Case Series

The Use of Implants with Conometric Connection and Monophasic Implants to Optimize the Maintenance of Soft Tissues in esthetic Areas

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Abstract

Background: The purpose of this study is to analyze the advantages of the conometric connection and of the monophasic implants in the esthetic area. This work, according to the authors, helps the clinician to achieve excellent results on soft tissue by knowing and avoiding the pumping effect. **Methods:** In this study, ten titanium implants of Immediateload SA-CH have been introduced instead of teeth in the upper and lower frontal area, (extracted because of infection or agenesis) with 1 year of follow-up with perfect healing of the interincisive papilla. **Results:** Thanks to the results achieved, that is osteointegration, minimal crestal bone resorption, good interincisive papilla maintained in the esthetic zone, it is clear how the conometric connection and the monophasic implant are an excellent prosthetic solution minimizing the effects of flat-to-flat connections. **Conclusion:** From the observed results, it has been highlighted that Immediateload Company appears to have two perfect solutions (conometric connection and monophasic fixture) to be used in esthetic area like lateral upper incisors.

Keywords: Conometric connection, immediate loading, interproximal papilla, monophasic implants

Introduction

In the recent decades, great advances in implantology have been achieved by allowing implant therapy to become a therapeutic solution today not only for total or partial edentulism but also for monoedentulias.

The external hexagon was the first connection system used in implantology, and it was born with Branemark to facilitate the insertion of the abutment, then expanded its functions to become an anti-rotation mechanism.[1]

It was used later by various implant companies that represented and interpreted it in various ways, causing various changes either with the height or with the diameter of the hexagon connection. Furthermore, the tightening screw changed a lot from the point of view of the material, of the diameter, of the number of the turns, of the dimension of the length, and torque application.[2]

In the literature, there are several studies that document the incidence of technical complications of systems equipped with the external hexagon connection with percentages that varies from 6% to 45%.[3]

However, we must not forget the importance of perfect adaptation between implant and hexagon of the abutment.

To try to overcome the biomechanical complications, such as loosening of the connecting screw or the fracture of the abutment or the clamping screw, the major implant companies with external hexagon connection have introduced the use of keys dynamometers that gave to the screw a calculated torque. This is the subject however; it did not completely eliminate the problem, although it led to a reduction in incidence.

The internal connections showed immediately greater mechanical stability and better stability than external ones.[4,5]

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Dibart *et al*.[5] tested *in vitro* three single tooth implant systems with drawings of different connections for anti-rotational stability, resistance to cyclic fatigue, and torque. They discovered that the internal hexagon system offered the highest stability of the abutment and a higher resistance to cyclic fatigue than the external hexagon system.

It can generally be said that the internal connection offers more advantages in terms of stability and with prolonged application of lateral forces.

A separate argument between the internal connections deserves the pure conometric connection, which it does not require the presence of screws and where the interface provides a direct joint between the surfaces of the abutment and implant.[5,6]

In this case, the tolerances of the coupling must be very precise because the transmission of the couple happens by friction, by effectiveness of the system that is closely linked to the material used, to the nature of the surfaces, and to the geometric shape.[1]

Considering that the surfaces are never perfectly smooth, there is microscopic asperity that, thanks to the contact, a cold welding is obtained.

The mechanical stability of this system is ensured by the total elimination of all micromovements at the interface between the components.

Numerous studies have demonstrated the effectiveness and reliability of this system by highlighting a low incidence of clinical complications.[7,8]

It was noted, thanks to some microscopic examinations, that the discrepancies present in the interface of the components in a conical connection amount to no more than 3 μ, compared with 20–30 μ of average distance between abutment and implant connected with screwed systems and even 70–120 μ of average discrepancy between screw thread and implant.[9]

It seems that this type of system is also very effective in countering the phenomenon of the pumping effect that is present in screwed systems.[10]

This conometric connection and the monophasic implants constitute an excellent barrier to bacterial penetration. Whereas the size of a bacterium can range from 1 to 6 μ and that, as mentioned above, the gap interfacing of this system ranges from 1 to 3 μ, bacterial percolation through the coupling of the implant components becomes a very difficult phenomenon to be realized.[11]

Some studies have shown that the conometric connection prevents the passage of fluids, and therefore also the bacterial colonization.[12,13]

All this, translated into clinical terms, would effectively contribute to the reduction of implant failures due to infectious causes.

The aim of this study is to present a series of cases of implants of the frontal area (mostly lateral incisors) rehabilitated with monophasic implants and with implants with the conometric connection.

Methods

Since January 2016, ten esthetic sites [Figure 1] have been rehabilitated in the upper and lower frontal area using implants with conometric connections or monophasic implants [Table 1].

The difference in their use consisted of the amount of bone available and the future inclination of the abutment.

When the prosthesis required an inclination of the abutment, the surgeon used a cone-shaped implant with an angled 15° abutment [Figure 2].

Among these seven monophasic implants, in three cases a slight filing of the abutment with a cylindrical diamond bur was made for prosthetic purposes.

From the radiographic point of view, Rx orthopantomography and TC cone beam were performed before the surgery to evaluate bone volumes.

In only two cases, there was the necessity to manage vestibular bone deficiency with bone grafting (Osteobiol) and Hemocollage with repositioning of the soft tissue.

In cases where suturing was necessary, it was removed after 2 weeks [Figure 3].

Following surgery, endoral control radiographs were performed to monitor the osseointegration process.

All rehabilitations were performed with antibiotic prophylaxis from the day before surgery (amoxicillin tablets from 1 g: 1 tablet every 12 h) up to 5 days after surgery. It was decided to use amoxicillin without potassium clavulanate to have a complete dose of 1000 mg of amoxicillin instead of 875 mg of amoxicillin plus 125 mg of potassium clavulanate.

Thanks to the 1-year follow-up, it is possible to notice the perfect achievement of the interproximal papilla's health with minimal loss of crestal bone.

Results

All the cases rehabilitated in this study ended with the perfect functional and esthetic achievement in the anterior area [Figure 4]. The control Rx performed up to a year of follow-up, showed the successful osseointegration, minimal crestal bone resorption, and the perfect maintenance of the interincisive papilla [Figure 5].

Discussion

Thanks to the results achieved, that is osteointegration, minimal crestal bone resorption, and good interincisive papilla maintained in the esthetic zone, it is clear how the conometric connection and the monophasic implant are an excellent prosthetic solution minimizing the effects of flat-to-flat connections.

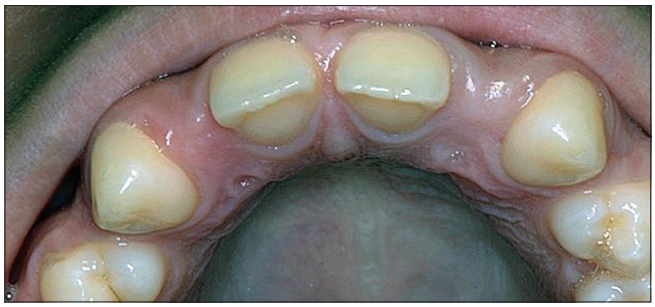

Figure 1: Preoperative alveolar site

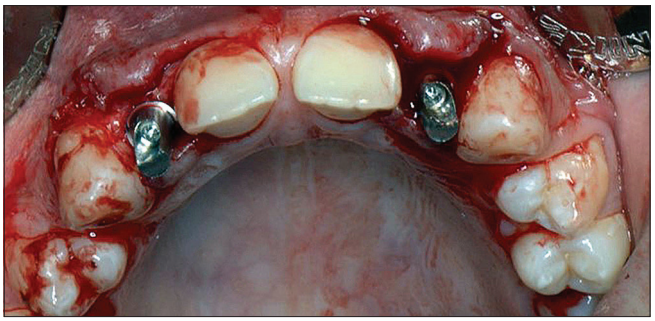

Figure 2: Positioned abutment with conometric connection with an angled 15° abutment

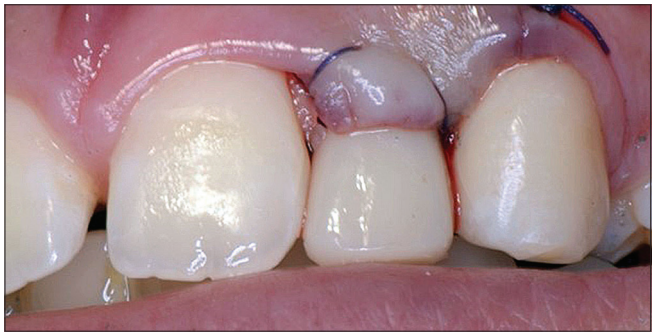

Figure 3: Immediate loading after implant introduction

Figure 4: Rehabilitated implant with final prosthetic artifact

As known, the implant-abutment interface and the clamping screw are subjected to very high mastication loads, especially in cases of monoedentulism or partial rear edentulous rehabilitation.[13]

It follows that a perfect implant-abutment coupling is essential for good bone preservation.

In the conometric connection, a true "cold welding" is generated, due to the contact pressure between the surface of the implant cone and the internal surface of the implant abutment.[14]

The friction that is created between two surfaces of equal taper tightened to 35 Ncm, is such as to generate a direct, durable, and waterproof joint. In fact, this type of connection is the only one that is likely to approach the ideal condition of the monophasic implant.

However, being able to mechanically create a perfect conometric coupling requires particular attention and ability, right from its design phase.

Immediateload designers and engineers can detect and evaluate every critical point to produce perfect components, in which the friction clutch functions not only on the project but also above all in the patient's mouth.

The resulting system is effective and reliable, as shown by numerous studies conducted all over the world.

Some of the advantages of the conometric connection are as follows:[14]

- Elimination of the passage of fluids and therefore of bacterial colonization,
- Elimination of micromovements at the interface between the components resulting in greater mechanical stability,
- Low incidence of clinical complications,
- Reduction of peri-implantitis,
- Significant reduction of implant failures.

The connection of the Immediateload implant Universe is designed not only to guarantee the implementation of the benefits of the conometric connection but also to those of the one-piece system.

In consideration of the studies that identify the concentration of mechanical stress in the cortical area as a possible contributing factor to bone resorption, the engineers have designed for the Universe implant an internal geometry that allows the implant–abutment screw system to be assimilated to the single piece implant. In fact, the Universe implant–abutment connection interface has a total height of about 5.5 mm, in contrast to the 2–3 mm on average found in other implant systems.

The resulting benefit is a better distribution of the load, which is dispersed on 80% of the implant instead of concentrating only in the cortical area, as it frequently happens in other implant systems.

Even monophasic implants are a valid alternative to daily practice. They in fact completely circumvent the problem of unscrewing by eliminating the screw passed between the abutment and implant.

Conclusion

In the approach of a site in the esthetic area, the ability to handle the therapeutic treatment in a single surgical session

Table 1: Implant used for this study

	Rehabilitation area	Implant used	Implant connection	Rehabilitation times
Case (*n*=1)	2.2	Monophasic implant DM 3.4 mm × 13 mm Power Immediateload	Monophasic connection	Postextraction and immediate loading
Case (*n*=2)	1.2	Monophasic implant DM 3.0 mm × 13 mm Solution Immediateload	Monophasic connection	Incisive agenesis and immediate loading
Case (*n*=3)	1.2	Monophasic implant DM 3.4 mm × 11.5 mm Power Immediateload	Monophasic connection	Postextraction and immediate loading
Case (*n*=4)	3.3	Biphasic implant DM 3.4 mm × 11.5 mm Universe Immediateload	Conometric connection	Postextraction and immediate loading
Case (*n*=5)	1.2	Monophasic implant DM 3.4 mm × 11.5 mm Power Immediateload	Monophasic connection	Incisive agenesis and immediate loading
Case (*n*=6)	4.2	Monophasic implant DM 3.4 mm × 11.5 mm Power Immediateload	Monophasic connection	Postextraction and immediate loading
Case (*n*=7)	4.1	Biphasic implant DM 3.4 mm × 11.5 mm Universe Immediateload	Conometric connection	Postextraction and immediate loading
Case (*n*=8)	1.2	Biphasic implant DM 3.4 mm × 11.5 mm Universe Immediateload	Conometric connection	Incisive agenesis and immediate loading
Case (*n*=9)	3.2	Monophasic implant DM 3.4 mm × 13 mm Power Immediateload	Monophasic connection	Postextraction and immediate loading
Case (*n*=10)	1.2	Monophasic implant DM 3.0 mm × 11.5 mm Solution Immediateload	Monophasic connection	Postextraction and immediate loading

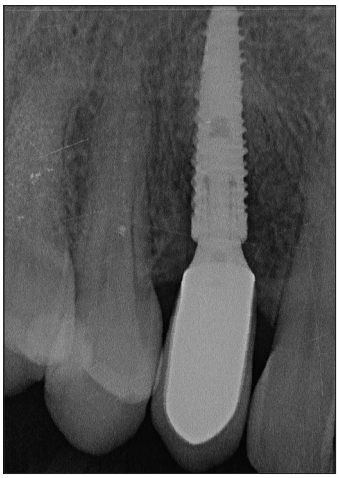

Figure 5: Rx intraoral after 1 year of follow-up

with immediate loading, using the conometric connection, or a monophasic implant, is definitely a benefit for the clinician and primarily for the patient.

The possibility of subjecting the patient to a limited number of surgical sessions can indeed a better acceptance to the treatment and allows a reduction in the time of completion of implant prosthesis rehabilitation, without affecting the quality of the performance. The evolution of surgical techniques and the greater ability to manage the mechanisms of interstitial tissue healing, thanks to the conometric connection and monophasic implants, allow dentists to deal with the treatment of esthetic sites in a more manageable way with great esthetic results.

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Conflicts of interest

There are no conflicts of interest.

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