

The Big Question

with

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Why and When does Splinting Crowns & Bridges make Treatment Better for Patients?

In Spectrum Implants October 2022 I introduced a few guidelines that I use to decide to splint implants within a fixed restoration or not. Let's test them against the root causes of mechanical problems that put our patients at risk of biological problems such as peri-implant disease and implant failure.

From the literature, I understand that increasing size increases Prosthesis Dimensional Error (PDE) and can make it more difficult to see and manage the Tissue Effects (TE): Resistance to Displacement (RTDE) and the Gingival Effects (GE).¹ Hard and soft tissues can prevent the dentist from seating a prosthesis properly by getting wedged between connections or otherwise displace connecting parts from their intended trajectory. Let's introduce another root cause of mechanical mis-

fits called Incongruent Paths of Insertion (ICPOI).² This considers intraoral elements such as teeth, implants, and implant parts that all have unique paths of insertion that are unlikely to be microscopically congruent. Why microscopically? We know that implant manufacturers can make connecting parts at an accuracy of $\pm 5\mu$ ³ and that the oral microbes that cause peri-implant disease are around 1 micron in diameter. To have parts fit together optimally, they need to have congruent paths of insertion, if there is a desire to make the prosthesis easily retrievable.^{2,4}

Where is the balance point where the immune systems of our patients can defend themselves from peri-implant disease? I think it is safe to say, less oral pathogens are better than more, as plaque is a known risk factor for disease. That is also why it is better to ensure access to

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daily maintenance of the peri-implant environment and indeed optimize the fit of joints and prevent subgingival cement. I stated that I choose to avoid splinting natural teeth, love splinting posterior implant retained teeth, and avoid long-span bridges. Does that make sense?

I believe splinting loose or weak natural teeth makes sense because that would tie them together mechanically, to better manage functional load. It will be a race as to whether continuing periodontal tissue loss or caries will cause them to fail. When the teeth are strong enough, I would choose to crown them individually. The margin fit will likely be the best because treatment of single teeth is often the most accurate and simple. Perhaps I would try to avoid snug to tight contacts, as they may push the crown off its optimal position on its retainer finish line. According to research reported by Carl Misch (2015)⁵ single crowns can be expected to last much longer than 3-unit bridges. Why is that?

I fail to buy the argument that the 3-unit bridge is more difficult to clean because it is too difficult to floss under the pontic region. This region can be adequately maintained by many devices including a GUM Stimulator or end tufted brush. I would guess that open and overhanging margins, subgingival cement, and increased trauma to the tooth retainers during their preparation are the culprits that put the 3-unit bridge at a higher risk failure.⁵ Of course, the Tissue Effects can be more challenging to manage as well and are more likely to also prevent the optimal seating of the larger prosthesis.

This is an implant forum, so what about implants? Well, they have abutments that are usually screwed into place onto a round implant base that has a smaller perimeter than the

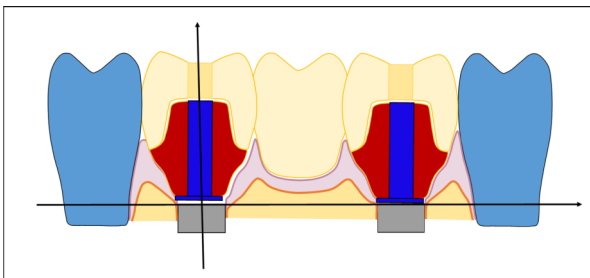


Fig 1: This screwed-in prosthesis is guaranteed to have misfit joints due to the root causes of mechanical complications—PDE, ICPOI & the TE.

teeth being replaced. Yes, I would tend to splint them for mechanical advantage to resist functional stresses, but not with conventional screw-in (Fig 1) or cement-in prosthetics. Will that be misfit joints or subgingival cement and open and overhanging margins?⁶ We no longer need to choose which risk factor for disease we wish to subject our patient to. We can simply

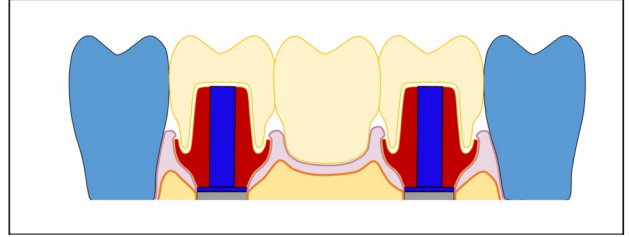


Fig 2: The RMS has features that helps the dentist consistently optimize the fit of implant-abutment connections and prevents open margins and subgingival cement.

use the Reverse Margin System (RMS) (Fig 2) to splint those implant retainers while optimizing the implant-abutment connections and preventing open margins and subgingival cement.

So yes, I would splint the implant restorations using the RMS for best mechanical advantage and to prevent several longstanding risk factors for peri-implant disease.⁷

I think adjusting contacts between an implant-retained crown and adjacent teeth is very difficult. Multiple, independent implant-crowns are even more difficult to manage. What is the challenge? Implant connectors are made at a tolerance of $\pm 5\mu$. Using the screw-in installation technique, do you really think that you can adjust contacts, 10 mm or so away from the implant-abutment joint (a level arm), accurately enough with your rotary instruments to allow the abutment to seat into its implant-connector optimally? Remember, $\pm 5\mu$ is about 1/20th the thickness of a human hair. With multiple splinted crown units, this is frankly impossible because of contacts and all the other root causes of mechanical problems: PDE, ICPOI and the TE.

It is only the RMS that has been designed to build needed tolerance to safely manage the root causes of mechanical complications without causing subgingival cement and open margins.⁸ Perhaps the open margins problem would not be so destructive if the conventional cement-in process of installation kept their margins well above the tissues. However, let's get back to adjusting contacts. The unique use

of cement space to tolerate error allows the RMS prosthesis to shift within its margin trough to safely manage expected Prosthesis Dimensional Error (PDE), Incongruent Paths of Insertion (ICPOI) and the Tissue Effects (TE): Resistance to Displacement Effects (RTDE) and the Gingival Effects (GE). It would be good to add these important concepts to your vocabulary so that you can better understand the root causes of mechanical complications that cause those difficult to manage peri-implant diseases.

So why not use the RMS to take advantage of the mechanical stability offered by splinting without unnecessarily exposing patients to risk factors for disease?

Why do I like to limit my splinting to smaller groups of implants like those used in the 3-unit bridge?

Some patients will still suffer complications for many reasons, so why not reduce the impact of those complications to small bridges rather than round-house restorations retained by few implants. Also, many of these immediate round house restorations require the removal of large amounts of tissue to hide the prosthesis tissue surface interface. Isn't there a thought about "Do no harm"? Unfortunately, their requirement for basal bone for stability makes their prosthesis dimensions wide and access to maintenance of the peri-implant environment difficult to impossible. Lack of access to maintenance is a huge risk factor for peri-implantitis.² Perhaps it is time to rethink this type of restoration that panders to the benefit of immediacy over the long-term health and well-being of the patient. Have the patients been fully informed about the consequences of their choices?

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Author

Emil L.A. Svoboda PhD, DDS has lectured and authored many articles about safer prosthesis installation. He has identified the root causes of the mechanical problems that are well-known risk factors for both mechanical and biological complications that are risk factors for peri-implant disease. **Dr. Svoboda is delighted to announce that Durban Labs now joins Shaw Labs and Aurum Group Labs as current sources for RMS custom products.** These fine dental laboratories understand the benefits of the RMS and make this remarkable restorative system available to dentists across Canada and the USA. This system was developed by the author to mitigate the risk factors for treatment complications. **Go to www.ReverseMargin.com to learn how to make your treatment better for your patients.**