free, reducing the need for re-takes and saving valuable time.

The efficiency of digital impressions not only improves the patient experience but also enhances the workflow in orthodontic practices. By minimizing the need for re-takes, digital impressions streamline the treatment process, allowing for faster turnaround times and more effective treatment outcomes. This streamlined process is particularly beneficial for children, as it reduces anxiety and makes the overall orthodontic journey more comfortable and efficient.

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.

In the fast-changing and technology-driven space of orthodontics, digital impressions have significantly enhanced patient care and treatment efficiency. One of the most substantial benefits of digital impressions is their ability to capture data with speed and precision. Unlike traditional impression molds, which require time to set and often result in messy and uncomfortable patient sessions, digital impressions can be taken in just a matter of minutes. This quick data capture allows orthodontists to immediately visualize and analyze the detailed 3D models of a patient's teeth, which are then shared with dental laboratories electronically.

The efficiency of digital impressions leads to faster turnaround times for treatment. Traditional dental labs often experience delays due to the need for physical impressions to be sent back and forth, which can lead to multiple sessions and longer waiting times for patients. In digital dental labs, this process is streamlined, allowing for the design and fabrication of restorations to begin immediately. This not only speeds up the treatment process but also means that patients can receive their prosthetic teeth or orthodontic appliances much faster, reducing the need for multiple clinic sessions.

Digital impressions also significantly improve patient satisfaction. The traditional method of using putty-like materials can be unpleasant and may even lead to gagging in some patients. In contrast, digital scanning is non-invasive and comfortable, providing a more positive experience for patients. Moreover, the accuracy of digital impressions helps in reducing errors and the need for redos, which can be a significant factor in patient satisfaction.

The use of digital impressions in orthodontics also allows for real-time adjustments and enhanced patient communication. Orthodontists can use these digital models to visually explain treatment plans to patients, making it easier for them to understand the proposed changes to their smiles. This improved communication and precision in treatment planning

lead to more efficient and stable treatment outcomes, ensuring that patients receive the best possible care.

In short, digital impressions have been a significant step in enhancing the efficiency and patient care in orthodontics. The ability to capture data with speed and precision, combined with the comfort and accuracy they offer, make them a preferred method over traditional impressions. As technology in dentistry and orthodontics progresses, it is clear that digital impressions will be at the very foundation of future treatment planning and patient care.

Myobrace: A No-Braces Approach

In the field of orthodontics, digital impressions have significantly enhanced collaboration between patients and orthodontists by providing a more comprehensive and informed treatment planning process. Unlike traditional impression methods, which involve messy materials and can be time-consuming, digital impressions offer a streamlined and comfortable experience for patients. This technology uses 3D scanning to create precise virtual models of the teeth, which can be easily shared with other oral health specialists.

The ability to digitally capture every contour and detail of a patient's teeth allows orthodontists to visualize tooth movements and assess bite relationships more accurately. This not only ensures that treatment plans are tailored to individual patient's specific dental conditions but also allows for real-time adjustments to these plans. The enhanced precision and accuracy of digital impressions enable orthodontists to engage patients more fully in their treatment process. Patients can be shown detailed digital models of their teeth and proposed changes, making it easier for them to understand and agree on treatment plans.

Digital impressions also promote better collaboration between orthodontists and other dental specialists. For instance, these digital models can be shared instantly with oral surgeons or dental labs, ensuring that all team members are on the same level of treatment planning. This integration of digital technology into orthodontic care not only enhances patient education but

also ensures that treatment outcomes are more precise and effective. In a digital workflow, the work of dentists and laboratory technicians is no longer separated, as they use the same digital solutions to design and manufacture dental products like aligners or appliances.

The efficiency and accuracy provided by digital impressions have transformed the way orthodontic treatment is planned and provided. Patients benefit from reduced chair time, enhanced comfort, and a more engaging treatment experience. As digital dentistry technologies become more standard, the future of orthodontic care is moving swiftly into a more streamlined, efficient, and patient-centered model.

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 modern orthodontics, digital impressions have revolutionized the way treatment plans are coordinated and shared among healthcare professionals. One of the significant benefits of digital impressions is their seamless integration into a comprehensive and well-informed collaboration between patients, orthodontists, and other oral health specialists. This enhanced collaboration is crucial for ensuring that treatment plans are not only effective but also tailored to meet the specific needs of each patient.

Digital impressions allow for the easy sharing of detailed 3D models of a patient's teeth and gums with specialists. This shared access enables orthodontists and other healthcare professionals to visualize and assess the patient's oral health from multiple perspectives, leading to more accurate diagnoses and treatment plans. Unlike traditional impressions, which are often physical and require physical transportation or storage, digital impressions can be instantly shared and updated, reducing the time and resources needed for communication and coordination.

Moreover, digital impressions facilitate real-time adjustments and updates to treatment plans. If a patient's needs or preferences require changes during the treatment process, these adjustments can be made quickly and accurately. This not only streamlines the treatment process but also ensures that all involved healthcare professionals are on the same page, reducing errors and improving patient outcomes.

For patients, this enhanced collaboration also leads to better engagement and education. Digital models can be used to visually explain treatment plans, making it easier for patients to understand their orthodontic journey and the expected outcomes. This transparency and involvement in the treatment process can lead to higher patient satisfaction and compliance with treatment recommendations.

Incorporating digital impressions into orthodontic care not only modernizes the field but also aligns with the overall aim of providing personalized and effective treatment. By ensuring that treatment plans are well-informed and comprehensive, digital impressions help create a more streamlined and patient-f

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Incorporating digital impressions into orthodontic care not only modern

Comprehensive Orthodontic Solutions

In the modern era of orthodontics, digital impressions have not only enhanced patient comfort and treatment accuracy but also offer significant environmental benefits. One of the most significant advantages of digital impressions is their eco-friendly impact. By reducing the use of physical materials, digital impressions contribute to a more environmentally-friendly practice. Traditional impressions require the use of putty-like materials, metal trays, and films, which can generate a significant amount of waste. This waste not only requires physical storage but also can end up in landfills, contributing to environmental pollution.

Digital impressions, on the other, use intraoral scanning technology to capture a three-dimensional image of the teeth and surrounding tissues. This process eliminates the need for any physical materials, reducing waste and the environmental footprint of dental practices. The digital models can be stored electronically, making them easily shareable and storable without the need for physical space. Additionally, digital impressions can be sent electronically to dental lab, reducing the time and resources required for transportation.

The environmental benefits of digital impressions align with the global concern for sustainability. By transitioning to digital impression taking, dental professionals can actively contribute to reducing their environmental impact and support a greener future. This not only benefits the environment but also aligns with the modern dental practice's need for precision, efficiency, and patient comfort. As technology in dentistry and orthodontics further advanced, the role of digital impressions will likely play an even more crucial role in providing eco-friendly and high-quality care.

About dental braces

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Dental braces

Dental braces (also known as **orthodontic braces**, or simply **braces**) are devices used in orthodontics that align and straighten teeth and help position them with regard to a person's bite, while also aiming to improve dental health. They are often used to correct underbites, as well as malocclusions, overbites, open bites, gaps, deep bites, cross bites, crooked teeth, and various other flaws of the teeth and jaw. Braces can be either cosmetic or structural. Dental braces are often used in conjunction with other orthodontic appliances to help widen the palate or jaws and to otherwise assist in shaping the teeth and jaws.

Process

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The application of braces moves the teeth as a result of force and pressure on the teeth. Traditionally, four basic elements are used: brackets, bonding material, arch wire, and ligature elastic (also called an "O-ring"). The teeth move when the arch wire puts pressure on the brackets and teeth. Sometimes springs or rubber bands are used to put more force in a specific direction.[1]

Braces apply constant pressure which, over time, moves teeth into the desired positions. The process loosens the tooth after which new bone grows to support the tooth in its new position. This is called bone remodelling. Bone remodelling is a biomechanical process responsible for making bones stronger in response to sustained load-bearing activity and weaker in the absence of carrying a load. Bones are made of cells called osteoclasts and osteoblasts. Two different kinds of bone resorption are possible: direct resorption, which starts from the lining cells of the alveolar bone, and indirect or retrograde resorption, which occurs when the periodontal ligament has been subjected to an excessive amount and duration of compressive stress.[2] Another important factor associated with tooth movement is bone deposition. Bone deposition occurs in the distracted periodontal ligament. Without bone deposition, the tooth will loosen, and voids will occur distal to the direction of tooth movement.[3]

Types

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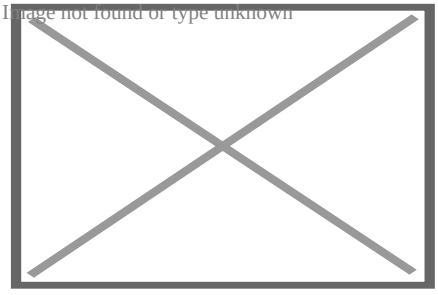

"Clear" braces

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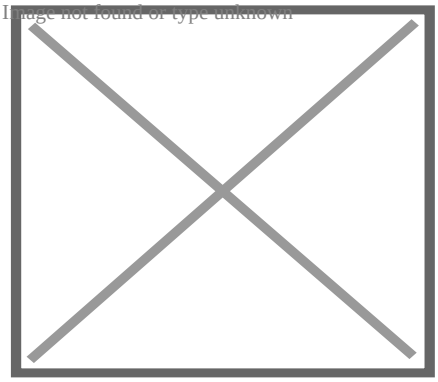

Upper and Lower Jaw Functional Expanders

- ***Traditional metal wired*** *braces* (also known as "train track braces") are stainless-steel and are sometimes used in combination with titanium. Traditional metal braces are the most common type of braces.[4] These braces have a metal bracket with elastic ties (also known as rubber bands) holding the wire onto the metal brackets. The second-most common type of braces is self-ligating braces, which have a built-in system to secure the archwire to the brackets and do not require elastic ties. Instead, the wire goes through the bracket. Often with this type of braces, treatment time is reduced, there is less pain on the teeth, and fewer adjustments are required than with traditional braces.
- ***Gold-plated stainless steel*** braces are often employed for patients allergic to nickel (a basic and important component of stainless steel), but may also be chosen for aesthetic reasons.
- ***Lingual*** *braces* are a cosmetic alternative in which custom-made braces are bonded to the back of the teeth making them externally invisible.
- ***Titanium*** *braces* resemble stainless-steel braces but are lighter and just as strong. People with allergies to nickel in steel often choose titanium braces, but they are more expensive than stainless steel braces.
- ***Customized orthodontic treatment systems*** combine high technology including 3-D imaging, treatment planning software and a robot to custom bend the wire. Customized systems such as this offer faster treatment times and more efficient results.[5]
- ***Progressive, clear removable aligners*** may be used to gradually move teeth into their final positions. Aligners are generally not used for complex orthodontic cases, such as when extractions, jaw surgery, or palate expansion are necessary.[*medical citation n*[6]

Fitting procedure

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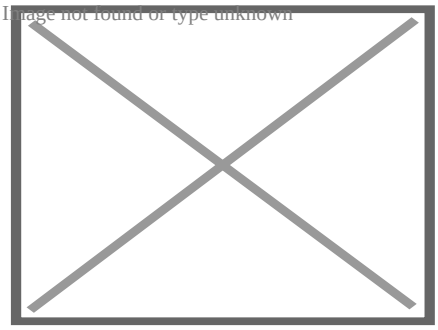


A patient's teeth are prepared for the application of braces.

Orthodontic services may be provided by any licensed dentist trained in orthodontics. In North America, most orthodontic treatment is done by orthodontists, who are dentists in the diagnosis and treatment of *malocclusions*—malalignments of the teeth, jaws, or both. A dentist must complete 2–3 years of additional post-doctoral training to earn a specialty certificate in orthodontics. There are many general practitioners who also provide orthodontic services.

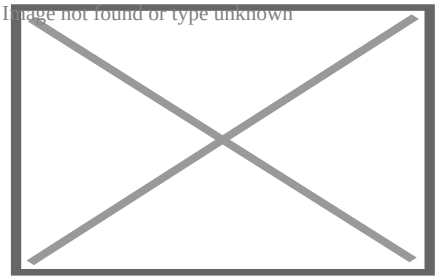
The first step is to determine whether braces are suitable for the patient. The doctor consults with the patient and inspects the teeth visually. If braces are appropriate, a records appointment is set up where X-rays, moulds, and impressions are made. These records are analyzed to determine the problems and the proper course of action. The use of digital models is rapidly increasing in the orthodontic industry. Digital treatment starts with the creation of a three-dimensional digital model of the patient's arches. This model is produced by laser-scanning plaster models created using dental impressions. Computer-automated treatment simulation has the ability to automatically separate the gums and teeth from one another and can handle malocclusions well; this software enables clinicians to ensure, in a virtual setting, that the selected treatment will produce the optimal outcome, with minimal user input.[*medical citation needed*]

Typical treatment times vary from six months to two and a half years depending on the complexity and types of problems. Orthognathic surgery may be required in extreme cases. About 2 weeks before the braces are applied, orthodontic spacers may be required to spread apart back teeth in order to create enough space for the bands.

Teeth to be braced will have an adhesive applied to help the cement bond to the surface of the tooth. In most cases, the teeth will be banded and then brackets will be added. A bracket will be applied with dental cement, and then cured with light until hardened. This process usually takes a few seconds per tooth. If required, orthodontic spacers may be inserted between the molars to make room for molar bands to be placed at a later date. Molar bands are required to ensure brackets will stick. Bands are also utilized when dental fillings or other dental works make securing a bracket to a tooth infeasible. Orthodontic tubes (stainless steel tubes that allow wires to pass through them), also known as molar tubes, are directly bonded to molar teeth either by a chemical curing or a light curing adhesive. Usually, molar tubes are directly welded to bands, which is a metal ring that fits onto the molar tooth. Directly bonded molar tubes are associated with a higher failure rate

when compared to molar bands cemented with glass ionomer cement. Failure of orthodontic brackets, bonded tubes or bands will increase the overall treatment time for the patient. There is evidence suggesting that there is less enamel decalcification associated with molar bands cemented with glass ionomer cement compared with orthodontic tubes directly cemented to molars using a light cured adhesive. Further evidence is needed to withdraw a more robust conclusion due to limited data.[7]

An archwire will be threaded between the brackets and affixed with elastic or metal ligatures. Ligatures are available in a wide variety of colours, and the patient can choose which colour they like. Arch wires are bent, shaped, and tightened frequently to achieve the desired results.



Dental braces, with a transparent power chain, removed after completion of treatment.

Modern orthodontics makes frequent use of nickel-titanium archwires and temperature-sensitive materials. When cold, the archwire is limp and flexible, easily threaded between brackets of any configuration. Once heated to body temperature, the arch wire will stiffen and seek to retain its shape, creating constant light force on the teeth.

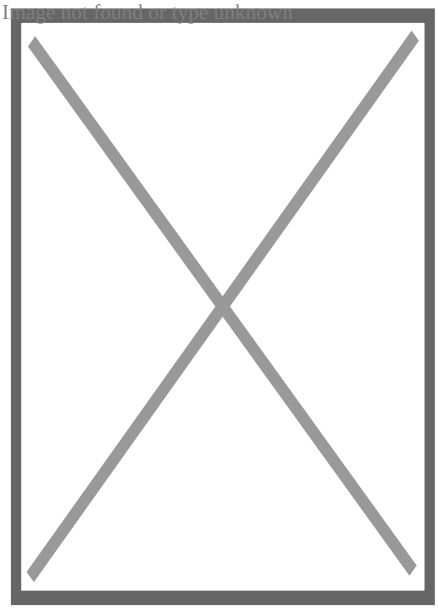
Brackets with hooks can be placed, or hooks can be created and affixed to the arch wire to affix rubber bands. The placement and configuration of the rubber bands will depend on the course of treatment and the individual patient. Rubber bands are made in different diameters, colours, sizes, and strengths. They are also typically available in two versions: Coloured or clear/opaque.

The fitting process can vary between different types of braces, though there are similarities such as the initial steps of moulding the teeth before application. For example, with clear braces, impressions of a patient's teeth are evaluated to create a series of trays, which fit to the patient's mouth almost like a protective mouthpiece. With some forms of braces, the brackets are placed in a special form that is customized to the patient's mouth, drastically reducing the application time.

In many cases, there is insufficient space in the mouth for all the teeth to fit properly. There are two main procedures to make room in these cases. One is extraction: teeth are removed to create more space. The second is expansion, in which the palate or arch is made larger by using a palatal expander. Expanders can be used with both children and adults. Since the bones of adults are already fused, expanding the palate is not possible

without surgery to separate them. An expander can be used on an adult without surgery but would be used to expand the dental arch, and not the palate.

Sometimes children and teenage patients, and occasionally adults, are required to wear a headgear appliance as part of the primary treatment phase to keep certain teeth from moving (for more detail on headgear and facemask appliances see Orthodontic headgear). When braces put pressure on one's teeth, the periodontal membrane stretches on one side and is compressed on the other. This movement needs to be done slowly or otherwise, the patient risks losing their teeth. This is why braces are worn as long as they are and adjustments are only made every so often.



Young Colombian man during an adjustment visit for his orthodontics

Braces are typically adjusted every three to six weeks. This helps shift the teeth into the correct position. When they get adjusted, the orthodontist removes the coloured or metal ligatures keeping the arch wire in place. The arch wire is then removed and may be replaced or modified. When the archwire has been placed back into the mouth, the patient may choose a colour for the new elastic ligatures, which are then affixed to the metal brackets. The adjusting process may cause some discomfort to the patient, which is normal.

Post-treatment

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Patients may need post-orthodontic surgery, such as a fiberotomy or alternatively a gum lift, to prepare their teeth for retainer use and improve the gumline contours after the braces come off. After braces treatment, patients can use a transparent plate to keep the teeth in alignment for a certain period of time. After treatment, patients usually use transparent plates for 6 months. In patients with long and difficult treatment, a fixative wire

is attached to the back of the teeth to prevent the teeth from returning to their original state.[8]

Retainers

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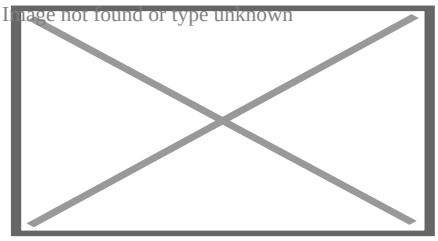
Main article: Retainer (orthodontic device)



Hawley retainers are the most common type of retainers. This picture shows retainers for the top (right) and bottom (left) of the mouth.

In order to prevent the teeth from moving back to their original position, retainers are worn once the treatment is complete. Retainers help in maintaining and stabilizing the position of teeth long enough to permit the reorganization of the supporting structures after the active phase of orthodontic therapy. If the patient does not wear the retainer appropriately and/or for the right amount of time, the teeth may move towards their previous position. For regular braces, Hawley retainers are used. They are made of metal hooks that surround the teeth and are enclosed by an acrylic plate shaped to fit the patient's palate. For Clear Removable braces, an Essix retainer is used. This is similar to the original aligner; it is a clear plastic tray that is firmly fitted to the teeth and stays in place without a plate fitted to the palate. There is also a bonded retainer where a wire is permanently bonded to the lingual side of the teeth, usually the lower teeth only.

Headgear

[edit]
Main article: Orthodontic headgear

Headgear needs to be worn between 12 and 22 hours each day to be effective in correcting the overbite, typically for 12 to 18 months depending on the severity of the overbite, how much it is worn and what growth stage the patient is in. Typically the prescribed daily wear time will be between 14 and 16 hours a day and is frequently used as a post-primary treatment phase to maintain the position of the jaw and arch. Headgear can be used during the night while the patient sleeps.[9][*better source needed*]

Orthodontic headgear usually consists of three major components:

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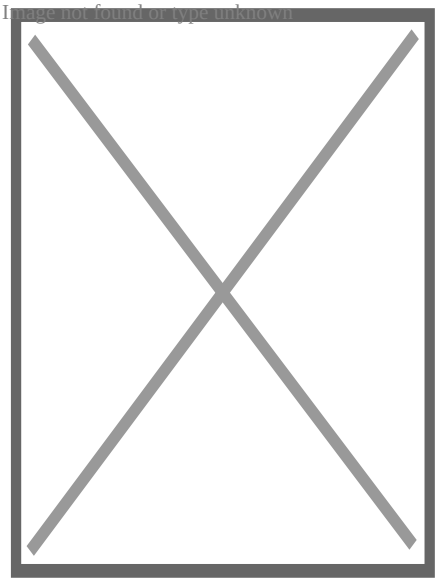

Full orthodontic headgear with head cap, fitting straps, facebow and elastics

1. Facebow: the facebow (or J-Hooks) is fitted with a metal arch onto headgear tubes attached to the rear upper and lower molars. This facebow then extends out of the mouth and around the patient's face. J-Hooks are different in that they hook into the patient's mouth and attach directly to the brace (see photo for an example of J-Hooks).
2. Head cap: the head cap typically consists of one or a number of straps fitting around the patient's head. This is attached with elastic bands or springs to the facebow. Additional straps and attachments are used to ensure comfort and safety (see photo).
3. Attachment: typically consisting of rubber bands, elastics, or springs—joins the facebow or J-Hooks and the head cap together, providing the force to move the upper teeth, jaw backwards.

The headgear application is one of the most useful appliances available to the orthodontist when looking to correct a Class II malocclusion. See more details in the section Orthodontic headgear.

Pre-finisher

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The pre-finisher is moulded to the patient's teeth by use of extreme pressure on the appliance by the person's jaw. The product is then worn a certain amount of time with the user applying force to the appliance in their mouth for 10 to 15 seconds at a time. The goal of the process is to increase the exercise time in applying the force to the appliance. If a person's teeth are not ready for a proper retainer the orthodontist may prescribe the use of a preformed finishing appliance such as the pre-finisher. This appliance fixes gaps between the teeth, small spaces between the upper and lower jaw, and other minor

problems.

Complications and risks

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A group of dental researchers, Fatma Boke, Cagri Gazioglu, Selvi Akkaya, and Murat Akkaya, conducted a study titled "Relationship between orthodontic treatment and gingival health." The results indicated that some orthodontist treatments result in gingivitis, also known as gum disease. The researchers concluded that functional appliances used to harness natural forces (such as improving the alignment of bites) do not usually have major effects on the gum after treatment.[10] However, fixed appliances such as braces, which most people get, can result in visible plaque, visible inflammation, and gum recession in a majority of the patients. The formation of plaques around the teeth of patients with braces is almost inevitable regardless of plaque control and can result in mild gingivitis. But if someone with braces does not clean their teeth carefully, plaques will form, leading to more severe gingivitis and gum recession.

Experiencing some pain following fitting and activation of fixed orthodontic braces is very common and several methods have been suggested to tackle this.[11][12] Pain associated with orthodontic treatment increases in proportion to the amount of force that is applied to the teeth. When a force is applied to a tooth via a brace, there is a reduction in the blood supply to the fibres that attach the tooth to the surrounding bone. This reduction in blood supply results in inflammation and the release of several chemical factors, which stimulate the pain response. Orthodontic pain can be managed using pharmacological interventions, which involve the use of analgesics applied locally or systemically. These analgesics are divided into four main categories, including opioids, non-steroidal anti-inflammatory drugs (NSAIDs), paracetamol and local anesthesia. The first three of these analgesics are commonly taken systemically to reduce orthodontic pain.[13]

A Cochrane Review in 2017 evaluated the pharmacological interventions for pain relief during orthodontic treatment. The study concluded that there was moderate-quality evidence that analgesics reduce the pain associated with orthodontic treatment. However, due to a lack of evidence, it was unclear whether systemic NSAIDs were more effective than paracetamol, and whether topical NSAIDs were more effective than local anaesthesia in the reduction of pain associated with orthodontic treatment. More high-quality research is required to investigate these particular comparisons.[13]

The dental displacement obtained with the orthodontic appliance determines in most cases some degree of root resorption. Only in a few cases is this side effect large enough to be considered real clinical damage to the tooth. In rare cases, the teeth may fall out or have to be extracted due to root resorption.[14][15]

History

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Ancient

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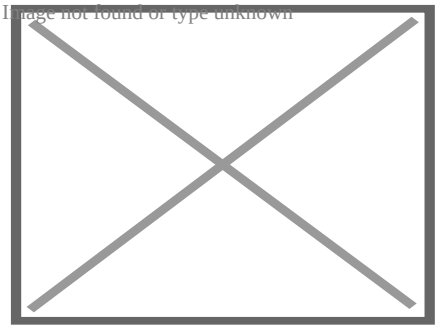

Old Braces at a museum in Jbeil, Lebanon

According to scholars and historians, braces date back to ancient times. Around 400–300 BC, Hippocrates and Aristotle contemplated ways to straighten teeth and fix various dental conditions. Archaeologists have discovered numerous mummified ancient individuals with what appear to be metal bands wrapped around their teeth. Catgut, a type of cord made from the natural fibres of an animal's intestines, performed a similar role to today's orthodontic wire in closing gaps in the teeth and mouth.[16]

The Etruscans buried their dead with dental appliances in place to maintain space and prevent the collapse of the teeth during the afterlife. A Roman tomb was found with a number of teeth bound with gold wire documented as a ligature wire, a small elastic wire that is used to affix the arch wire to the bracket. Even Cleopatra wore a pair. Roman philosopher and physician Aulus Cornelius Celsus first recorded the treatment of teeth by finger pressure. Unfortunately, due to a lack of evidence, poor preservation of bodies, and primitive technology, little research was carried out on dental braces until around the 17th century, although dentistry was making great advancements as a profession by then.[*citation need*

18th century

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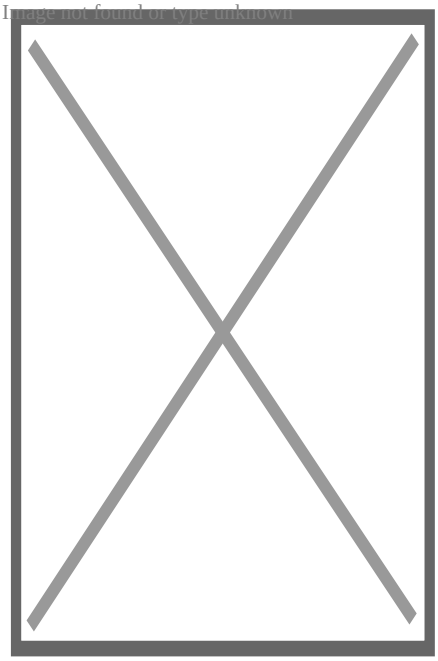

Portrait of Fauchard from his 1728 edition of *"The Surgical Dentist"*.

Orthodontics truly began developing in the 18th and 19th centuries. In 1669, French dentist Pierre Fauchard, who is often credited with inventing modern orthodontics, published a book entitled *"The Surgeon Dentist"* on methods of straightening teeth. Fauchard, in his practice, used a device called a "Bandeau", a horseshoe-shaped piece of iron that helped expand the palate. In 1754, another French dentist, Louis Bourdet, dentist to the King of France, followed Fauchard's book with *The Dentist's Art*, which also dedicated a chapter to tooth alignment and application. He perfected the "Bandeau" and was the first dentist on record to recommend extraction of the premolar teeth to alleviate crowding and improve jaw growth.

19th century

[edit]

Although teeth and palate straightening and/or pulling were used to improve the alignment of remaining teeth and had been practised since early times, orthodontics, as a science of its own, did not really exist until the mid-19th century. Several important dentists helped to advance dental braces with specific instruments and tools that allowed braces to be improved.

In 1819, Christophe François Delabarre introduced the wire crib, which marked the birth of contemporary orthodontics, and gum elastics were first employed by Maynard in 1843. Tucker was the first to cut rubber bands from rubber tubing in 1850. Dentist, writer, artist, and sculptor Norman William Kingsley in 1858 wrote the first article on orthodontics and in 1880, his book, *Treatise on Oral Deformities*, was published. A dentist named John Nutting Farrar is credited for writing two volumes entitled, *A Treatise on the Irregularities of*

the Teeth and Their Corrections and was the first to suggest the use of mild force at timed intervals to move teeth.

20th century

[edit]

In the early 20th century, Edward Angle devised the first simple classification system for malocclusions, such as Class I, Class II, and so on. His classification system is still used today as a way for dentists to describe how crooked teeth are, what way teeth are pointing, and how teeth fit together. Angle contributed greatly to the design of orthodontic and dental appliances, making many simplifications. He founded the first school and college of orthodontics, organized the American Society of Orthodontia in 1901 which became the American Association of Orthodontists (AAO) in the 1930s, and founded the first orthodontic journal in 1907. Other innovations in orthodontics in the late 19th and early 20th centuries included the first textbook on orthodontics for children, published by J.J. Guilford in 1889, and the use of rubber elastics, pioneered by Calvin S. Case, along with Henry Albert Baker.

Today, space age wires (also known as dental arch wires) are used to tighten braces. In 1959, the Naval Ordnance Laboratory created an alloy of nickel and titanium called Nitinol. NASA further studied the material's physical properties.[17] In 1979, Dr. George Andreasen developed a new method of fixing braces with the use of the Nitinol wires based on their superelasticity. Andreasen used the wire on some patients and later found out that he could use it for the entire treatment. Andreasen then began using the nitinol wires for all his treatments and as a result, dental doctor visits were reduced, the cost of dental treatment was reduced, and patients reported less discomfort.

See also

[edit]

- icon Medicine portal
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- Oral and maxillofacial surgery
- Orthognathic surgery
- Prosthodontics
- Trismus
- Dental implant

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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 Overbite Overjet Open bite Crossbite Dental crowding Dental spacing
Conditions	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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