Review Article

Lingual Orthodontics The Beginning....

(Part-1)

Dr. Katta Balajee Krishnamurthy

***Corresponding Author: Dr. Katta Balajee Krishnamurthy,** Specialist Adult Orthodontist NDC LLC AL AIN, ABU DHABI REGION, UAE.

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Introduction

Orthodontic appliances have been used on the lingual surface of teeth since the 18th century. The earliest record show Pierre Fauchard (1726) used appliances on the lingual surface. Since then many orthodontists have used Lingual or Palatal appliances to solve certain problems. The notable names in the literature are Angle, Goshgarian, Crozet, Ricketts, Nance, and Wilson to name a few.

The first steps...

The actual evolvement of a pure multi-bracket Lingual appliance took birth in the latter half of the last century. The reasons for its initiation were different across the pacific.

In the early 1970s, Dr. Kinja Fujita (Japan) to satisfy the Orthodontic needs of patients who practiced martial arts, to protect soft tissues (lips and cheeks) from the possible impact against brackets. Fujita developed a multi-slot lingual bracket and the mushroom archwire. Dr. Craven Kurz (Beverly Hills California) an Orthodontist, then assistant professor of Occlusion and Gnathology at the UCLA School of Dentistry, found his private practice to be increasingly dominated by adult patients. A particular patient, who was an employee of the Playboy Bunny Club, presented to his practice requesting treatment. Because (Aber public position she refused metal or plastic labial appliances on aesthetic grounds. From her demand for an appliance that did not show, the concept of a lingually bonded appliance was born. The appliance consisted of

plastic Lee Fischer brackets bonded to the Lingual aspect of the anterior dentition and metal brackets bonded to the lingual aspect of the posterior dentition. Kurz started his investigations in 1973 and 1976 he patented his Lingual bracket. Ormco founded the task force for research and development of this bracket, as well as to carry out clinical tests. The company created a product development team consisting of Mr. Frank Miller and Mr.Craig Andrieko to work with Dr. Kurz and his new appliance. The problems that plagued the development were a high bracket bond failure rate due to shear forces and patient discomfort from the roughness against the tongue.

A star is born…

The turning point in the development of the appliance was the addition of an anterior inclined plane as an integral part of the maxillary bracket. This inclined plane converted the shearing forces produced by the mandible incisors to compressive forces

KURZ-ORMCO 7th Generation Brackets

KURZ-ORMCO 7th Generation Brackets applied in an intrusive and labial direction. The other characteristics were a base pad adapted to the anatomic characteristics of the lingual surfaces of the teeth and a pre¬angulated slot according to the conversion of torques used in the labial surfaces. The most successful form of the bracket was the Kurz-Ormco seventh-generation bracket system.

Dr. Kurz presented the concept of Lingual treatment, the appliance, and his treatment results from the initial 100 cases tested to the professional community at a symposium on Lingual Orthodontic therapy. From this group, the original task force was developed. Administrative guidance from.

Craven Kurz

Jack Gorman

b Bob Smith

Ormco was under Mr. Floyd Pickrel, Mr. Ernie Strauch and Dr. Micheal Scwartz.

The research and development team included in addition to Dr. Kruz, the late Dr. Jack Gorman of Marion, Dr. Bob Smith of Florida, Dr. Richard (Wick) Alexander and Dr. Moody Alexander both from Dallas, Dr. James Hilger of California, Dr. Bob Scholz of Almeda, to provide beta test sites for the appliance.

In 1979, Dr. Fujita published his first article on Lingual therapy in the American Journal of Orthodontics. Unitek supported a lingual clinical project under the direction of Dr. Vincent Kelly. Dr. Stephen Paige of Florida began giving courses using a Lingual Begg appliance. Forestadent and American Orthodontics all began to market lingual brackets and accessories.

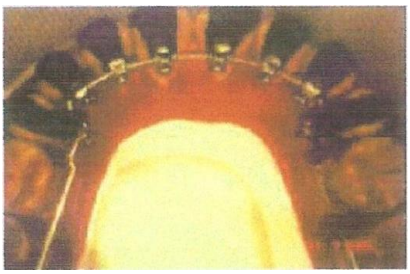
Lingual technique had a great success and many professionals started to use it but its difficulty in direct bonding and loss of control experienced by many clinicians very quickly brought its decline.

The enthusiasm for Lingual therapy waned in the profession and commercial interest also declined. The original Ormco task force was restructured to form the KGS Ormco task force number 2. This group consisted of Craven Kurz, Bob Smith and John C. Gorman with the help of Emie Strauch and Micheal Swartz. Longer courses were developed with a typodont (hands-on) component and continuing education was stressed, with support provided by study clubs, journals and professional meetings.

In 1986, Dry Didier Fillion along with Gerald Altounian founded the Societe Francaise Orthdontie Linguale (SFOL) for which Dr. Didier Fillion was elected president. In 1987, Dr. Thomas Creekmore, developed a complete technique of Lingual brackets with vertical slots, together with a Laboratory system using the Slot Machine.

In 1987, the American Lingual Orthodontic Association (ALGA) was established. During this, some clinicians trained by the KGS group were brave enough to start lingual orthodontics on a large number of patients in their practices. The prominent being Didier Pillion and Kyoto Takemoto. These master clinicians with their devout effort lead the resurgence in the lingual scenario.

In the 1980's Kyoto Takemoto, began treating patients with Fujita brackets and a mushroom archwire. He shifted to the Kurz Ormco bracket on its introduction and used the Hiro technique of indirect bonding of brackets.



Hiro System

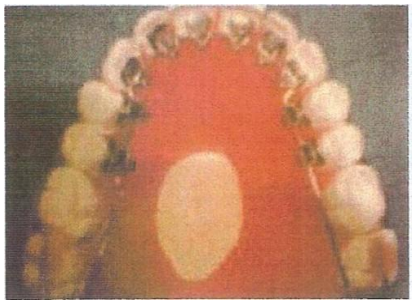
Hiro technique by Dr: Toshiaki Hire has proven to be a breakthrough in indirect bonding for lingual cases without the use of silicon trays. It consists of a setup model, individualized cores and an ideal archwire form, also used as a 3D replacement jig for rebonding. Takemoto recommends the use of the Lingual bracket from the first molar to the first molar. He also used labial tubes on the first molar and second molars. In 1981, Ormco Introduced the T.A.R.G. unit Torque, Angulation, Reference Guide, a Laboratory aid in placement of Lingual brackets on models. The original instrument was induced. A surveyor universal swivel base for casts.

A base with a vertical arm that holds a bracket clamp.
A labial gauge holder, which can be moved to change both torque and angulations.
A set of gauges with the prescription of each tooth.

T.A.R.G. Unit

Iechmann

Class system (Customised Lingual Appliance Set-up Service)

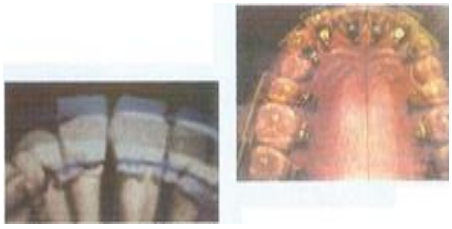


Customised Lingual Appliance Set-up Service

Designed by Dilinger and Newhart with Ormco in 1984. The brackets are positioned on a target set-up model. To permit clinical rebonding with only one tray, the individualized brackets are transferred to the malocclusion model before making the transfer tray.

BEST system (Bond Equal Specific Thickness)

Pillion promoted a new procedure between 1989-1991, which includes a thickness-measuring device (T.M.D.) to the original TARG, which is a caliper, modified to hold the bracket. Pillion also designed a computer program for Lingual archwire design called DAL1(Dessui de L'Arch Lingual informatise).



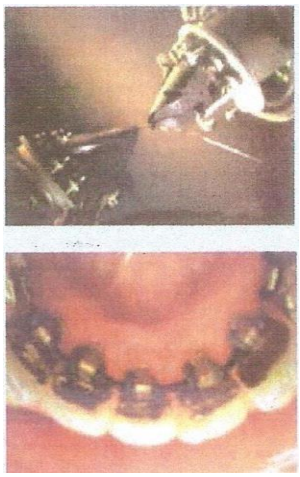
Currently, Pillion in co-operation with Orapix (KCl South Korea) has developed software that helps in a 3D set-up to decide on the final position of teeth and Dall Archwire decides the ideal prescription. Using CAD-CAM Rapid Prototype cores technology a Rapid prototype machine is

used to prepare transfer trays. The bracket position is computer-aided and any type of bracket system can be used by this procedure.

TOP system (Transfer Optimised Position)

In Germany, Dr, Dirk Wiechman (University of Munster) put forth a customized lingual therapy, which utilized state of the art CAD-CAM technology and TARG Pro (TARG2 modified by the addition of height measuring device to the vertical arm).

Currently, Wiechmann has developed his new brackets called Incognito with computerized designed pads with a wide base and perfect fit. The bracket prescription is individualized and the anterior brackets have a vertical slot and posterior brackets have horizontal slots. The computer converts the virtual brackets into real ones with a Rapid Prototyping machine using a material called Degunorm (Degussa Germany).



1.Archwire Bending Robots, 2.Incognito System

(Part- 2)

At that time the dental University of Zurich/Switzerland was one of the leading Institutes in the world. The superb head of the orthodontic department was Prof. Dr. Hotz. He integrated fixed appliances very early into his teaching program by Prof. Dr. Stockli and Prof. Dr. Joho, and Prof. Dr. Teuscher. By these activities, he was called in Germany the "traitor" of functional jaw orthopedics.

Prof. Dr. Hotz realized the problems of removable appliances concerning cooperation and even more in reduced or no control of tooth angulations.

The doctrine of functional adaptation still in mind, the University of Zurich developed the so-called "Teuscher Activator", to combine growth stimulation with the control of tooth and jaw angulations using a combination of a removable activator with a headgear. This combination is very effective in progress for removable appliances.

Remaining evolution for the future

The law of Roux - the functional adaptation and the equilibrium of function and form is still an accepted law in medicine. In contemporary orthodontic mechanics, the background of a functional treatment is still missing. By this, contemporary orthodontics remains still mechanics based on technical/physical precision and not on individual precision.

The TOP system does not compensate for the difference in thickness of anterior teeth as done by other systems. The brackets are bonded with the least possible positioning thickness. Hence, it needs to incorporate bends on the wire to compensate for the difference in thickness.

The European Society of Lingual Orthodontics (ESLO) was founded in 1992 in Venice, Italy with a mission of assimilation and diffusion of the Lingual experience of the clinicians. It also formed the main front for the presentation of advancements and new developments by clinicians and companies. It also formed the body of recognition of Lingual standards in the world over.

SLOT Machine

Designed by Thomas Creekmore between 1989-1993 is a precise instrument for labial and lingual bracket positioning directly on the plaster model cast. It was originally designed for labial and lingual vertical slot brackets I; Dr. Echarri has designed accessories that enable its use with horizontal slot brackets.

Pablo Echarri, Slot Machine

The Slot Machine consists of

- Model cradle
- Model Platform
- Labial Tower
- Lingual Tower And host of other accessories that provides guidance in ideal placement of brackets.

Mushroom Bracket Positioner :

Dr. Hee Moon Kynug developed the Individual Indirect Bonding Technique (IIBT 1986). The IIBT consists of three steps

- Mounting of set up models on articulator, casecorrection and over correction.
- Bracket positioning on the corrected models with Mushroom bracket M.B.Positioner positioner.
- Fabrication of flexible individualized trays called Flexible core trays.

This technical precision means precise angulations of molars being in opposition to angulations of age-adapted angulation, causing row boat moments, many not necessary extractions and angulated teeth out of axial loading by function.Concerning the occlusion, this technical precision means a straight occlusion of prehistoric fossil skulls with many craniomandibular dysfunctions and precise scientific statistics of questionable worth.

The term "light forces" does not mean the functional treatment of an organ.The evolution of orthodontics needs to solve the problem: How to guide the organ of mastication individually and functionally by fixed appliances and not after demanding, and how to treat individual age-adapted angulations of teeth, especially of the 1st upper molars, the key of occlusion.

To solve this concept successfully, basics in contemporary anatomy and biomechanics need to be redefined or even defined, as mentioned at the beginning. A second key will be a reduction of slot heights and wire sizes. A third key will be the introduction of the modern sciences of System Theory, Bio-cybernetics, and Fuzzy Logic.

Future orthodontics will be Individual orthodontics for individual problems on the theory of New Orthodontics, Bio-Functional Orthodontics, BFO, connecting back with the theory of Lischer and Graber towards "orthodontics as applied biology, not just tooth straightening."

End of the dap decides what pun is capable of straightening.

KISS System :

Dr. Tae Weon Kim and the Korean Society of Lingual Orthodontics (KSLO) developed the system called KISS - Korean Bonding Set up System. According to the authors, the ideal positioning of Lingual brackets depends on, ideal set up models, ideal bracket positioning on set up models and accurate transfer of the brackets to the patient's teeth.

T. W. Kim

Model Checker

The KISS system consists of - Set up Model checker

- Bracket Positioner
- CRC ready made core

CRC Cores

Lingual BracketJig :

Dr. Sylvia Geron from Israel has designed the Lingual bracket Jig, which can be used in direct bonding, but it also can be used to bond brackets on the model cast and then fabricate a transfer tray. In 1987 the Italian Society was founded, Associazione Italians Orthodonzia Linguale (AIOL). Dr. Guieseppe Scuzzo was able to keep a lingual mechanism in prominence by achieving excellent results in all types of malocclusion. His quest fora new ideal bracket design with Dr. Takemoto is most notable. Dr. Favero (Italy) regularly treats children and adolescents with LO and making it a legitimate treatment option for all.

The Asian Lingual Association was active in the form of the Japan Lingual Orthodontic Society and the Korean Society of Lingual Orthodontics.

Significant strides have changed the present scenario of LO. The number of bracket systems available has increased. There has been a sincere attempt to make LO an evidence-based system. The normally used professional systems in use are:

TARG based Systems

1)CLASS System (Customized Lingual Appliance Set up Service)

2)BEST System (Bonding with Equalized Specific Thickness)

3)TOP System (Transfer Optimized Positioning)

Non TARG Systems

1)HIRO Systems

2)Individual Indirect Bonding Technique

3)KISS System

The different brackets available can be classified on the direction of the slot

Horizontal slot

- 7th generation Kurz Bracket (Ormco) - Scuzzo Takemoto bracket (Ormco)
- -Conceal II, 2nd generation (Creekmore Enterprise)
- -N/M bracket (Forestadent)

Mixed slot

Vertical in anterior and Horizontal in posterior

- -Incognito (Wiechmann)
- -Evolution LT (Adenta)

Combination of Slots

Horizontal, Vertical and accessory slots.

- Fujita bracket (Citizen)
- Stealth bracket (American Orthodontics)

Today, the major limitations of LO are

- Need for improvement of bracket design for ligation and tongue irritation
- Reduction in speech distortion.

The main goals in lingual orthodontics today are Aesthetics and function. The turn of the century has seen the introduction of two new systems, which address these issues, the Incognito brackets (Wiehmann TOP system) STb (Scuzzo Takemoto bracket) appliance.

Drs. Scuzzo and Takemoto developed the STb appliance to achieve the three essential goals of the "Light lingual philosophy". Minimize appliance friction; maintain low forces throughout treatment, the reduction in discomfort and no speech distortion.

The significant development at the beginning of this century has been the establishment of the World Society of Lingual Orthodontics (www.wslo.org) with Dr. Didier Fillion elected as President of the apex body. This federation would aim to provide organized dispersion of the science of lingual orthodontics around the world.

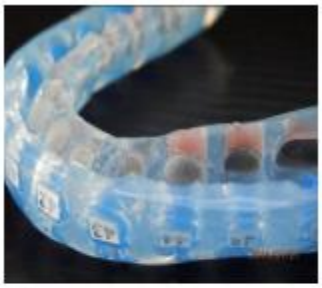
Dr. Didier Fillion

Guieseppe Scuzzo

STb System

In 2004, Mr. Peter Sheffield (Lab Ceramist & inventor) after training in Paris for two weeks using Modified TARG at Dr. Fillion Laboratory in Paris. Went on to develop Two Devices in collaboration with Hexa Ceram & Polydee Instruments in Thailand. His concepts derived to defeat inaccurate bonding heights & improve speed & ergonomics in the Lab. He is credited with the development of TAD – Torque Angulation Device, which acted as TIP & TORQUE surveyor. BPD – Bracket Positioning Device, which made inhouse bonding accessible & simple.

In 2010, onwards he introduced SET-UP after measuring up Bond directly on Malocclusion models. He preferred the BEST principle (Bonding with Equalised Specific Thickness), to reduce first order bends to a minimum. He named it IN-tendo. Trays were modified slightly using LC block-out resin to make occlusal rests & indicators in hard blue resin before using Memosil. Then he went on to design brackets - IN-tendo JK-SL Lingual, with a smaller slot size & passive SL with rounded contours. (Images are supported below).



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