Orthodontic Equipment

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Introducing Temporary Anchorage Devices in Treatment

Understanding brackets: Types and functions in orthodontic treatment

Understanding brackets: Types and functions in orthodontic treatment

Introducing Temporary Anchorage Devices (TADs) into pediatric orthodontic treatment has brought about significant advancements, notably improving efficiency and reducing overall treatment time. TADs, typically small titanium screws or plates, provide a stable point of anchorage within the bone, offering orthodontists enhanced control over tooth movement.

Orthodontists specialize in correcting dental irregularities in kids **Child-friendly orthodontic solutions** jaw.

One of the primary advantages of using TADs in pediatric orthodontics is their ability to streamline treatment processes. Traditional orthodontic methods often rely on patient compliance with devices like headgear or elastics, which can be cumbersome and uncomfortable for children. TADs eliminate the need for such external appliances by providing a fixed point of support directly within the mouth. This not only simplifies the treatment process but also makes it more comfortable and less intrusive for young patients.

Moreover, TADs significantly reduce treatment time, which is a crucial factor in pediatric orthodontics. Growing children often require swift interventions to correct issues before they become more complex and potentially impact permanent dentition or facial growth. By offering a stable anchorage point, TADs allow for more precise and efficient tooth movements, thereby accelerating the correction of malocclusions. This reduced treatment time minimizes the duration during which children must wear braces or other appliances, leading to fewer adjustments and fewer appointments, ultimately enhancing patient satisfaction and compliance.

The stability provided by TADs also enables orthodontists to tackle more challenging cases that might have previously required surgical intervention or prolonged treatment periods. For instance, severe crowding or significant jaw discrepancies can be addressed more effectively with TADs, as they provide the necessary leverage to move teeth into their desired positions without relying on unstable points of anchorage like other teeth or soft tissues.

In conclusion, integrating Temporary Anchorage Devices into pediatric orthodontic treatments offers numerous benefits, including improved efficiency and reduced treatment time. These advantages not only make the process more comfortable for young patients but also ensure that corrections are made swiftly and effectively, leading to better outcomes and happier patients overall.

In the fascinating world of orthodontics, there's a lot more going on than just braces. For children undergoing orthodontic treatment, temporary anchorage devices, or TADs, play a crucial role in achieving that perfect smile. Let's introduce and explore some common types of TADs: mini-screws, mini-plates, and Onplants.

Imagine TADs as tiny, helpful anchors that orthodontists temporarily place in the mouth to assist tooth movement. They provide stable points that can be used to push, pull, lift, or intrude teeth, making complex tooth movements predictable and efficient.

First up, we have mini-screws, also known as micro-screws or temporary anchorage screws. These are the most common type of TADs due to their versatility and ease of placement. They are self-drilling, self-tapping screws made of titanium alloy, with lengths varying from 6 to 12 mm and diameters from 1.2 to 2 mm. Orthodontists can place them in various locations in the mouth under local anesthesia, and they can be loaded immediately or after a healing period.

Next, let's talk about mini-plates. These are L- or T-shaped titanium plates placed surgically under the gums and fixed with screws. Mini-plates provide excellent stability and can withstand heavy forces. They are particularly useful when more anchorages is needed, or when mini-screws aren't an option due to insufficient bone quality or quantity. Mini-plates do require a minor surgical procedure for placement and removal, but they offer a robust solution for complex cases.

Lastly, let's introduce Onplants. These are custom-made devices that sit on the bone under the gum tissue like a small button or dome. Onplants are typically placed surgically under local anesthesia and can be used with a wide range of auxiliaries for tooth movement. They are particularly useful when other TADs can't be placed due to root proximity or insufficient interradicular space.

TADs have revolutionized orthodontic treatment for children by making complex tooth movements more predictable and efficient. They help reduce treatment time and improve the quality of results. So even though they might sound a bit intimidating at first, TADs are truly helpful innovations in a child's journey towards a beautiful, healthy smile.

How brackets contribute to the alignment and movement of teeth

Temporary Anchorage Devices (TADs) have revolutionized orthodontic treatment by providing stationary anchorage points within patients' mouth without needing patient cooperation or causing damage tooth structure . When it comes kids' orthodontic treatment , TAD can play pivotal role several clinical situations . Here are few key applications : Space Closure : Kids often have spaces between their teeth , either due tooth loss , congenitally missing teeth , or simply because their jaw growth hasn't caught up tooth development . TAD anchor point help facilitate space closure by allowing orthodontist apply direct force brackets adjacent teeth . This pull teeth together , closing gap efficiently minimizing need patient comply elastics or other removable appliances .Molar Distalization : Excessive overjet problematic bite issues can often traced back lack space within dental arch . Instead resort extractions create space , TAD can used push molars backward arch , creating needed space align front teeth properly without compromising facial profile . Since anchorage provided TAD immovable , it prevents unwanted side effects like mesial drift anterior teeth common traditional techniques Bite Correction : Correct bite crucial ensuring long term dental health stability results orthodontist treatment . For children open bites deep bites correction malocclusion essential establishing functional occlusion . By strategic placing TAD maxilla mandible orthodontist harness vertical horizontal forces correct abnormal bit relationship making sure child grows proper symmetrical facila profile With these clinical applications , TAD become indispensable tools modern orthodontics , enabling practitioners achieve results were previously difficult impossible attain They empower orthodontist tackle wide range cases efficiently effectively providing kids beautiful smiles lifetime oral health benefits

Overall integration temporary anchorage devices pediatric orthodontics continues transform field positively impact numerous young patients lives day basis improving quality care received exponentially expanding scope possibilities treatment modalities offered professionals worldwide .. This essay merely scratches surface potential held TAD unlock future kids orthodontics exciting frontier await exploration discovery advancements further enhance treatments outcomes children everywhere .. Welcome future anchored innovations ... Welcome era smiles perfection .. Next Generation await ... Happy smiling .. :) :))))))))))))))))))))))))))))) .....) ...))) ..)) ..)) ..)))))))))) ...)))) :) :) :-) > :-) >:-) >:-) >:-) >:-)))))))))))) o))))))))))))))))

Benefits of early orthodontic intervention with brackets for kids

Temporary Anchorage Devices (TADs), also known as mini-implants or microscrews , have become increasingly popular in orthodontics for providing absolute anchorage without patient compliance issues typically associated with other anchorage reinforcement methods such as headgear or elastics . When considering TAD usein pediatric patients timimg placement ,and stability are crucial factors for safe nd effective treatment . First lets discuss timing . In pediatric patients its essentialto consider growth nd development milestones . Early interventionwith TADsis typically avoided due tot he riskof interfernigwith growth structures suchasgrowth plates nd developing teeth .The optimaltimimgforTADplacementis often duringthe late mixed dentition or early permanent dentition stage ,when root formationofthepermanentteethiscompleteandgrowthismorestable .PlacementofTADsisalso guidedbytheindividualpatientanatomyndtreatmentneeds

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Common issues and solutions related to brackets in pediatric orthodontics

Temporary Anchorage Devices (TADs), commonly used in orthodontic treatments, provide stable anchorage for tooth movement, making complex corrections possible. However, their use in children comes with potential complications that clinicians should be aware of to ensure safe and effective treatment.

One of the primary concerns is the risk of root contact. TADs placed too close to dental roots can cause damage, leading to root resorption or even tooth loss. To prevent this, careful planning with radiographic imaging is essential. Using cone-beam computed tomography (CBCT) scans helps identify safe insertion sites. Additionally, employing smaller TADs and placing them at an angle can further minimize root contact risks.

Another complication is soft tissue irritation or inflammation around the TAD site. To manage this, maintaining good oral hygiene is crucial. Regular rinsing with antiseptic mouthwash and gentle brushing around the TAD can keep inflammation at bay. Topical anesthetics or anti-inflammatory medications may also be prescribed for severe cases.

TAD failure or mobility is another potential issue, often due to poor bone quality or excessive forces applied during treatment. To prevent this, ensuring adequate bone density at the insertion site through radiographic assessment is important. Clinicians should also avoid immediate loading of TADs and consider a healing period before applying orthodontic forces.

Infections around the TAD site, although rare, can occur if proper sterilization protocols are not followed during insertion. Preventive measures include using sterile instruments and techniques during placement and ensuring patients follow strict oral hygiene routines post-insertion. If an infection does occur, prompt treatment with antibiotics and local debridement is necessary.

Lastly, patient discomfort or pain can be a concern, especially immediately after TAD placement. Managing this involves educating patients about what to expect and providing appropriate analgesics as needed. Topical anesthetics can also alleviate initial discomfort during insertion procedures.

In conclusion, while TADs offer significant benefits in orthodontic treatment for children by providing stable anchorage for precise tooth movement corrections that were previously unattainable using conventional techniques alone; they come with potential complications such as root contact risks leading possibly even towards resorption or loss if not handled properly alongside possibilities including inflammation issues within surrounding soft tissues plus possible infection risks too–all necessitating careful consideration & appropriate management strategies involving thorough planning particularly via radiographic assessments alongside diligent oral hygiene practices plus adequate pain management measures being implemented wherever required ensuring successful therapeutic outcomes without compromising on patient safety & overall wellbeing throughout treatment duration effectively thereby maximizing benefits whilst minimizing risks associated therewith comprehensively ensuring optimal results consistently across diverse clinical scenarios encountered commonly during practice thereof successfully delivering desired therapeutic goals maintaining highest standards professional excellence continually elevating benchmarks quality care rendered therein holistically encompassing comprehensive aspects integral part orthodontics essentially transforming lives positively impactfully significantly enhancing overall oral health status substantially contributing towards betterment society ultimately fulfilling noble objectives profession profoundly satisfying rewarding manner indeed conclusively emphasizing importance meticulous attention detail every stage process vital ensuring seamless

The role of parental support during orthodontic treatment with brackets

Temporary Anchorage Devices (TADs) have revolutionized orthodontic treatment by providing stationary points from which force can be applied to move teeth more predictably and efficiently. When it comes to treating kids, the successful integration of TADs into orthodontic plans has been demonstrated through various case studies, showcasing their versatility and effectiveness.

One notable case involved a 10-year-old patient with severe crowding and a narrow upper arch. Traditional methods would have required extensive extractions or even surgery in later years. However, the orthodontist strategically placed TADs between the roots of the molars to provide anchorage for palatal expansion. Over several months, the TADs helped widen the upper arch, creating space for the crowded teeth to align properly without extractions. The result was not only a beautiful smile but also improved facial harmony and better breathing function.

Another compelling case study featured an 11-year-old with an overjet issue, where the upper front teeth protruded significantly over the lower teeth. Instead of relying solely on braces, which could have led to unwanted movement of other teeth, TADs were placed buccally (on the cheek side) to provide stable anchorage. This allowed for effective retraction of the protruding teeth, correcting the overjet without compromising other dental structures. The patient's profile improved dramatically, enhancing both aesthetics and function.

In yet another case, a 9-year-old patient presented with a deep bite, where the upper teeth overlapped the lower teeth excessively. The use of TADs provided intrusion forces directly on the problematic incisors, allowing them to be lifted upwards without affecting adjacent teeth. This targeted approach corrected the deep bite efficiently and minimized overall treatment time compared to traditional methods that might have relied on cumbersome appliances or more invasive procedures.

These case studies highlight how TADs can be seamlessly integrated into orthodontic treatment plans for kids, offering precise control over tooth movement and minimizing unwanted side effects. By providing fixed points of anchorage, TADs allow orthodontists to address complex issues more effectively and reduce reliance on extractions or surgical interventions. Moreover, they contribute to shorter treatment durations and superior outcomes, making them an invaluable tool in modern orthodontics for young patients.

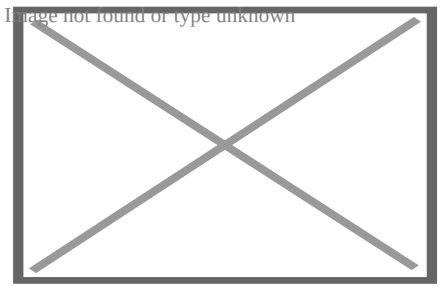
Long-term effects and maintenance after bracket removal

In recent years, Temporary Anchorage Devices (TAD) have become increasingly integral in orthodontics practice particularly when treating young patients . As we look towards future trends , several innovations promise enhanced orthodontic outcomes! Let' s dive into some exciting developments shaping pediatric orthodontics! . One key trend is advancing material science leading toward smaller sizes without sacrificing stability . This means less discomfort during placement which can alleviate anxiety associated common among younger patients . Additionally , improved designs now allow precise control over force vectors enabling highly targeted tooth movements resulting faster treatment times alongwith better efficiency ! Another notable innovation lies within digital integration ! By combining advanced imagining techniques such CBCT scans together using sophisticated software platforms allows clinicians accurately plan placements preoperatively reducing

chances errors improving overall success rates significantly ! Moreover , customized treatment plans can now simulate final results before actual procedure beings giving parents clear visualization regarding expected improvements thereby building trust communication bridges essential during lengthy treatments spanning several months/yearsof childhood growth spurt phase ! Furthermore , regenerative medicine techniques coupled biocompatible materials offer potential accelerate bone healing post procedure minimizing risks associated such invasiveness ! Lastly embracing automation through robotics assisted surgeries could revolutionize TADs placements ensuring extreme precision reducing human error margin substantially ! In conclusion , embracing these futuristic trends not only promises enhanced clinical outcomes but also elevates patient experiences making journey smoother reassuring thereby fostering positive orthodontic memories lasting adulthood !

About jaw

This article is about the anatomical part. For the mountain, see The Jaw. For other uses, see Jaws (disambiguation) and Jawbone (disambiguation).

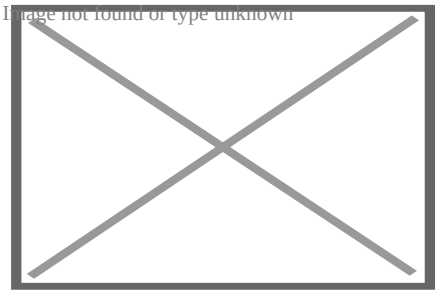


Human lower jaw viewed from the left

The **jaws** are a pair of opposable articulated structures at the entrance of the mouth, typically used for grasping and manipulating food. The term *jaws* is also broadly applied to the whole of the structures constituting the vault of the mouth and serving to open and close it and is part of the body plan of humans and most animals.

Arthropods

[edit]
Further information: Mandible (arthropod mouthpart) and Mandible (insect mouthpart)



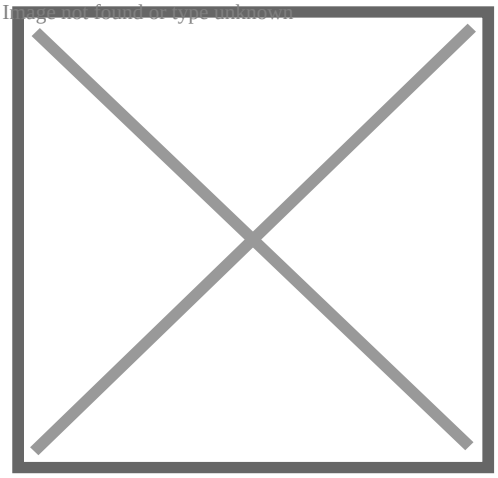
The mandibles of a bull ant

In arthropods, the jaws are chitinous and oppose laterally, and may consist of *mandibles* or *chelicerae*. These jaws are often composed of numerous mouthparts. Their function is fundamentally for food acquisition, conveyance to the mouth, and/or initial processing (*mastication* or *chewing*). Many mouthparts and associate structures (such as pedipalps) are modified legs.

Vertebrates

[edit]

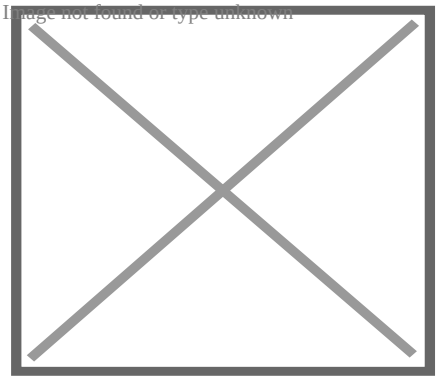
In most vertebrates, the jaws are bony or cartilaginous and oppose vertically, comprising an *upper jaw* and a *lower jaw*. The vertebrate jaw is derived from the most anterior two pharyngeal arches supporting the gills, and usually bears numerous teeth.



Jaws of a great white shark

Fish

[edit]



Moray eels have two sets of jaws: the oral jaws that capture prey and the pharyngeal jaws that advance into the mouth and move prey from the oral jaws to the esophagus for swallowing.

Main article: Fish jaw

The vertebrate jaw probably originally evolved in the Silurian period and appeared in the Placoderm fish which further diversified in the Devonian. The two most anterior pharyngeal arches are thought to have become the jaw itself and the hyoid arch, respectively. The hyoid system suspends the jaw from the braincase of the skull, permitting great mobility of the jaws. While there is no fossil evidence directly to support this theory, it makes sense in light of the numbers of pharyngeal arches that are visible in extant jawed vertebrates (the Gnathostomes), which have seven arches, and primitive jawless vertebrates (the Agnatha), which have nine.

The original selective advantage offered by the jaw may not be related to feeding, but rather to increased respiration efficiency.[1] The jaws were used in the buccal pump (observable in modern fish and amphibians) that pumps water across the gills of fish or air into the lungs in the case of amphibians. Over evolutionary time the more familiar use of jaws (to humans), in feeding, was selected for and became a very important function in vertebrates. Many teleost fish have substantially modified jaws for suction feeding and jaw protrusion, resulting in highly complex jaws with dozens of bones involved.[2]

Amphibians, reptiles, and birds

[edit]

The jaw in tetrapods is substantially simplified compared to fish. Most of the upper jaw bones (premaxilla, maxilla, jugal, quadratojugal, and quadrate) have been fused to the braincase, while the lower jaw bones (dentary, splenial, angular, surangular, and articular) have been fused together into a unit called the mandible. The jaw articulates via a hinge joint between the quadrate and articular. The jaws of tetrapods exhibit varying degrees of mobility between jaw bones. Some species have jaw bones completely fused, while others may have joints allowing for mobility of the dentary, quadrate, or maxilla. The snake skull shows the greatest degree of cranial kinesis, which allows the snake to swallow large prey items.

Mammals

[edit]

In mammals, the jaws are made up of the mandible (lower jaw) and the maxilla (upper jaw). In the ape, there is a reinforcement to the lower jaw bone called the simian shelf. In the evolution of the mammalian jaw, two of the bones of the jaw structure (the articular bone of the lower jaw, and quadrate) were reduced in size and incorporated into the ear, while many others have been fused together.[3] As a result, mammals show little or no cranial kinesis, and the mandible is attached to the temporal bone by the temporomandibular joints. Temporomandibular joint dysfunction is a common disorder of these joints, characterized by pain, clicking and limitation of mandibular movement.[4] Especially in the therian mammal, the premaxilla that constituted the anterior tip of the upper jaw in reptiles has reduced in size; and most of the mesenchyme at the ancestral upper jaw tip has become a protruded mammalian nose[5]

Sea urchins

[edit]

Sea urchins possess unique jaws which display five-part symmetry, termed the *Aristotle's lantern*. Each unit of the jaw holds a single, perpetually growing tooth

composed of crystalline calcium carbonate.

See also

[edit]

- Muscles of mastication
- Otofacial syndrome
- Predentary
- Prognathism
- Rostral bone

References

[edit]

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3. ^ *Allin EF (December 1975). "Evolution of the mammalian middle ear". J. Morphol.* ***147*** *(4): 403–37. doi:10.1002/jmor.1051470404. PMID 1202224. S2CID 25886311.*
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Human regional anatomy

Body
- Skin
- Hair

Head
- Face
  - Forehead
  - Cheek
  - Chin
  - Eyebrow
  - Eye
  - Eyelid
  - Nose
  - Mouth
  - Lip
  - Tongue
  - Tooth
- Ear
- Jaw
- Mandible
- Occiput
- Scalp
- Temple

Neck
- Adam's apple
- Throat
- Nape

Torso (Trunk)	○ Abdomen ○ ○ Waist ○ ○ Midriff ○ ○ Navel ○ Vertebral column ○ Back ○ Thorax ○ ○ Breast ○ ○ Nipple ○ Pelvis ○ Genitalia ○ ○ Penis ○ ○ Scrotum ○ ○ Vulva ○ Anus

- **Limbs**
  - **Arm**
    - Shoulder
    - Axilla
    - Elbow
    - Forearm
    - Wrist
    - Hand
      - Finger
      - Fingernail
      - Thumb
      - Index
      - Middle
      - Ring
      - Little
  - **Leg**
    - Buttocks
    - Hip
    - Thigh
    - Knee
    - Calf
    - Foot
      - Ankle
      - Heel
      - Toe
      - Toenail
      - Sole

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The facial skeleton of the skull

Maxilla	**Surfaces**	○ Anterior: *fossae* (Incisive fossa, Canine fossa) ○ Infraorbital foramen ○ Orbital bones ○ Anterior nasal spine ○ Infratemporal: Alveolar canals ○ Maxillary tuberosity ○ Orbital: Infraorbital groove ○ Infraorbital canal ○ Nasal: Greater palatine canal ○ Zygomatic process
	Processes	○ Frontal process (Agger nasi, Anterior lacrimal crest) ○ Alveolar process ○ Palatine process (Incisive foramen, Incisive canals, Foramina of Scarpa, Incisive bone, Anterior nasal spine)
	Other	○ Body of maxilla ○ Maxillary sinus
Zygomatic		○ Orbital process (Zygomatico-orbital) ○ Temporal process (Zygomaticotemporal) ○ Lateral process (Zygomaticofacial)
Palatine	**Fossae**	○ Pterygopalatine fossa ○ Pterygoid fossa
	Plates	○ Horizontal plate (Posterior nasal spine) ○ Perpendicular plate (Greater palatine canal, Sphenopalatine foramen) ○ Hard palate
	Processes	○ Pyramidal ○ Orbital ○ Sphenoidal

- **Mandible**
  - **Body**
    - *external surface* (Chin, Jaw, Mandibular prominence, Mandibular symphysis, Lingual foramen, Mental protuberance, Mental foramen, Mandibular incisive canal)
    - *internal surface* (Mental spine, Mylohyoid line, Sublingual fovea, Submandibular fovea)
    - Alveolar part
    - Mylohyoid groove
      - Mandibular canal
      - Lingula
  - **Ramus**
    - Mandibular foramen
    - Angle
    - Coronoid process
    - Mandibular notch
    - Condyloid process
    - Pterygoid fovea
- **Nose**
  - Nasal bone
    - Internasal suture
    - Nasal foramina
  - Inferior nasal concha
    - Ethmoidal process
    - Maxillary process
  - Vomer
    - Wing
  - Lacrimal
    - Posterior lacrimal crest
    - Lacrimal groove
    - Lacrimal hamulus
- **Other**
  - Prognathism
  - Retromolar space

Portal:

- ic Anatomy

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About dental braces

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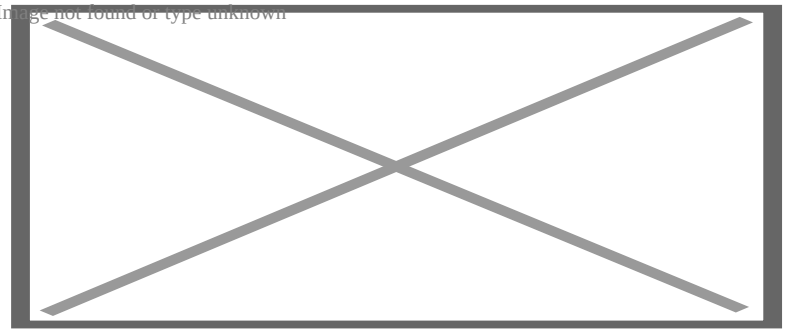

Dental braces

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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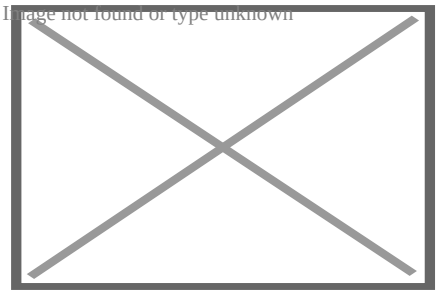

"Clear" braces

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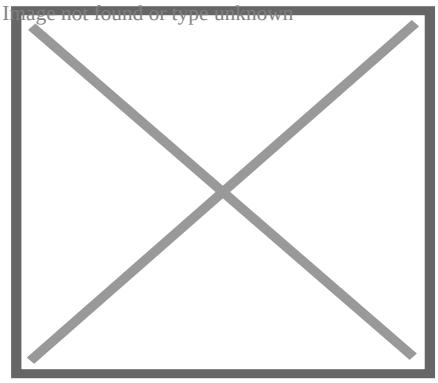
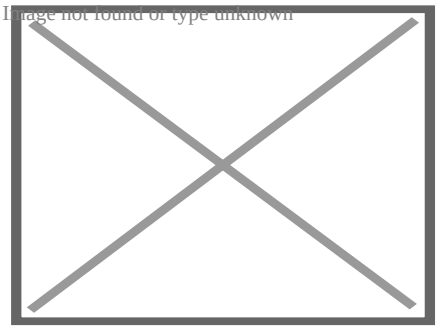


Upper and Lower Jaw Functional Expanders

- ***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 c*
[6]

Fitting procedure

[edit]



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.

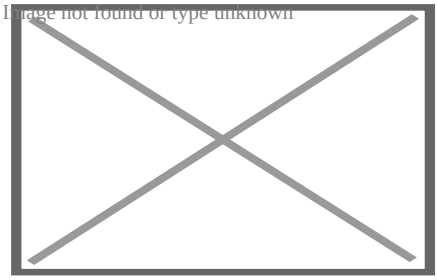
The first step is to determine whether braces are suitable for the patient. The doctor consults with the patient and inspects the teeth visually. If braces are appropriate, a records appointment is set up where X-rays, moulds, and impressions are made. These records are analyzed to determine the problems 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 cita*

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.

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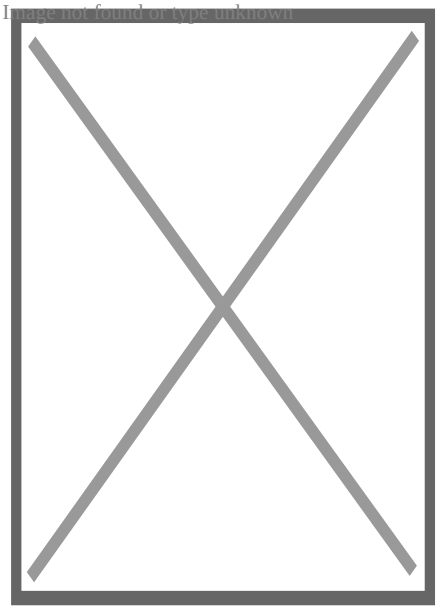


Young Colombian man during an adjustment visit for his orthodontics

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

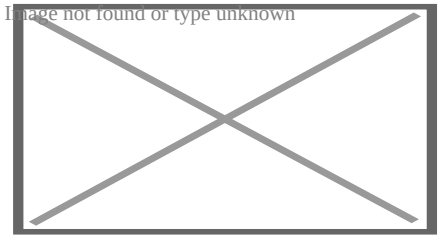
[edit]

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

[edit]

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.

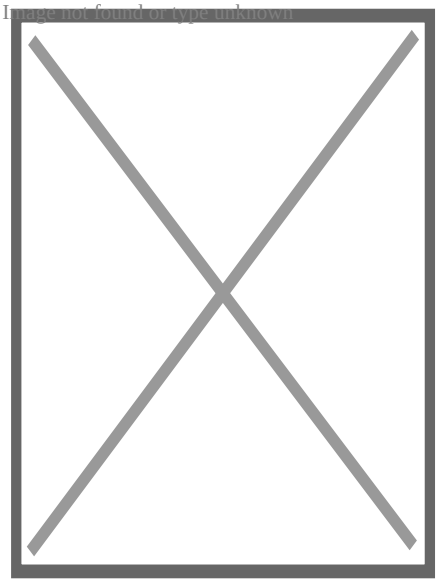
Headgear

[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:



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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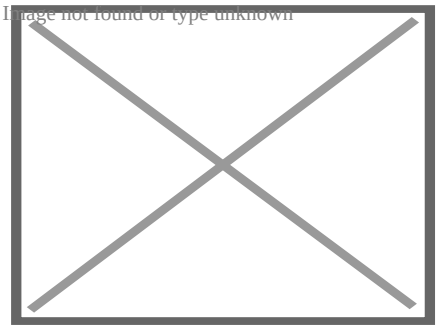

Old Braces at a museum in Jbeil, Lebanon

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 needed*]

18th century

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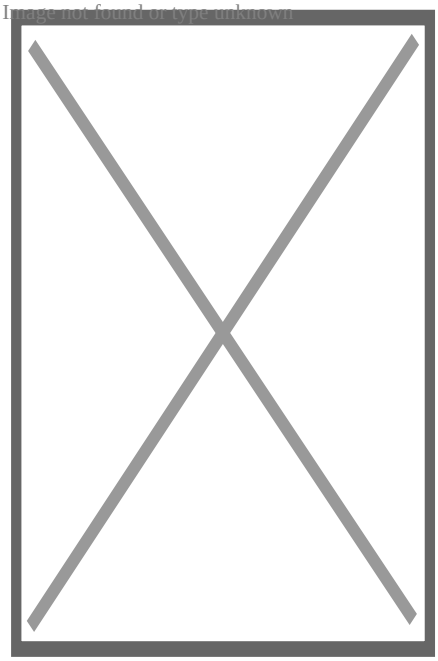

Portrait of Fauchard from his 1728 edition of *"The Surgical Dentist"*.

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
- Mandibular advancement splint
- Oral and maxillofacial surgery
- Orthognathic surgery
- Prosthodontics
- Trismus
- Dental implant

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External links

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- Useful Resources: FAQ and Downloadable eBooks at Orthodontics Australia
- Orthos Explain: Treatment Options at Orthodontics Australia
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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

Notable contributors	○ Edward Angle ○ Spencer Atkinson ○ Clifford Ballard ○ Raymond Begg ○ Hans Peter Bimler ○ Samir Bishara ○ Arne Björk ○ Charles B. Bolton ○ Holly Broadbent Sr. ○ Allan G. Brodie ○ Charles J. Burstone ○ Peter Buschang ○ Calvin Case ○ Harold Chapman (Orthodontist) ○ David Di Biase ○ Jean Delaire ○ Terry Dischinger ○ William B. Downs ○ John Nutting Farrar ○ Rolf Frankel ○ Sheldon Friel ○ Thomas M. Graber ○ Charles A. Hawley ○ Reed Holdaway ○ John Hooper (Orthodontist) ○ Joseph Jarabak ○ Harold Kesling ○ Albert Ketcham ○ Juri Kurol ○ Craven Kurz ○ Benno Lischer ○ James A. McNamara ○ Birte Melsen ○ Robert Moyers ○ Hayes Nance ○ Ravindra Nanda ○ George Northcroft

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