

## **Dental brace**

Dental braces (also known as orthodontic braces or brackets) are a fixed appliance used in orthodontics to correct alignment of teeth and their position with regard to bite. Braces are often used to correct malocclusions such as underbites, overbites, cross bites and open bites, or crooked teeth, and various other flaws of teeth and jaws, whether cosmetic or structural. They can be used on either upper or lower sets of teeth, or both, depending on the problem they are being used to treat. Orthodontic braces are often used in conjunction with other orthodontic appliances to widen the palate or jaws, create spaces between teeth, or otherwise shape the teeth and jaws. Most orthodontic patients are children or teenagers; however, more and more adults are seeking out orthodontic treatment.

## **History**

Historians claim that two different men deserve the title of being called "the Father of Orthodontics." One man was Norman W. Kingsley, a dentist, writer, artist, and sculptor, who wrote his "Treatise on Oral Deformities" in 1880. What Kingsley wrote influenced the new dental science greatly. The second man who deserves credit was a dentist named J. N. Farrar, who wrote two volumes entitled "A treatise on the Irregularities of the teeth and their corrections". Farrar was very good at designing brace appliances, and he was the first to suggest the use of mild force at timed intervals to move teeth.

## **How braces work**

Teeth move through the use of force. The force applied by the archwire pushes the tooth in a particular direction and a stress is created within the periodontal ligament. The modification of the periodontal blood supply determines a biological response which leads to bone remodelling, where bone is created on one side by osteoblast cells and resorbed on the other side by osteoclasts.

Two different kinds of bone resorption are possible: direct resorption, starting from the lining cells of the alveolar bone, and indirect or retrograde resorption, where osteoclasts start their activity in the neighbour bone marrow. Indirect resorption takes place when the periodontal ligament has become acellular (necrosis or hyalinization), for an excessive amount and duration of compressive stress. In this case the quantity of bone resorbed is larger than the quantity of newly formed bone (negative balance). Bone resorption only occurs in the compressed periodontal ligament. There is another important phenomenon that is intricately associated with tooth movement and it 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.

A tooth will usually move about a millimeter per month during orthodontic movement, but there is high individual variability. Furthermore, orthodontic mechanics can be more or less efficient, thus explaining a wide range of responsiveness to orthodontic treatment.

## Procedure

The service of orthodontics may be delivered by either an orthodontist or general dentist. An orthodontist is a dentist who specializes in diagnosing and treating malocclusions, which are misalignments of the teeth, jaws, or both. Following dental school, an orthodontist completes 2–3 years of additional training resulting in a specialty certificate in orthodontics.

The first step is a consultation. During the consultation, the doctor will review the patient's teeth visually and speak with the patient. If treatment is recommended and the patient is willing, a records appointment will be set where X-rays, molds, and impressions of the teeth will be taken to determine the problem and proper course of action. Treatment time can vary from six months to six years depending on the type and intricacy of problem. Orthognathic surgery may be required in extreme cases.

Teeth to be braced will have an etchant applied to the surface to help the cement stick to the surface of the tooth. A bracket will be applied with a dental grade cement, and then cured with a light until hardened completely. This process usually takes only 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 work make securing a bracket to a tooth unfeasible.

Dental braces, with a powerchain, removed after completion of treatment. An archwire will be threaded between the brackets and affixed with elastic or metal ligatures. Archwires in the past had to be bent, shaped, and tightened frequently to achieve the desired results. 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 archwire will stiffen and seek to retain its shape, creating constant light force on the teeth.

Elastics are used to close open bites, shift the midline, or create a stronger force to pull teeth or jaws in the desired direction. Brackets with hooks built in can be placed, or hooks can be created and affixed to the archwire to affix the elastic to. The placement and configuration of the elastics will depend on the course of treatment and the individual patient. Elastics come in different diameters, sizes, and strengths.

In many cases there is not enough space in the mouth for all the teeth to fit properly. There are two main procedures done to make room in these cases. One is extraction: teeth are removed to create more space. The second is expansion: the palate or arch is made larger by using an expander. Expanders can be used with both children and adults. However, since the bones of adults are already fused, expanding the palate is not possible without surgery to unfuse them. An expander can still be used on an adult without surgery, but to expand the dental arch, and not the palate.

For some patients, Invisalign might be a viable alternative to braces. The Invisalign system uses a series of clear plastic trays to move teeth into their position over a length of time. This system is not recommended for more difficult cases, or for people whose last molars have yet to erupt.

Patients may be recommended to take orthodontic surgery procedures, such as a fibrotomy, in order to prepare their teeth for retainer use.

## **Post-treatment**

Retainers are required to be worn once treatment with braces has been finalized. The orthodontist will recommend a retainer based on the patient's needs. If a patient does not wear the retainer as recommended, the teeth might move towards their original position (relapse).

A Hawley retainer is made of metal hooks that surround the teeth and are enclosed by an acrylic plate that is shaped to fit the patient's palate. An Essix retainer is similar to Invisalign trays; it is a clear plastic tray that is form-fitted to the shape of the teeth and stays in place by suction. A bonded retainer is a wire that is permanently bonded to the lingual side of the teeth (usually the lower teeth only).

## **Complications and risks**

Plaque gets easily caught in the fine metalwork of braces. For this reason, it is important to maintain proper oral hygiene by brushing and flossing thoroughly when wearing braces to prevent tooth decay, decalcification or unpleasant color changes to the teeth.

There is a small chance of an allergic reaction to the latex rubber in elastics or the type of metal in braces. However, there are latex-free elastics and other types of metal that can be used instead. If a person with braces believes he/she is allergic to his/her braces, it is important that an orthodontist or dentist be notified immediately.

Mouth sores are usually triggered due to the oral obstructions from certain components of the braces. There are many products that can make a patient more comfortable, such as oral rinses, dental wax or dental silicone, and products that help heal the sores.

Braces can also be damaged if not careful. It is important to wear a mouthguard to prevent breakage when playing sports. Certain sticky or hard foods and confectionaries, gum and toffee for example, should be avoided because they can damage braces. Constantly breaking braces can prolong orthodontic treatment.

In the course of treatment, orthodontic brackets may occasionally pop off due to the force involved, or due to the adhesive cement weakening over time. The orthodontist should be

contacted immediately for advice if this occurs. In most cases, the bracket must be replaced and re-applied to the tooth.

When teeth move, the arch wire may become displaced, causing it to painfully poke into the back of the patient's cheek. If this happens, it is recommended to apply a glob of dental wax to cushion it. The orthodontist must be called immediately to have it clipped, or a painful mouth ulcer is likely to form.

The dental displacement obtained with the orthodontic appliance, determines in most cases some degree of root resorption. Only in a few cases this side effect is large enough to be considered a real clinical damage for the tooth. [1][2]

## **Treatment time and cost**

Typical treatment time is anywhere from six months to six years, depending on the severity of the case, location, age, etc., although two years is average. Treatment can be accelerated using novel planning and positioning techniques.

Typical cost of braces is about \$5,000 in the United States, although in other countries the price can be much lower. In CIS countries for example, the price is anywhere from \$200 to \$500 per jaw.

In some European countries, orthodontic treatment is available without charge to patients under 16 (or for treatment to start at 16, such as Ireland), as benefits for orthodontic treatment is provided under the government-run health care systems.

## **Types of braces**

Modern orthodontists can offer many types and varieties of braces:

Traditional braces are made of stainless steel and are the most widely used. They offer many different types of brackets, including speed (or self-ligating) and damon brackets. Ceramic braces offer a less visible alternative. They blend in more with the natural color of the tooth and are arguably more visually appealing; however, they are not as strong as metal and may cause treatment time to be lengthened. Ceramic brackets are also slightly larger than metal brackets and may be more difficult to adapt to.

Gold-plated stainless steel braces are necessary for people who are allergic to nickel (a component of steel), but may also be chosen because they blend better with teeth, and some people simply prefer the look of gold over the traditional silver-colored braces. Lingual braces are fitted behind the teeth, and are not visible with casual interaction. Lingual braces can be more difficult to adjust to, since they can hinder the movement of the tongue.

## **Braces in popular culture**

Like eyeglasses, braces can be seen as "geeky". That stigma, however, is fading. For many Americans, even those without severe bite problems, braces are simply a part of growing up. Additionally, there are a growing number of adults (roughly 25% of brace patients are over 21) wearing braces to correct orthodontic issues.

Celebrities who have been spotted wearing functional braces in adulthood include Tom Cruise, Gwen Stefani, Lil Bow Wow, Ashley Judd, Lee Ann Womack, Lila McCann, Linda Gray, Cher, Nancy Kissinger (wife of former Secretary of State Henry Kissinger), Brett Favre, Randy Moss, Marquis Daniels, Josh Howard, Alyssa Milano and Svetlana Kuznetsova.

Wearing braces as a fashion statement, rather than from medical necessity, appears to catch on among the young in some parts of the world. In 2006, the media reported that wearing fake braces had become a teen fad in Thailand, to the extent that authorities felt it necessary to consider punishing sellers of fake braces with six months in prison or a \$1,300 fine. [1]

Dental braces carry the connotation of youth, and as such have become a sexual fetish for some people (see dental braces fetishism).

Notable appearances of braces in popular culture include:

The Simpsons episode "Last Exit to Springfield" featured the memorable mantra "Dental Plan... Lisa Needs Braces" as Homer considered the fact that losing his work-based dental plan would force him to pay for Lisa's orthodontic work.

Braceface is a cartoon where the protagonist's braces prevent her from having a normal life.

Norelle Van Herk, a contestant on America's Next Top Model Cycle 3, came into the competition wearing braces.

Tootie Ramsey, a character on the long-running U.S. sitcom The Facts of Life, wore braces for six years.