

How T-Scan™ Could Have Prevented Surgery: A Case Report

An Implant Case Summary Provided by
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Teksan™



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Patient Overview

A 56-year-old male patient with a recent history of a lower right first molar that had fractured and was deemed unrestorable.

- **The patient was advised by his periodontist to do a dental implant (not another bridge) in order to regain function.**
- **The molar was consequentially removed and the site received a bone graft.**
- **A dental implant was placed by the periodontist after the bone graft healed.**

The patient knew about our facility and advanced dental technology, including CEREC CAD/CAM and T-Scan technology. Dr. Patel's care, in conjunction with the application of these technologies, was the primary reason for the patient selecting his practice for his restorative care.

The patient requested restoration of the lower right posterior quadrant. Upon examination of the area and occlusion, a limited treatment plan was generated, reviewed, and consented, for restorative care with CEREC CAD/CAM restorations in conjunction with T-Scan equilibration and occlusal load management.



About the Author:

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- Dr. Sangiv I. Patel, DDS, RDH, AFAAID is a general dentist in private practice since 1993, has served as faculty at the Advanced Dental Implant Institute's AAID Maxicourse in Puerto Rico, and formerly served on the faculty at Loyola University of Chicago- School of Dentistry and Brevard Community College.
- Dr. Patel is among 30 clinicians worldwide to have received Mastership in Dental Biometrics.
- Dr. Patel is a published author and international lecturer. He has served as a beta tester for BioRESEARCH Inc., Tekscan Inc., and CEREC 3D by Sirona, and collaborated with Carestream Health, Inc. the manufacturers of Cone Beam Computed Technology (CBCT). His experience in cutting-edge dentistry runs long and deep.
- Dr. Patel offers physics-based model on the principles of rigid vs. resilient dynamics in the stomatognathic system, that paves a road for logical, predictable, and evidenced based diagnostics and restorative single-visit dentistry.

“T-Scan Identifies the Location, Intensity, and Duration of Occlusal Loads Graphically”

The Center of Force trajectory (COF) demonstrates the net location of occlusal loads in one-tenth of a second increments once the maximum loads exceeds 10% during the occluding cycle. The COF exhibits where in the mouth the forces begin, travel, and end, as the loads are distributed throughout the occluding cycle.

A simple analogy to aid in patient education is to relate the COF to a hurricane tracker. The Circle of Mannes (gray and white oval in the center) can be referred to as a safe bunker where the energy is well distributed, most functional, and least harmful.



“It is Very Possible the Patient Would Never Have Lost that Particular Molar”

The initial T-Scan test was recorded in MIP (**Figure 1**). The first thing that caught my eye was the COF that begins over the first right maxillary and mandibular molars (teeth #3 and #30), and proceeds distally to the left side, as the occluding cycle leads to MIP. The second thing I noticed is obviously the premature hyper-intense contact on the second molars, with a load distribution of 10%.

Based on the pre-restorative COF, it is very possible this patient would have never lost that particular molar if the COF was managed with an equilibration prior to the molar fracturing. There is a direct cause-and-effect relationship incriminating the unrestorable molar fracture to the excessive occlusal loads in the area. The data reveals that the second molars on the right side are also at risk of failure, due to occlusal trauma. **This negligence in monitoring the occlusion to the extent and detail required resulted in the patient becoming a tooth amputee, requiring multiple surgeries and a prosthetic replacement.**

This case emphasizes the need to monitor the occlusion digitally with a T-Scan vs any other traditional occlusal analysis method, as only the T-Scan technology can expose the time and force vectors that can impact dental longevity.

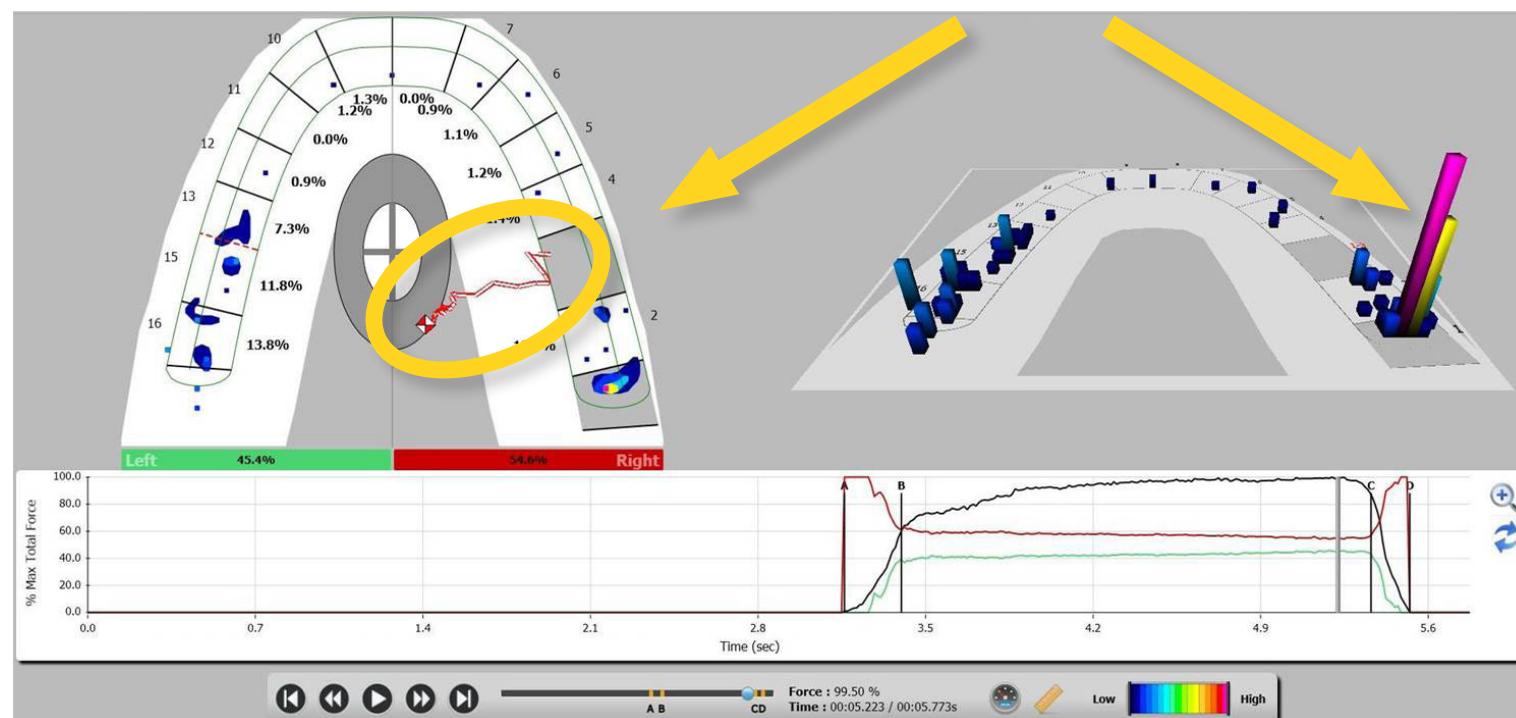


Figure 1: Pre-restoration MIP T-Scan Recording (Highlighted)

The Benefits of Digitally-Managed Equilibration

The second variable that can only be predictably diagnosed and managed with the T-Scan is **Bilateral Simultaneity**. It accounts for all teeth and restorations meeting at the same time, and hence, accounts for occlusion time and COF.

This was the patient's first dental implant with an occlusal scheme of crowns, bridges, and a few natural teeth. A pre-restoration full mouth equilibration was provided to achieve anterior guidance with bilateral simultaneity. The post-equilibration COF demonstrates the anterior guidance with elimination of the premature contacts on the second molars, with concurrent increase in the MIP load from 10% to 13%. This is now an atraumatic stable occlusal scheme that is better engineered to tolerate parafunctional loads. The implant at site #30 is now ready to be restored.

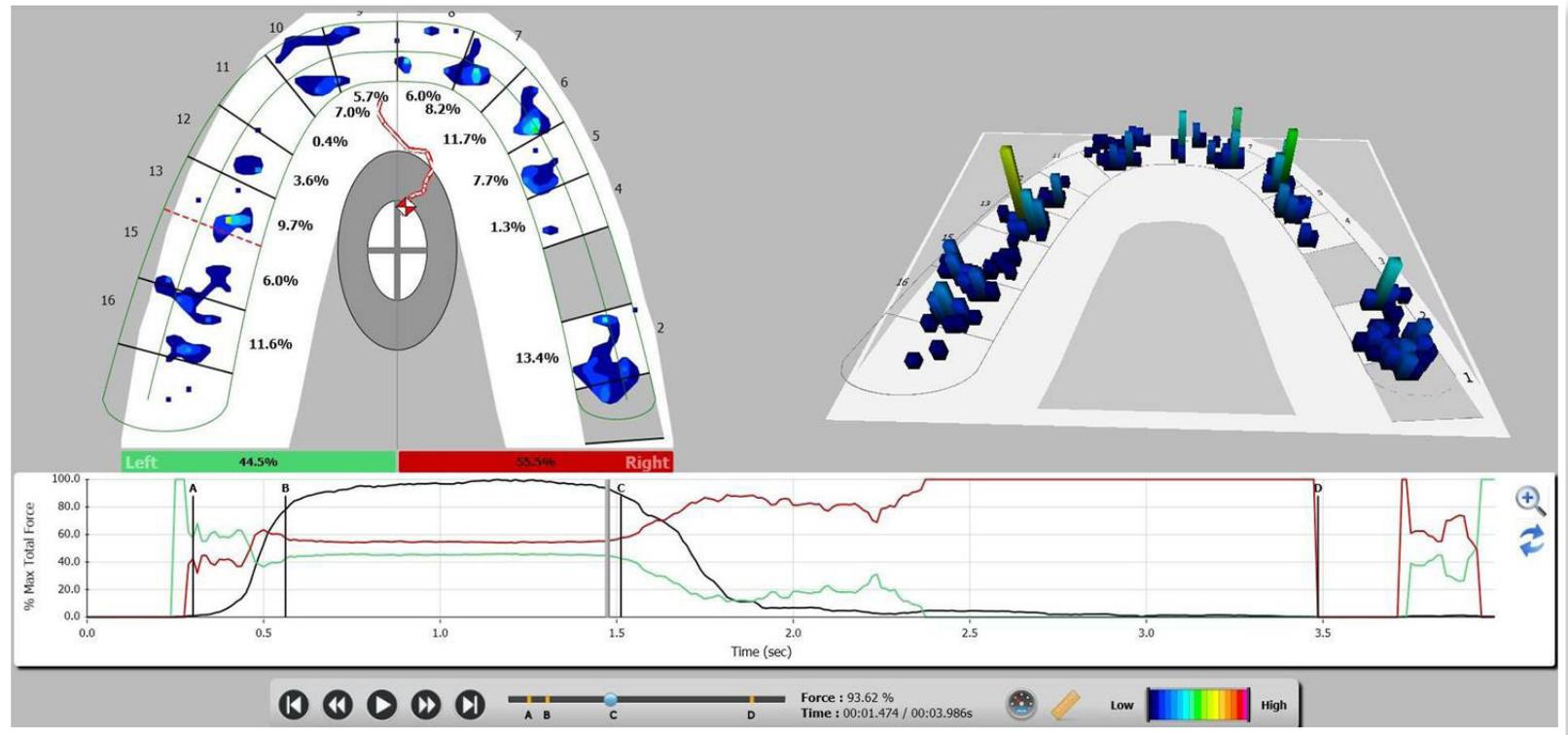


Figure 2: Pre-restoration equilibration completed.

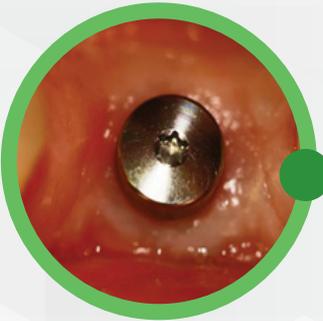


“[T-Scan Helped] Realize the Goal of Time Delay Loading.”

The adjacent teeth were restored with CEREC restorations—an onlay on tooth #29 and a crown on tooth #31. The integrated Straumann implant was uncovered, and a prefabricated abutment was placed and torqued to 35 Ncm.

The final restoration at site #30 was a full coverage, all ceramic crown. The material we used to restore sites #29, #30 and #31 was VITA Mark II, which is bit “softer” on the stress strain curve, in comparison to enamel. The energy transmission of the cement retained restorations is going to be much more favorable against the opposing dentition. If there is occlusal trauma, the material will fracture and no subsequent energy will travel to the abutment screw or implant body. This inherently mitigates against crestal bone loss. The potential crown failure will be easily visible and readily repaired.

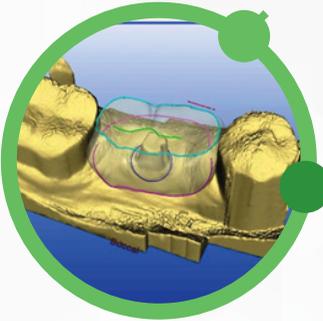
After cementation and x-ray verification of cement removal, Time Delayed Loading of the implant was implemented. The goal was to sequentially load the natural and restored teeth, then restore the implant, then finally achieve MIP without excursive interferences. This achieves proper COF, Bilateral simultaneity, occlusion, and disclusion times. The pre-restoration equilibration had established anterior guidance and MIP without excursive interferences. Utilizing the T-Scan for guidance and verification, minimal reductions in the intensity of the centric stops on the abutment-supported crown was initiated. This realized the goal of Time Delay Loading.



Pre-restoration Straumann implant



Abutment torqued to 35 Ncm



CEREC digital rendering of restoration



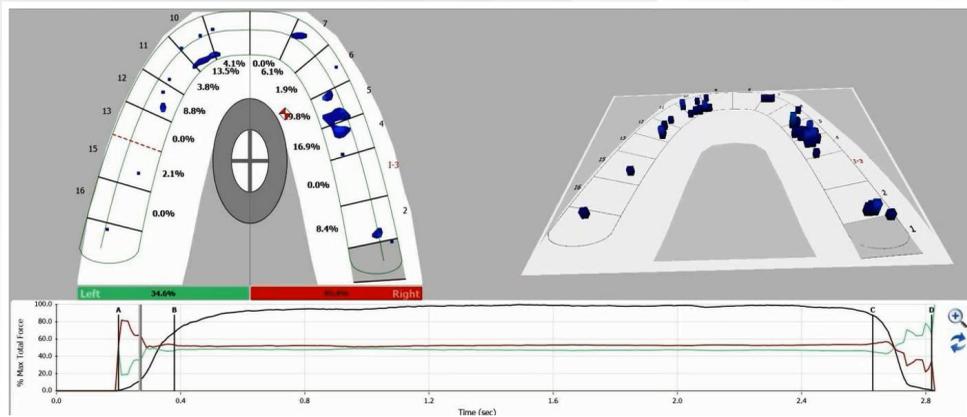
Final restoration using VITA MARK II



Using X-ray for cement removal

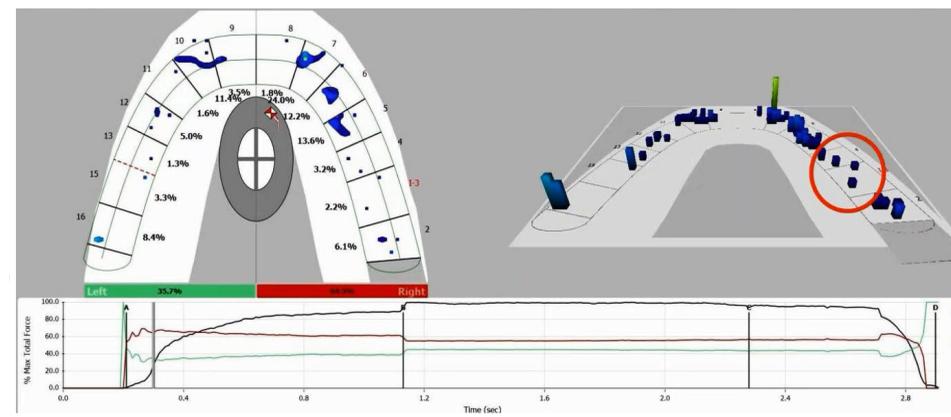
Results from T-Scan

12% Maximum Force



The T-Scan above is captured at 12% maximum force into the maximum intercuspation (MIP) occluding cycle that will eventually achieve a maximum force of 100%. The anterior teeth start to engage and so does our second molar, but there's no contact on that implant restoration.

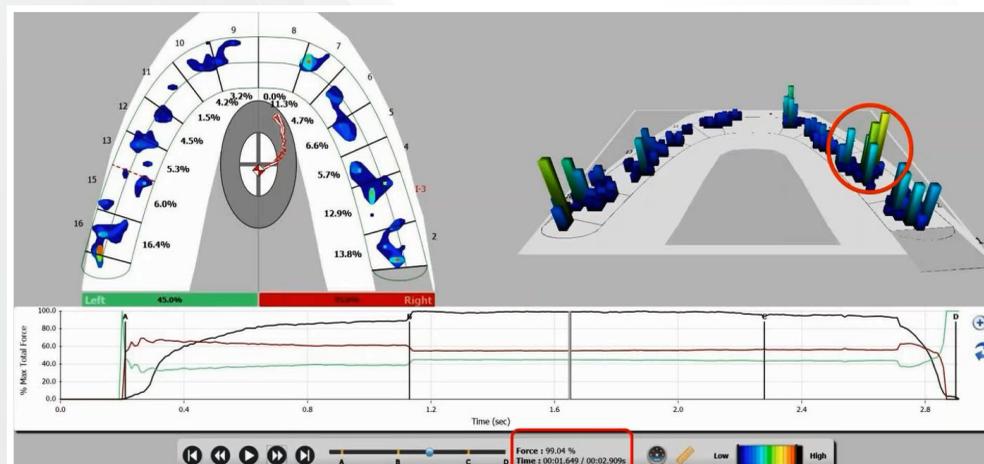
27% Maximum Force



At 27% Maximum force in the MIP occluding cycle, the initial contact on the implant restoration is evident.

At this stage, all the teeth with periodontal ligaments are already engaged; the fluid has left the periodontal ligament, and the principal fibers in the periodontal ligament are converting compressive forces into tensile energy—or, in other terms, the natural teeth have “bottomed out.” Now, we start engaging the implant.

99% Maximum Force



At 99% of the force, the anterior guidance is verified with a safe COF and acceptable bilateral simultaneity. We have used the periodontal ligaments to our advantage, and in so doing, managed not to overload that whole structure. This occlusal scheme is exactly what we look for, to ensure the longevity of the implant and overall oral health of this patient.

“It’s Your Ethical Duty to Inform the Patient on the State of their Occlusion”

This particular patient travelled about six hours each way to achieve these predictable results. **If his dentist had the technology to recognize and address the occlusal trauma, he would have never needed implant surgery and restoration procedures.** When he learned that he could have actually avoided the implant, it broke his heart.

When I walk into my doctor’s office, they don’t ask me how my blood pressure feels today. They slap a cuff on my arm and take the data. The cardiologist doesn’t live without blood pressure, but why does dentistry live without teeth pressure measurements and hope to achieve longevity. Is that okay?

Occlusion is not static. Like blood pressure, it fluctuates, and our job isn’t to perform supervised negligence, but rather control and manage its energy so it does not lead to negative, destructive effects; hypertension leads to a heart attack or stroke, occlusal trauma leads to tooth attack(s). The T-Scan is incredibly powerful as a diagnostic and treatment instrument required for comprehensive management of dental occlusion.



For More Information on T-Scan in Implant Dentistry, Download our Free eBook!

Implant Occlusion in the Digital Age of Dentistry

A look at the state of the implant dentistry today with real cases from dentists who utilize technology to manage implant occlusion.



Ready to invest in a new tool to advance your practice? Let's start a conversation.

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