

## **Simplicity and Safety in Implantology: “How to Control Implant Stability Over Time?” Protocols and Tools**

**Giovanni Giorgetti\***

*Director of the Maxillofacial Surgery Department at the Salus Clinic in Battipaglia SA, Magna Graecia University School of Medicine, Italy*

**\*Corresponding Author:** Giovanni Giorgetti, Director of the Maxillofacial Surgery Department at the Salus Clinic in Battipaglia SA, Magna Graecia University School of Medicine, Italy.

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### **Abstract**

**Purpose:** This randomized clinical trial aimed to investigate the relationships between insertion torque, implant stability quotient (ISQ), bone quality and crestal bone loss (CBL) of implants placed in the short and long time.

**Materials and Methods:** Total of 80 implants were inserted, all submerged and all had a diameter greater than 3.3 mm and a length of at least 10 mm, rough surface and is expected to conventional healing period.

Were carried out periodic reminders of 2, 4 months prior to shipment, and 1 month after prosthetic loading, considering the RFA.

**Results:** The data in our possession are: one failed implant, placed in zone 27, had a torque value of 24 N/Cm<sup>2</sup> and a value of 60 ISQ.

Straumann: 79 ± 2,80 Mean ± Dev. St; Neoss: 75.5 ± 7.55 Mean ± Dev. St; Ghimas: 73 ± 8,48 Mean ± Dev. St; IntraLock: 72.17 ± 7.07 Mean ± Dev. St. The data we have do not allow to relate the torque of entry with the ISQ value. The only statistically significant data with P < 0.05% unique to the ISQ values of Straumann.

**Conclusion:** From our data we found no relationship between insertion torque and ISQ in posterior edentulous saddles. It seems, however, that the ISQ is related to the plant geometry, in particular the length and bone morphology, as implants inserted in the “soft” bone show a progressive increase of the values in the course of the healing period.

**Keywords:** *Implant; Torque; ISQ*

### **Introduction**

With increasing of the life expectancy are more and more patients treated with implant-prosthetic thanks to the simplification of the surgical protocol and prosthetic materials and the improvement of the recent discoveries in the biomedical field.

The limitations of this type of treatment are still many challenges and implant dentistry is to have an absolute predictability. However, there are still many issues and variables that can cause failures: in fact, the implant success at 5 years was 61.3% (55.3 to 66.8) [1-4]. The failures can be biological or mechanical. Those biological load in the first year appear with a rate of 9-12% (respectively plants with smooth neck and TiO<sub>2</sub>-blasted) [5], 9.6% [2], 9% [6], then 13% [7]. The mechanical complications may be: 1) ceramic fracture 5.51% [8], 4.62% [7], 3.39% [9], 2) unscrewing connection screw 5.8% [3], 3) fracture or abutment screw connection 0.88% [4], 0.85% [7], 0.21% [10], 4) 0.21% fixture fracture [8], 0.24% [2], 5) 2.9% decementazione prostheses [11].

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It seems clear, therefore, that the use of standardized surgical protocols, patient selection, appropriate timing of loading, the choice of prosthesis solution and maintenance therapy play an important role for the long-term success.

**Aim**

The aim of this study is to relate some clinical parameters such as insertion torque, bone quality [12], bone resorption, the resonant frequency (RFA, Resonance Frequency Analysis), obtaining the ISQ (Implant Stability Quotients) in relation to implant successfully in the short and long term.

**Materials and Methods**

A total of 30 patients were enrolled, mean age 58.3 years (58.3 ± 10.27, Mean ± Dev. St): 15 men and 15 women. The inclusion criteria require that these patients are non-smokers, have no systemic disease, periodontal disease, and no dysfunction or TMJ disorder, a Full Mouth Plaque Score, and a full mouth Breeding scores below 20%.

In addition, we selected all those who had edentulous in the posterior region of the mouth in both jaws in the jaw. In no one case were used regenerative techniques, expansive bony ridge or maxillary sinus. Total of 80 implants were inserted, all submerged and all had a diameter greater than 3.3 mm and a length of at least 10 mm, rough surface and is expected to conventional healing period.

The cylindrical implants used are: 20 Straumann, Basel, Switzerland, 20 Ghimas Casalecchio di Reno, Bologna, Italy; Neoss 20, Cornwall Road, Harrogate, North Yorkshire, England; Intralock 20, West Rogers Circle, Suite 24 Boca Raton, FL, USA. During implant placement was assessed with the torque motor surgical iChiropro (Bien-Air Dental SA-Bien-Swiss) and detected with the ISQ PenguinRFA (Integration Diagnostics Sweden-Goteborg-Sweden).

Were carried out periodic reminders of 2, 4 months prior to shipment, and 1 month after prosthetic loading, considering the RFA.

**Results**

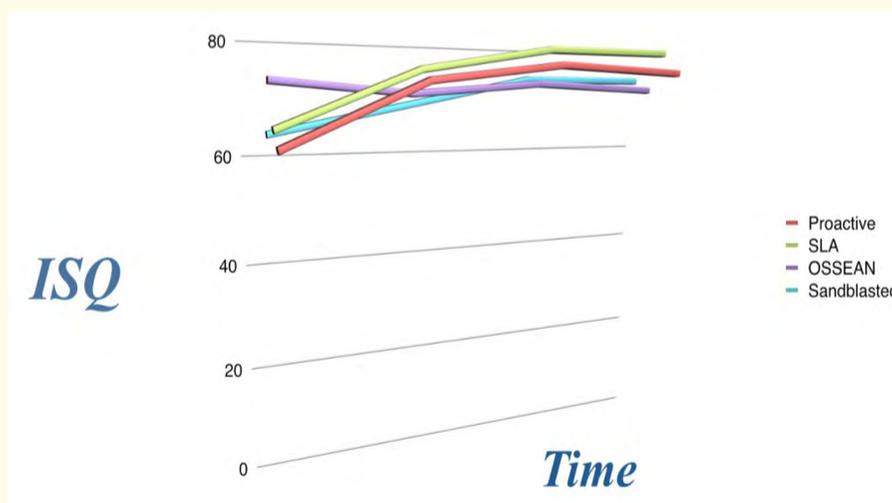
From our data, a single implant is not osseointegrated in area 27, with a torque value and a value of 24 n/cm<sup>2</sup> ISQ 60 and D4 of bone quality (Ghimas Casalecchio di Reno, Bologna, Italy).

**The results of the torque of implant placement are as follows**

Intralock: 45.4 ± 10.12 Mean ± n/cm<sup>2</sup> Dev. St; Ghimas: 41 ± 12.27 Mean ± n/cm<sup>2</sup> Dev. St. Straumann: 40.5 ± 8.15 Mean ± n/cm<sup>2</sup> Dev. St; Neoss: 33.1 ± 3.69 Mean ± n/cm<sup>2</sup> Dev. St.

**The results of the ISQ outcomes are all good**

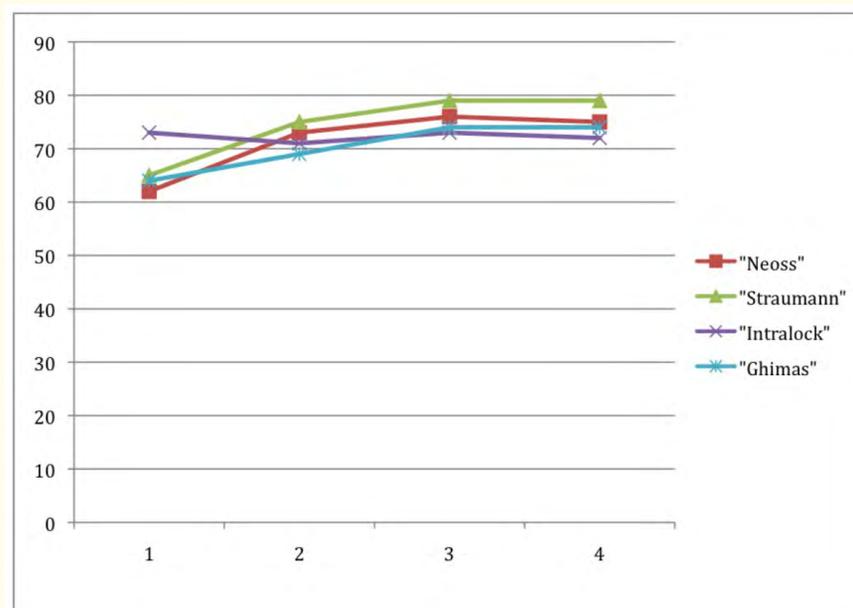
Straumann: 79 ± 2.80 Mean ± Dev. St; Neoss: 75.5 ± 7.55 Mean ± Dev. St; Ghimas: 73 ± 8.48 Mean ± Dev. St; Intralock: 72.17 ± 7.07 Mean ± Dev. St.



**Table 1:** Correlates the results as a function of time AFC.

**Discussion**

The data in our possession do not allow to relate the torque input to the ISQ value. The only statistically significant with P < 0.05% applies only to the ISQ values of implants with SLA surface (Neoss and Strauman) for the ealing in bone with soft quality (Figure 1). The lack of correlation between torque and ISQ, especially in this case leads us to speculate that this plant has a greater capacity for osseointegration. This may be due to several factors: implant design with a capacity greater compactor, implant surface resulting in a greater BIC mills with a capacity of cutting and removing more than frustules and irrigation.



**Figure 1:** Mean values obtained by placing the vestibular Osstell Mentor in the first four months and one month after loading.

## Conclusion

From our data we found no relationship between the insertion torque and ISQ in the posterior edentulous saddles. It seems, however, that the RFA-ISQ is related to the geometry of the system, in particular the length and morphology of bone implants in bone as "soft" values show a gradual increase during the healing period.

We affirm that a high torque can significantly affect the early stages of osseointegration vascular, compromising the long-term durability of the system. In addition, intraoral radiographs performed one month after the load showed no significant loss of bone around the implants.

Moreover, these working technologies has enabled us to diagnose deficiencies in vitamin D and bone regenerated quality, choosing the ideal time for to load.

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