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SHORT COMMUNICATION A TRUE AESTHETIC ORTHODONTIC ARCHWIRE: OPTIFLEX

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Abstract

The change in field of dentistry by the percolation of the technology into the very fabric of it has drastically changed the patient's perception and doctor's efficiency in providing a satisfactory dental care. This inflow of technology into the orthodontics had led to the development of a new orthodontic archwire called optiflex that provides a prefect aesthetic solution for the fixed labial mechanotherapy. With collaboration from the ceramic brackets the optiflex provides a true aesthetic effect during the process of the treatment.
The optiflex provides excellent aesthetic effects as they are transparent unlike the coated metal archwires and they exhibit similar mechanical properties as the metallic wire, while in exhibiting the physical properties they surpass the metallic wires and reach to new heights. The following short coomunication gives a brief idea about the advantages and journey of the optiflex wire from its invention in 1992 till now.

Keywords: field of dentistry, optiflex, short coomunication.

INTRODUCTION

O Orthodontics is always considered as an important branch in dental speciality that has the capacity to deliver aesthetic facial profile. As the time advancing there is an upbeat in the technologies that are incorporating in the field of orthodontics, which led to the patients demand for the aesthetic options even during the orthodontic treatment.

This led to development of aesthetic brackets and archwires that incorporated aesthetics into the labial orthodontics. One of such innovation is the optiflex orthodontic archwire.

Optiflex is a modification of the optical fiber and is developed by Taalas1 in 1992 and produced by Ormco cooperation. This is the first non-metallic archwire ever used in orthodontics. Though optiflex was developed way back in 1992 there is not much of a literature that has been published about the optiflex since then, so this article will give a detailed insight about optiflex.(Figure 1)

Figure 1: *Optiflexarchwire engaged in ceramic brackets*

COMPONENTS OF OPTIFLEX WIRE: 2

Optiflex wire consists of 3 layers they are:

1. Inner silicon dioxide glass core

2. Middle silicon resin

3. Outer nylon layer

MANUFACTURE OF OPTIFLEX WIRE:

Optiflex manufacture is similar to that of optical fiber where the raw materials like silicone dioxide are used for the production of both the inner core and middle cladding for the core protection.

The process is called vapour deposition which has a cylindrical preform made by depositing layers of specially formulated silicon dioxide on the inside of a hollow substrate rod. The layers are deposited by applying a gaseous stream of pure oxygen into substrate rod.

Various chemical vapours are added to stream of oxygen, as the oxygen contacts the red hot surface of the rod a layer of silicone dioxide soot is deposited. After the soot is built to a desired thickness the substrate rod is moved through other heating process to remove moisture and bubbles trapped in the soot layers creating a solid cylinder of core and cladding material that is heated and drawn into different sectional archwires.

The middle layer is made of silicone resin that is formed by branched, cage like oligosiloxanes. They act as binders and they are water and heat resistant that helps to prevent damage to inner silicone core.

Finally the outer nylon layer is a synthetic polymer which is thermoplastic and has excellent abrasion resistance and superior colourfastness.

Wire diameters:Optiflex is available in

1) Round - .014 up to .020

2) Rectangular- .021 x .025

3) Square - .016 x .016

4) Multi-stranded wires- 2 or more wires of smaller diameter are twisted together/coiled around a core wire - 0.016 or 0.017

PROPERTIES OF OPTIFLEX:

Mechanical properties of optiflex: 1

Table 1:*Comparison of mechanical properties of different archwires with Optiflex*

	Tests	Optiflex	NiTi	NiTinol	Respond
1)	Tensile test	1%	3.5%	5.1%	4.5%
2)	Cantilever beam bending test	1.6Nm	6.75Nm	12.25Nm	5.5Nm
3)	Three point bending test	Lower than other archwires	More than other archwires	Medium	Medium
4)	Time dependent effects	Excellent	Excellent	Low	Low

• Tensile strength: optiflexarchwire exhibited good mechanical properties although according to basic physics the glass exhibit less tensile strength than metals.

In a similar way optiflex showed less tensile strength as it's a glass when compared with metal(NiTi). Clinically the effect of low tensile strength is not an issue as its influence on the orthodontic treatment is significantly less.

• Bending tests: bending test showed that forces applied by optiflex is much lighter and more constant than those delivered by other archwire this comes as an advantage as it reduces the discomfort of the patient during the intial alignment of the crowded dentition. Clinically the forces delivered by the optiflex are sufficient enough to produce the desired tooth movement.

• Time dependent effects: optiflex showed excellent time dependent effects as it's a glass it do not have a significant plastic deformation and its flexible until it reaches the threshold of a breaking point.

Optiflex and coaxial wire comparison: 3

Table 2: *Comparison of Coaxial wire with Optiflex wire*

		Optiflex	Coaxial wire
1)	Load deflection rate	Less	More
2)	Decrowding efficiency	Same	Same

- Load deflection rate: when compared between the coaxial and optiflex the load deflection was measured using INSTRON(4300) which showed coaxial wire has more load deflection rate than the optiflex wire.

- Decrowding efficiency: when coaxial and optiflex wire was compared for decrowding efficiency in time period of 45 days, both the wires showed similar decrowding ability.

Physical properties of optiflex:

Optiflex show excellent physical properties that is unparalleled with any other aesthetic archwire since this wire has a glass core which scatters the light making it the most aesthetic of all.

When compared with other aesthetic coated wire where the coating gets scrapped of after few days and tends to discolour due to contamination in the oral cavity, the optiflex will be stable with no discoloration for several weeks. And the outer scratch resistant nylon layer and middle silica layer protects the inner glass core from oral contamination making it water resistant.

CLINICAL CONSIDERATIONS FOR OPTIFLEX WIRE: 4

1) Metal ligatures can fracture the glass core of the archwire. Therefore, Optiflex must be tied into the brackets only with elastomeric ligatures.

2) Sharp bends similar to those commonly placed in metal archwires should be avoided since they can fracture the core of Optiflex.

3) Instruments with sharp edges should not be used to force Optiflex into the bracket slot. Instead, a gentle force with the clinician's finger is more appropriate.

4) Sharp distal end cutters can be used to cut the end of the archwire distal to the molars.

5) Friction between elastomeric ligatures and the outer surface of the archwire (Nylon) eliminates unwanted sliding of Optiflex to either side. Therefore, "cinch back" is not needed when using Optiflex.

6) Patients must be informed about the nature and structure of Optiflex. They must avoid a rough diet which can harm the archwire and delay treatment progress.

CONCLUSION

With the advent of technology into the field of orthodontics created a vast erray of opportunities to improve the treatment by incorporating aesthetics and efficiency. Optiflex is such an invention that caters the need of patient and practitioner.

Reference

[1] Talass MF. Optical fibers as orthodontic archwires: optiflex. J. showa. Univ. Dent. Soc 1995; 15:51-58.
[2] Talass MF. Optiflexarchwire treatment of a skeletal class III openbite. J ClinOrthod 1992; 26:245-59.
[3] NagalakshmiS et al. A comparative evaluation of mandibular incisor decrowding with coaxial and optiflex arch wires and their load-deflection rates. J Pharm BioalliedSci 2014; 6:118-21.
[4] Kusy RP. A review of contemporary archwire: their properties and characteristics. Angle Orthod 1997; 67:197-207.