

## REVIEW ARTICLE

# LINGUAL ORTHODONTICS – AN ESTHETIC CONSIDERATION

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### ABSTRACT:

This paper aims to clear the misconceptions regarding the complexity of lingual orthodontics among the practitioners as over the past decades, the hard work of researchers and manufacturers has resulted in many improvements in appliance design, laboratory and bonding procedures, as well as in clinical, mechanical techniques, that simplify the lingual treatment. This paper discusses a fully customised lingual appliance, the incognito appliance.

Keywords: Incognito appliance; Esthetics; Lingual braces; Orthodontics

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**I**NTRODUCTION:  
Long durations of unaesthetic appearance due to malocclusion treatment led to the invention of so called invisible orthodontics<sup>1</sup> which comprises of tooth coloured brackets and archwires, clear aligner therapy and lingual orthodontics. However, these brackets and archwires are invisible from a certain distance only. Also, the clear aligners are not purely invisible as it is a transparent sheet closely adapted to the teeth. The lingual orthodontic appliances are in a true sense the only invisible appliance system available. This appliance system consists of placing specially designed lingual brackets onto the palatal / lingual surface of the teeth.<sup>2</sup>

History of lingual orthodontics date back to 1967 when Kinja Fujita first developed lingual multibraket technique using the mushroom shaped archwire. He introduced Fujita method treating Class I and Class II cases with extraction of four bicuspids and the brackets used had three slots – occlusal, horizontal and vertical known as Fujita bracket.<sup>3</sup>

The first lingual appliances used standard labial brackets, which were modified by the clinician and bonded to the teeth using a direct technique, the same technique as is employed to bond labial brackets. Lingual orthodontics achieved a certain amount of popularity in the 1980s; however, its

popularity soon decreased due to clinical difficulties associated with the technique. There has been an enormous resurgence of interest in lingual orthodontics in the last ten years. This can be accounted for by two factors: the invention of the incognito lingual appliance; and, the increase in the number of adults seeking orthodontic treatment.<sup>1</sup> A significant benefit of lingual appliances is that they leave the labial enamel unaffected.<sup>5</sup>

Van der Veen<sup>6</sup> conducted a study comparing the prevalence and intensity of white spot lesions between labial and lingual fixed appliance cases and reported that labial orthodontics produced 4.8 times increased frequency and 10.6 times increased intensity of white spot lesions compared to lingual cases. Thus lingual appliances also reduces the risk of decalcification as compared to lingual appliances.

### INDICATIONS<sup>6,7</sup>

- Deep bite cases
- Class I with mild crowding
- Class I with generalised spacing
- Arch expansion
- Diastema closure
- Class II with retruded mandible
- Class I bidental protrusion - all first bicuspid extraction, where in anchorage is not critical
- Class II only upper bicuspid extraction

- Surgical cases
- class III cases

### CONTRA INDICATIONS<sup>6</sup>

- Acute Temporomandibular joint dysfunction
- Mutilated posterior occlusions
- High angle / dolichofacial patterns
- Extensive anterior prosthesis
- Short clinical crowns
- Critical anchorage cases
- Poor oral hygiene or unresolved periodontal involvement
- Unadaptable or demanding personality types.

### LINGUAL APPLIANCES

The Lingual orthodontics, apart from its esthetic values, also presents several other advantages. Currently, it has become a complete system in itself, starting from an accurate diagnosis, treatment protocol, laboratory procedure to placement of the appliance in the patient's mouth.<sup>2</sup> Mechanically, conventional lingual orthodontics has always been difficult to finish in comparison to conventional buccal appliances. This is because the inter-bracket distance between lingual appliances is much smaller than on the buccal. Therefore, the finishing and detailing phase of lingual appliances has been protracted greatly. Computerization and robotic technology are changing the disadvantages of lingual appliances into positive results, better outcomes, and decreased chairtime.<sup>8</sup> Because the system incorporates the final occlusion into the computerized process, it allows the orthodontist to incorporate all of the finishing details into the occlusion from the beginning.

### THE INCOGNITO LINGUAL APPLIANCE

Lingual orthodontics has advanced to a highly sophisticated level where CAD/CAM (computer-aided design/computer-aided manufacture) technology is employed to manufacture both the brackets and arch wires for each patient individually in the incognito appliance system.<sup>1</sup> It was launched in 2004 as the first fully customized lingual bracket system in the world.<sup>9</sup> The Incognito appliance is manufactured using state-of-the-art CAD/CAM technology. The first step in the fabrication process is taking accurate polyvinyl siloxane impressions and bite registration using polyvinyl siloxane, and then creating a model in plaster and a diagnostic waxup thereafter (according to my direct instructions). The final model is then sent to dentist, digitally for feedback. The final model is then scanned with a 3-D scanner and the brackets are designed on the

computer.<sup>10</sup> This appliance has an advantage over other "invisible" orthodontic appliances for several reasons. Due to its core brackets and wires, all tooth movements can be accomplished. It is a lingual appliance; therefore, it does not suffer from any visible issues that are imposed by conventional ceramic brackets, coated or even translucent wires, and aligner attachments. With the arrival of the Unitek TMP computerized portal, Incognito is a major improvement over lingual appliances of the past and a giant leap forward in orthodontic technology.<sup>8</sup> The Incognito™ Appliance System features fully customized brackets, archwires and bonding trays to deliver predictable, efficient and effective treatment outcomes.

### DIGITALLY CUSTOMIZED SELF LIGATING LINGUAL SYSTEM<sup>11</sup>

Harmony is the lingual system that combines

- Interactive Self Ligating Brackets
- Customized Bonding Pads
- Anterior Positioning Jigs
- Robotically Formed Arch Wires
- Digitally-Assisted Treatment

Using proprietary digital scanning and CAD/CAM technologies, a highly accurate bonding pad is created for the lingual surface of each tooth. The customized pad integrates seamlessly with its corresponding interactive self ligating bracket. The slot of each bracket is positioned ideally on each tooth using a digitally customized adapter that works in conjunction with robotically formed arch wires to deliver doctor-driven, patient-specific treatment goals.<sup>11</sup>

Kafle D et al<sup>12</sup> reported five cases of midline diastema which was successfully treated with lingual orthodontic appliances. Chaudhari PK et al<sup>13</sup> reported a case of 19 year old female patient with Class I malocclusion associated with 80% overbite (closed bite) treated by lingual appliance. As the patient was adult and college going, and more esthetic conscious, she chose lingual orthodontic appliance for the treatment of her malocclusion. Another reason for choosing lingual appliance was the bite plane effect of the lingual appliance which would be helpful in bite opening. The patient was highly satisfied esthetically as well as functionally after the treatment was completed.

Khaled M. Abouseada<sup>10</sup> also reported a case of non-extraction treatment of a Class II case with a missing mandibular central incisor treated successfully using a CAD/CAM lingual orthodontic system and concluded that the key to success in lingual orthodontics in terms of both professional and patient satisfaction is practice and

training. The Incognito system can be used for all types of malocclusions with the same precision as labial braces.

### CONCLUSION:

Lingual Orthodontics is the most aesthetic treatment modality, and is the best treatment option for adult patients, as the lingual brackets fulfil the demand of socially active adult patients. When the orthodontist considers the specific aspects of the appliance, modern customized lingual appliances offer the potential to treat cases with a precision and finish up to and even beyond that which is achievable with labial appliances. Lingual orthodontics encourages those patients for orthodontic treatment who demands aesthetics but hesitant to wear the labial braces.

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