

The Potential Contribution of PEEK Infrastructure to the Maintenance of Excellent Long-Term Results

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When the definitive prosthesis is installed, everyone – the surgeon, the lab technician, the prosthodontist, the patient – is happy. Nevertheless, there remains a vital need for maintenance. With a procedure such as the All-on-4™, it is not possible to have excellent results without long-term maintenance. By maintenance, we mean modern maintenance, in the sense of an epidemiological approach that allows us to profile the patient, foresee problems, and provide better treatment – in short, to start solving problems by preventing them.

For the patient at least, there is a whole lifetime ahead, and this is why it is important to assemble a strong team, one capable of establishing a protocol that can monitor the patient long-term – and, even more importantly, can hold the patient accountable for what is going to happen to him or her over the long term.

This is in a situation where peri-implant pathology is the main menace to excellent long-term results. In our opinion, *peri-implant pathology* is preferable to the term *peri-implantitis*, since *peri-implantitis* implies a disease process similar to that of periodontitis. Precisely defined, *peri-implant pathology* is a group of multifactorial situations that negatively affect the implant. Both biological and biomechanical factors can intervene, with biofilm-mediated infection not considered significantly instrumental.

Study of Bone Loss – Refining the Model

On the basis of this definition of *peri-implant pathology*, we undertook a study of bone loss. In terms of methodology, bone loss requires a multifactorial model to explain its occurrence. However, all the factors are not yet understood, and that limitation must be taken into account when completing the model.

Adopting this approach, 22,009 patients were studied over three years for the prevalence of the three main chronic oral conditions. The results indicated that the prevalence of *peri-implant pathology* was 13.9% (Figure 1).



Figure 1: Patients studied over 3 years demonstrated a *peri-implant pathology* prevalence of 13.9%.

So now that we have the term, the definition and the prevalence, how can we apply them? Our objective is to obtain excellent results over the long term, so the need is to measure the risk, manage the risk and communicate the risk. Failure in one of these will result in an exponential increase in the probability of overall failure.

Implementing a Multifactorial Strategy

Our strategy was to begin by comparing more than 30 variables. Of these 30-something variables, 19 were inferentially significant. This is a causation-component model that says you have different manifestations of the disease based on a set of risk factors that are interacting with each other. Different risk factors might have the same outcome because implants are not exactly the same as teeth. With this in mind, we assembled our model.

*Measure the risk,
Manage the risk,
Communicate the risk*

Using these variables, we were able to build 25 models. Applied in clinical practice, analysis of the results allowed us to calculate an odds ratio of whether a patient with a particular factor will or will not manifest the disease.

For example, in those cases where the prosthesis is a *passive fit*, the PEEK compensates for any minor errors in the fit. But when the prosthesis is not a passive fit, the patient will be five-times more likely to develop periodontology.

Study of a Possible Correlation Between Plaque and Bleeding

Another study that attempted to isolate a variable and define an odds-ratio looked for a possible relationship between plaque and bleeding. Here, 15 subjects suspended oral-hygiene habits for three weeks. Each was scored from 0-3 for plaque and bleeding, where 0 meant zero correlation between plaque and bleeding; 1 indicated some evidence of correlation, and 3, a large amount of correlation.

What was observed, over the following weeks, was something of a linear-positive relationship between plaque and bleeding. Then at six months, while there was still a significant correlation, it was not that strong. And then at 12 months, there was no significant correlation. (Figure 2).

Correlation between mPLI (plaque) and mBI (bleeding)

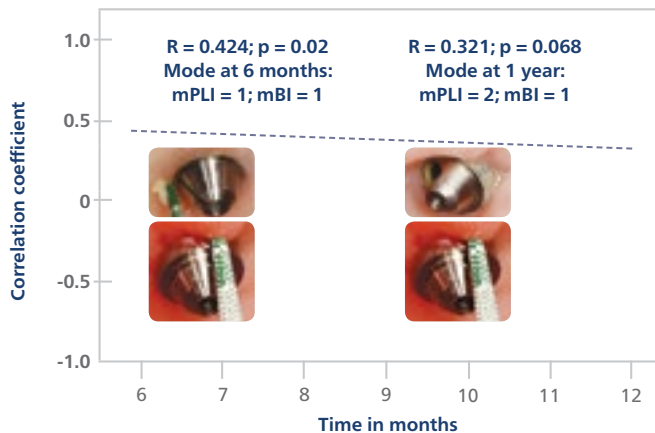


Figure 2

In terms of marginal bone loss, the median value was 0.34 mm, which can be considered an excellent result for an All-on-4 procedure.

How Does a PEEK Prosthetic Impact Risk?

But what, precisely, in terms of risk score, will be the impact of using a PEEK infrastructure (made with the JUVORA™ CAD/CAM Dental Disc from Invisio Biomaterial Solutions™)? It will not have any impact on a history of periodontitis, nor the proximity to other teeth or implants, at least not in this particular study because it is a full-arch

reconstruction. It won't teach patients to improve their brushing and cleaning – and bleeding, as previously noted, was present. And it won't help patients quit smoking!

Basically, the use of a PEEK infrastructure increases the probability of a passive fit since it is CAD/CAM manufactured. A passive fit translates to six-to-eight points of prevention – a significant number of points.

In summary, the absence of a correlation between plaque and bleeding, with low marginal bone resorption, plus a low incidence of biomechanical complications and a complete absence of biological complications, translates as a good prognosis for the long term.

Summary - One Recall Schedule at a Time

We began with the observation that installation of the definitive prosthesis makes everyone happy. But the maintenance of excellent clinical results, over the long term, is very dependent on the patient and the compliance between patients and clinicians.



Figure 3: Installation of the definitive prosthesis makes everyone happy – There's a lifetime to go!

We don't need to plan according to a 10-year overview. Instead, both clinicians and patients should live their lives one recall schedule at a time. Together, the clinician and the patient plan for the next visit. This is the MALO CLINIC's approach to the better maintenance of excellent clinical results over the long term (Figure 3). We plan in steps. ▲

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* Since 2017, Miguel de Araújo Nobre, RDH, MSc Epi has provided ad hoc consultancy services to Juvora Ltd.

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** EAO: European Association for Osseointegration

SEPEs: Spanish Society of Stomatological Prosthesis

SEPA: Spanish Society of Periodontics and Osseointegration

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