



“EVOLUTION OF ORTHODONTIC BRACKETS: NOW AND THEN” – A REVIEW

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ABSTRACT

The evolution of treatment concepts, as well as the tools and methods available to practitioners, all influence the nature of orthodontic appliances. In 1728, ligatures were used to fasten the first machinery to teeth. As soon as practitioners were able to take accurate impressions, which was a period that started in 1840, removable appliances began to be constructed of metal, ivory, and then vulcanite. Following the development of a dental cement that could be used to secure permanent equipment to teeth in 1871, a variety of fixed appliances were made available. But even before that, around 1860, dentists started creating intra- and extra-oral gadgets to change the shape and position of the basal bone. Furthermore, it wasn't until 1916 that Angle introduced the first bracket that allowed orthodontists to apply a couple of forces to teeth. In this article we are going to discuss the evolution of bracket system through Edgewise appliance, Straightwire to today's ceramic Self –Ligating bracket system in a brief way.

Key words: Orthodontics, Bracket system

INTRODUCTION

In 1000 BC, the earliest attempts at treating malocclusions were made. By pressing his fingers against the teeth, Aulus Cornelius Celsus (25 BC–50 AD) attempted to treat

malocclusion. The original thorough analysis of "Regulating teeth" was carried out by Pierre Fauchard, known as the "father of modern dentistry".¹ Brackets were initially utilised in written communication between 1855 and 1930. When Dr. Edward H. Angle developed the Ribbon Arch appliance in 1916, the name "BRACKET" entered the orthodontics vocabulary. The edgewise bracket was developed by Dr. Angle after it became evident that all teeth needed to be engaged simultaneously and horizontally. Begg's differential force approach uses small round wires and a modified ribbon arch bracket with the slot facing gingivally. The slot angulation theory leads naturally to Andrews' creation of the completely preadjusted straight wire appliance (SWA) in 1970. In order to change the tip, torque, rotations, and in-out movements of Andrews regular set up brackets, Dr. Ronald Roth created a bracket setup in 1979. Self-ligating and combinable brackets were also introduced to increase the effectiveness of treatment mechanics. The intended influence of numerous factors on various tooth movements, such as tipping.²

1.EVOLUTION OF EDGEWISE BRACKET SYSTEM

A. APPLIANCE WITH PIN AND TUBE ¹⁴

Each tooth was given a vertical tube into which a soldered pin from a smaller arch wire was put. All of the teeth were given bands. The teeth were moved at each consultation by moving the individual pegs. Despite being excellent at moving roots, the gadget was less practical to use because wire bending required special skills.

B. RIBBON ARCH APPLIANCE (1915)

This device was first introduced in 1915 as a result of the challenges associated with using the pin and tube appliance. In actuality, it was the very first orthodontic appliance to ever use a bracket. Brass pins held the arch wire in place, and the bracket had a vertical slit in it. Like beads on a string, the teeth were able to freely move along the arch wire.

MODIFICATION OF EDGEWISE SYSTEM:

TWIN BRACKET were created by combining the two edgewise brackets on a single base in the following stage of development. These are what the bracket's creator, Brainerd Swain, called "Siamese twin brackets." It was referred to as the "Twin Brackets".⁴

POSTERIOR BRACKETS: The evolution of a solid bracket known as a posterior bracket, which was almost twice as broad as the initial edgewise bracket, was another early development.

TWIN BRACKETS having CURVED BASES: The next evolutionary step involved curved twin bracket bases to lessen the deflection of the bracket from the base on teeth having curved buccal surface features.

LEWIS BRACKET: Dr. Paul D. Lewis was the next. He soldered supplementary rotation arms that abutted the bracket and provided a lever arm to deflect the arch wire and rotate the tooth.

STEINER BRACKETS were developed by Cecil Steiner. The ability of the arch wire to withstand tooth rotation was not the main factor because these brackets had flexible rotational arms.

For use with the Broussard technique, Garford Broussard developed the **BROUSSARD BRACKETS**. The edgewise bracket has been provided with a 0.0185x0.046-inch vertical slot to receive a doubled 0.018-inch auxiliary wire.

THE BURSTONE SEGMENTED ARCH TECHNIQUE: The segmented arch approach, a modified full-banded edgewise orthodontic procedure, moves teeth and anchorage units under control of a relatively gentle, constant force. It was developed in 1961 by Drs. Charles J. Burstone and James Baldwin.

Twin-wire equipment Joseph Johnson introduced it in the 1930s. Its use was justified by the idea that by using two light wires in a single bracket, more physiologic tooth movement could be achieved than with a single heavy wire.

2. EVOLUTION OF STRAIGHTWIRE CONCEPT

MODIFICATION IN STRAIGHTWIRE APPLIANCE:

1. **DR. RONALD ROTH'S RECOMMENDATION:** Dr. Roth used clinical trials and time to develop what is now known as "The Roth setup" by gradually modifying the values present in the original Andrews straight wire gadget.

2. **MCLAUGHLIN, BENNETT, AND TREVISI SYSTEM:** To totally revamp the bracket system, McLaughlin and Bennett worked with Trevisi. They referred to the MBT Bracket System as the Third Generation of Pre Adjusted Appliance.⁵

3. **BRACKET FOR DUAL ENVIRONMENTS** in 1990, George F. Schudy created the Dual Environment bracket for the first time. A new bracket was created in order to benefit

from the advantages of fewer wires and additional intrabacket space without the disadvantages of the Bi-Metric appliance.

4. CREEMORE'S NEW TORQUED APPLIANCE: The New Torque Appliance was created by integrating torque and other features into the brackets with the goal of incorporating 90% of the treatment into the bracket and leaving 10% for any particular case-specific changes to the archwire. Thomas Creekmore first presented it in 1973.

3. BEGG'S LIGHTWIRE APPLIANCES' EVOLUTION

The pioneer in his profession who created the Begg technique was Dr Raymond Begg. Begg worked and studied with Angle between 1924 and 1925.

REFINED BEGG TECHNIQUE: This technique was created by Dr. V. P. Jayade. Refinements are necessary to account for novel concepts and technology development. From Dr. Begg's inaugural lectures, the modern Refined Begg technique was created to solve the shortcomings of the conventional Begg technique and include contemporary concepts and technology improvements. When palatal elastics from TPA are used for the upper incisor incursion, these PALATAL BRACKETS are inserted on the palatal surface of the upper incisors. When using the rectangular wires for finishing, COMBINATION TUBES are used.

4.EVOLUTION OF LINGUAL ORTHODONTIC BRACKET SYSTEM

KURZ APPLIANCE: In 1982, Dr. Craven Kurz and Ormco introduced this product. The brackets come in a single design with different widths for each tooth in the arch and are constructed of stainless steel that has been hardened. The brackets are brazed to a base constructed of diffusion-bonded foil and mesh.

LINGUAL ARCH WIRE TECHNIQUE: Dr. Stephen F. Paige first described the lingual arch wire procedure in 1982. The inter bracket distance is reduced on the lingual, which is the first crucial aspect to take into account while building lingual attachments. The bracket must be as narrow mesiodistally as possible as a result. Second, because of the narrower brackets, mesiodistal root treatment becomes more difficult.

CREEKMORE LINGUAL APPLIANCE²²

Dr. Thomas Creekmore first presented this method in 1989. According to Dr. Creekmore, the following essential components must be present in any lingual orthodontic appliance system:

A mechanical appliance that straightens teeth from the lingual aspect as effectively as a labial appliance; a method of precisely positioning brackets to create a "near" straight-wire appliance on the lingual aspect; a reliable and precise indirect bonding technique; a variety of preformed arch wires complete with canine-premolar offsets; lingual bracket-removing pliers and offset torquing keys; and specially designed pliers with longer handles and offset beaks. The development of the lingual treatment technique by the orthodontist and personnel so that it becomes as commonplace as their labial treatment. These requirements are met by a lingual mechanical appliance.

5. EVOLUTION OF SELF-LIGATING BRACKETS

1. **PASSIVE BRACKETS:** These brackets enclose the arch wire in a rigid, moveable part. The only aspect of passive brackets that influences tooth control is the fit between the bracket slot and arch wire. As a result, tooth control is frequently affected by undersized arch wires that are kept in what is essentially an arch wire tube.

2. **ACTIVE BRACKETS:** A flexible part is used to encapsulate the arch wire in these brackets. This flexible component can store energy by elastic deflection before releasing it. It holds the arch wire in the arch wire slot. The first self-ligating bracket, the Russell lock edgewise attachment, was developed by Dr. Jacob Stolzenberg, a pioneer in New York orthodontics, in 1935. A flat head screw fit precisely into the round, threaded aperture in the face of this bracket. The orthodontist found it quick and simple to modify the arch wire. Dr. Alexander J. Wildman, a resident of Eugene, Oregon, invented the Edgelok Bracket in 1972. The bracket had a circular body and a firm labial sliding cover on top of it. Using a specific opening tool, the slide was shifted occlusally in preparation for the placement of the arch wire.

ACTIVA BRACKET: Dr. Erwin Pletcher created the Activa bracket in 1986. The Activa brackets have a horizontal slot of .022 x .022 inches and a vertical slot of .020 x .020. They are fully programmed, pre-adjusted brackets. A rigid, curving arm of the bracket rotates occluso-gingivally around its cylindrical body.²⁹

BRACKET FOR DAMON 2: Due to the flaws in the Damon SL bracket, the Damon 2 bracket was created. It uses the same U-shaped spring to control opening and closing and the same vertical slide movement, but it positions the slide inside the tie wings for protection. These advancements, when combined with metal injection moulding production, which

enables tighter tolerances, have virtually eliminated accidental slide opening or slide breaking.

GAS IN-OVATION BRACKET: In terms of thought and design, the GAC In-Ovation bracket is quite similar to the SPEED bracket, however it has a dual arrangement. They have an excellent, sturdy design, and neither I nor anyone else has ever heard of a clip breaking. There are a few rather small drawbacks to managing brackets.¹⁷

SYSTEM FOR SPEED BRACKETS: Dr. Herbert G. Hanson created the SPEED appliance system in 1975, and it was first made available in 1980. In 1975, Hanson merged Angle's edgewise device with his own idea to create a dynamic and self-ligating device. This led to the creation of a spring-loaded, self-adjusting, ligature-free design that had the special ability to actively maintain control over the arch wire inside the arch wire slot.

6. EVOLUTION OF BRACKET ON THE BASIS OF MATERIAL

Terushige Kawata first introduced magnetic brackets in 1987. The first magnetic substance to be used in therapeutic settings was a cast alloy made of 45%–60% iron, 15%–25% cobalt, and 25%–30% chromium. The magnet's initial dimensions were 6 x 8 x 2 mm. Despite the fact that the CoCr alloy was simple to work with and had a strong enough magnetic field to support tooth movement.

PLASTIC BRACKET: Originally made of acrylic and later polycarbonate, their adoption by orthodontists as an attractive alternative to metal brackets was hastily accomplished due to the challenges they brought with them.

CERAMIC BRACKETS:^{22,23} Ceramic brackets were first introduced in 1986 and provide a number of advantages over conventional cosmetic equipment. Ceramic braces provide patients improved aesthetics as well as higher strength, more resistance to wear and deformation, better colour stability, and better wear resistance. Ceramic braces come in a number of morphologies, including as true Siamese, semi-Siamese, solid, and Lewis/Lang designs, as well as in a range of appliance systems, such as Begg and variable force ligation brackets.

There are three types of ceramic brackets: polycrystalline, single crystal, and polycrystalline zirconia.

Conclusion

Since digital technology is being used more frequently, this development should continue for years to come. The development of lingual brackets, which are intended to meet higher

cosmetic requirements, is a recent advancement in the field of orthodontic bracket systems. The lingual bracket is positive from the standpoint of reducing the frequency of enamel decalcification as well, and the rationale may be seen in improved saliva wetting and self-cleansing of enamel surface.

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