Preventing Peri-Implantitis by Safer Prosthesis Installation

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EMIL L.A. SVOBODA PHD, DDS

HONORED FELLOW, AMERICAN ACADEMY OF IMPLANT DENTISTRY

DIPLOMATE, AMERICAN BOARD OR ORAL IMPLANTOLOGY / IMPLANT DENTISTRY

Acknowledgements

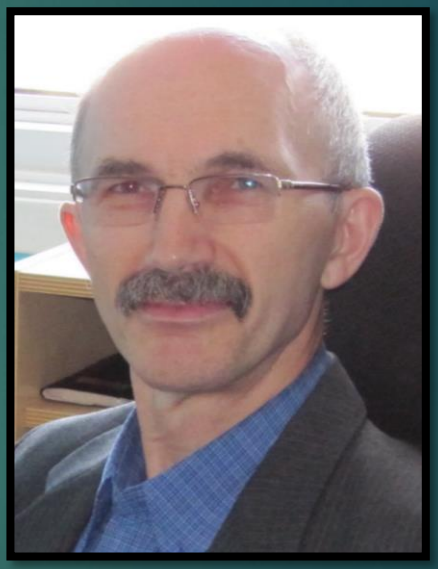
Helping Deepen my Knowledge of Laboratory Technology and Making Custom Prosthetics

Morning Picture

Evening Picture

Milan Jovanovic RDT
Digital Workflows
1(888)337-5223
www.DiamondDentalStudio.com

Helping Deepen my Knowledge of Fluid Dynamics and Modeling Technology



Vladimir Agranat PhD
Fluid Mechanics
1(416)708-7153
www.acfda.org


To Prevent Problems
We Must First Discover their Root Causes

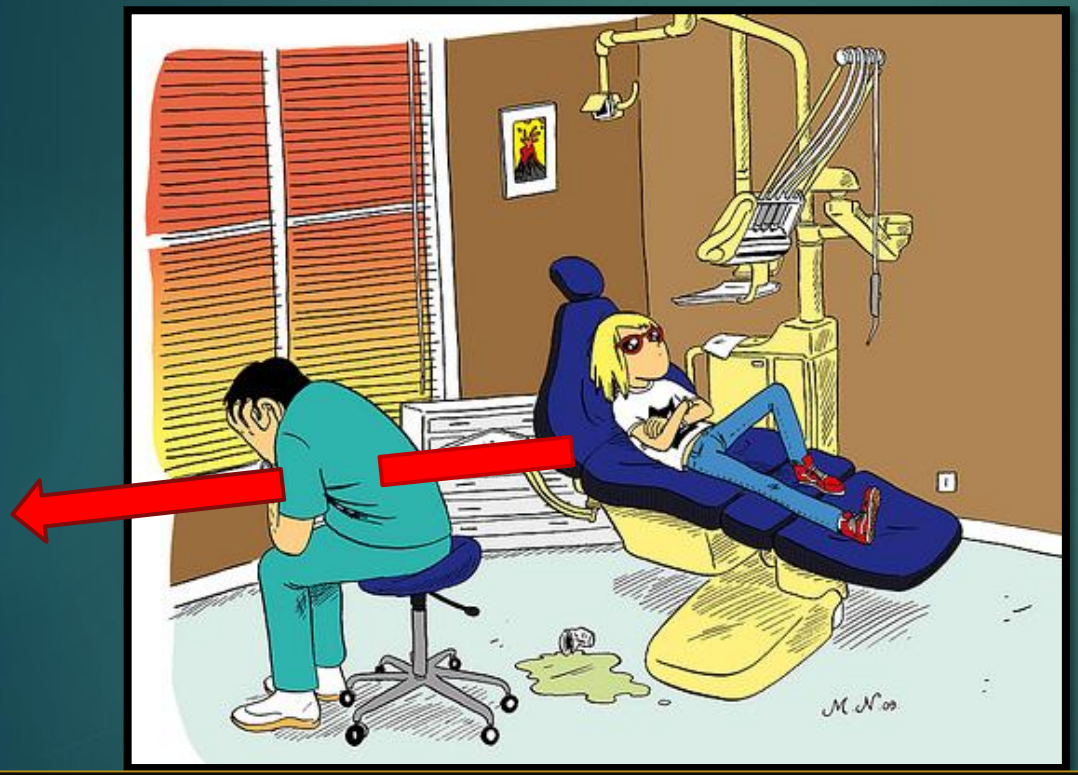
Dental Implants Let Us Put Humpty Together Again After All Else Has Failed

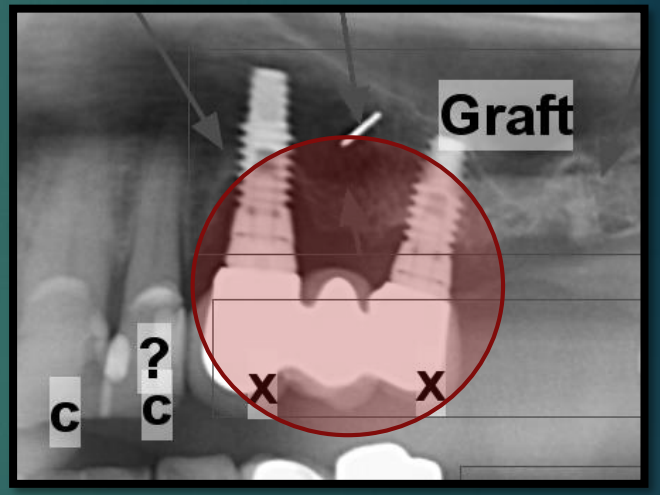
1. Increase load bearing dental units
2. Reduce collateral damage
3. Preserve existing tissues
4. Improve function
5. Bonus – Implants are immune to caries

Why were natural teeth lost?
Function, Trauma and Infection

Why are Dental Implants Lost?
Function, Trauma and Infection

Unlike Teeth – Dental Implants are NOT FREE





Treatment Complications are Bad for Business

Who Stands Alone When Treatment Fails?

Who has got your Back?

1) **The implant companies?**
2) **Those who taught the procedures?**
3) **The RCDSO?**

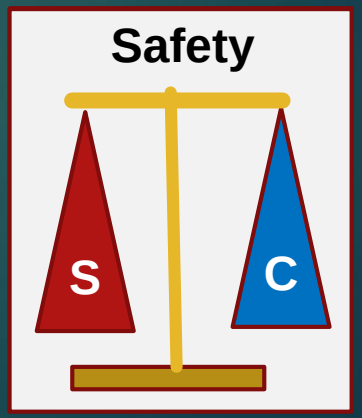
Are you really incompetent, or are the current installation procedures FLAWED?

4 Large Reviews 2013 - 15

Mucositis	30% of **Implants**
Peri-implantitis	15% of **Implants**
Peri-implant Disease	**45% of Implants****
Failures	**4% 5 years, 8% 10 years**

Same for Cement or Screw Installation

****Requires Treatment!**



Atieh MA et al. The Frequency of Peri-implant diseases: A systemic review and meta-analyses. J Periodontol **2013**:84(11):1586-1598

Daubert DM et al. Prevalence and predictive factors for peri-implant disease and implant failure: a cross-sectional analyses. J Periodontol **2015**:86(3): 337

Sherif S et al. A Systematic Review of Screw- versus Cement-Retained Implant Supported Fixed Restorations. J of Prosthodontics **2014** (23)1-9

Whittneben JG et al. Clinical Performance of Screw- Versus Cement Retained Fixed Implant-Supported Reconstructions: A Systemic Review. The Int J Oral Maxillofac Implants; **2014**:29(Suppl):84-98.

Some Reviewers only Focus on Complications related to the Cement-in Installation Technique

The Complication Rates for Screwed-in Prosthetics Are Not So Low

What is Causing Them?

Review 2016

8989 Implants – 2139 Participants
average 5 years

Cement-in Better than Screw-in

1. Less marginal bone loss
2. Higher implant survival rates
3. Fewer prosthetic complications

Lemos CAA et al. Evaluation of cement-retained versus screw-retained implant-supported restorations for marginal bone loss: A systematic review and meta-analysis. J Prosthet Dent **2016**; 115(4):419-27.

Cement-in Can be Safer than Screw-in Prosthesis Installation

Nissan et al. Long-Term Outcome of Cemented Versus Screw-Retained Implant-Supported Partial Restorations. Int J Maxillofac Implants 2011; 26:1102-1107

Table 1 Comparison of Complications and Clinical Parameters of Screw-Retained and Cemented Implant-Supported Partial Restorations

Complications/clinical parameters	Screw-retained restoration		Cemented restoration	P
Ceramic fracture	38% ± 0.3%	10X	4% ± 0.1%	< .001
Abutment screw loosening	32% ± 0.3%	4X	9% ± 0.2%	.001
Metal frame fracture	0		0	NS
Mean Gingival Index	0.48 ± 0.5	5X	0.09 ± 0.3	< .001
Mean marginal bone loss (mm)	1.4 ± 0.6	2X	0.69 ± 0.5	< .001

Split Mouth Design, 38 patients, 221 Implants, mean follow up 5 years to 15 years

Should We Install Implant Prosthetics by Screw or Cement?

Insanity … Doing the same thing over and over and expecting different results. Albert Einstein

Which is Safer for our Patients?
Is the 45% Peri-Implant Disease Rate OK?
Can We Do Better?

Screw Vs Cement for Dental Implant Prosthesis Installation Part 1: The Logic Behind the Argument. Emil LA Svoboda, Published to www.ReverseMargin.com, Update January 2, 2016
Screw versus Cement for Implant Prosthesis Installation. Part 2: The Game Changer the Tips the Balance to Favour Intra-oral Cementation. Emil LA Svoboda, Published to www.ReverseMargin.com, Update January 2, 2016

How are Oral Prosthetics Made?

The Dentist
Makes an Impression
of the Mouth
and
Sends it to the Lab

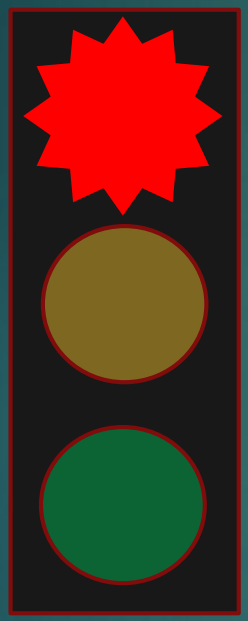
Lab Makes the Prosthesis
To Fit the Dental Model

The Lab Makes the Prosthesis To Fit the Dental Model

Why do We Need to Adjust
Contacts, Fit & Occlusion
to Install it
into the MOUTH?

Why Do We have Good and Bad Days?
Why is Fit Variable?

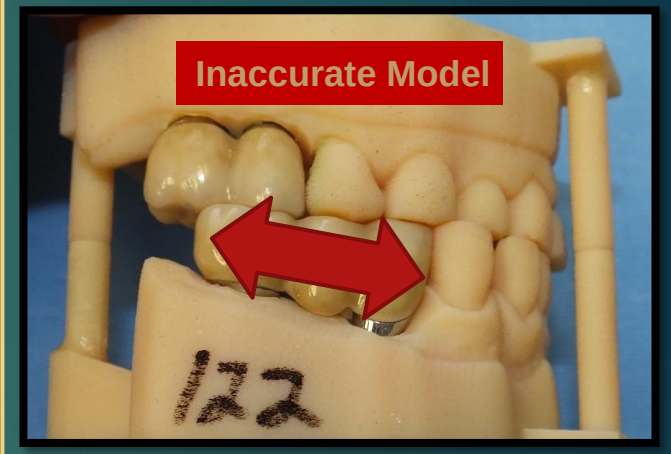
Does Anyone Know How Accurate a Particular Dental Model Is?



Shouldn’t We Assume it is Inaccurate!

A BIG Problem for Screwed-in Prosthetics is …

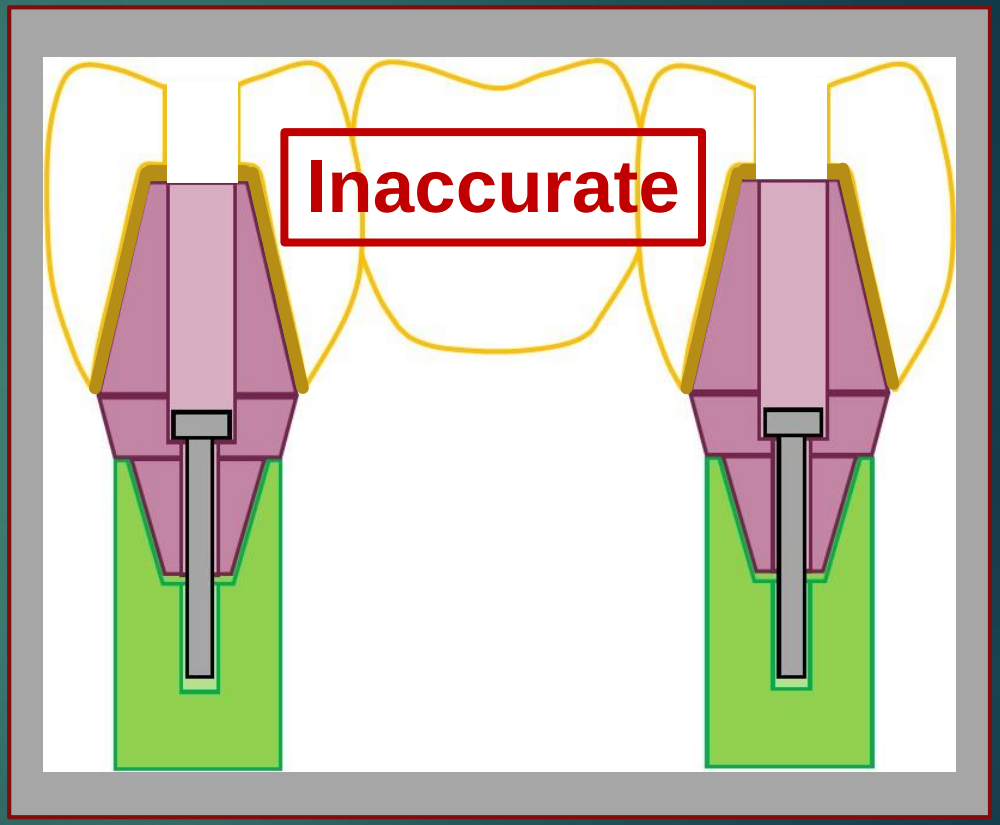
The Prosthesis
is Made to
Fit a Dental Model
That is Inaccurate
And the Abutments are
Joined to the
Inaccurate Prosthesis
on that Model



Prosthesis Construction can add Additional Error

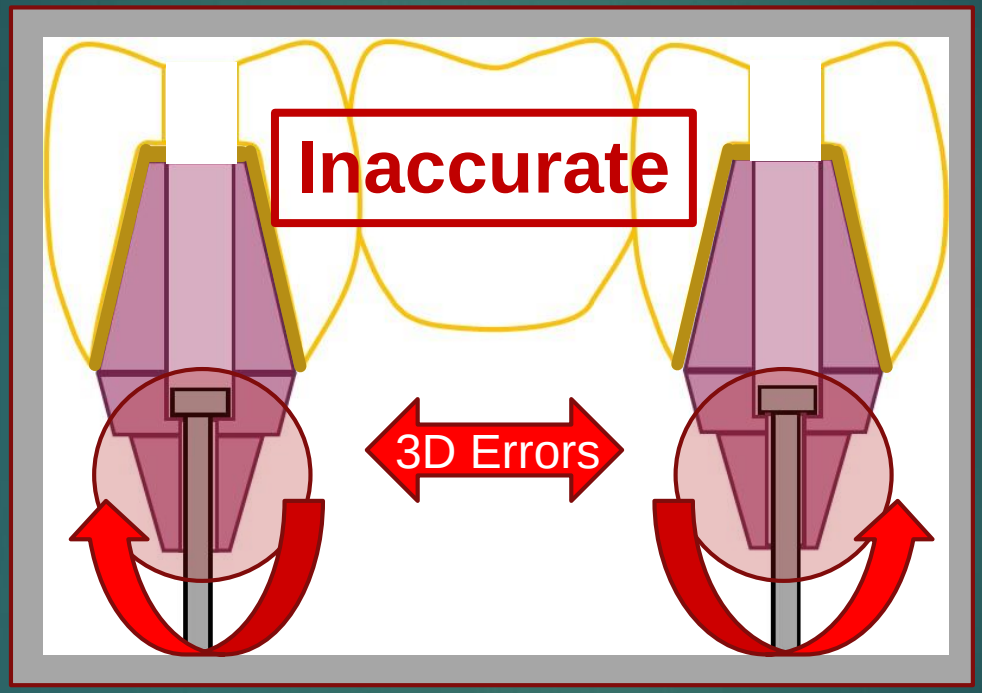
Current Screw-in Technique

Lab Makes the Prosthesis fit Abutments on Implant-Analogues on the Inaccurate Model And JOINS the Prosthesis to those Abutments



Current Screw-in Technique

The Constrained Prosthesis-Abutment Complex is then transferred to the Mouth



The Implant-Abutment Fit Cannot be Optimized

Implant-Abutment Misfit Implications

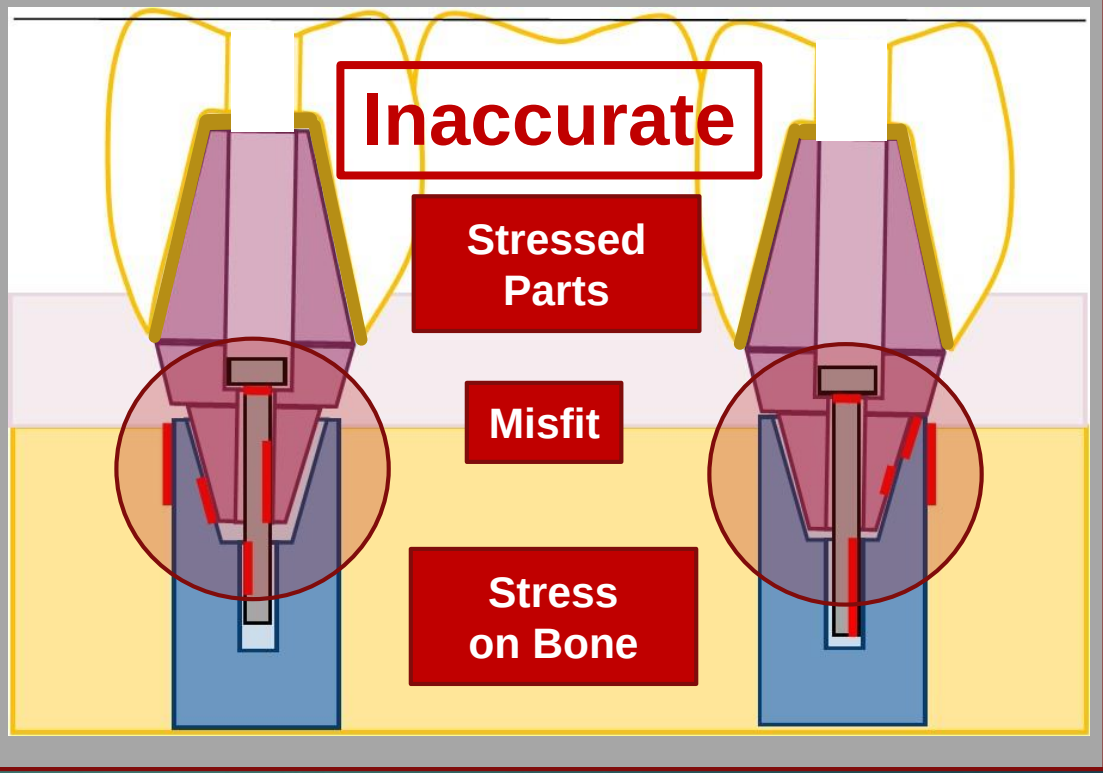
Mechanical Problems

- Misfit of Components
- Deformation of Parts
- **Movement of Parts***
- Broken Retaining Screws

Biological Problems

- Stress on Bone
- **Voids at Connection**

and Microbial Invasion



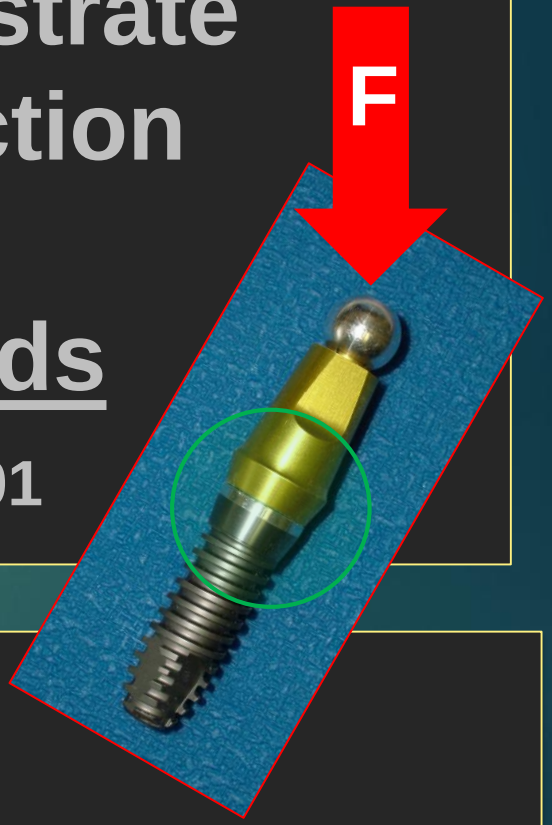
*Zipprich Micro Movements on Implant Abutment Interfaces Part 1&2.H Zipprich, 2013 http://youtu.be/AhsjiYjmTLE

***Stability of the Joint MATTERS!**
That is Why we have GOVERNMENT Standards

Health Canada & FDA in the USA Regulate the Sale of Abutments

Manufacturers Must Demonstrate Implant-Abutment Connection Stability According to ISO 14801:2016 Standards

Soon to be replaced by ISO/CD 14801



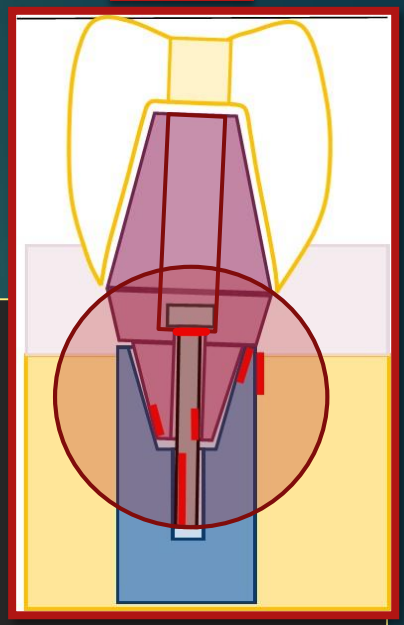
For the Test, the Abutment is Attached to the Implant According to Manufacturer's Specifications

Government Regulators Believe Joint Stability is Important

Manufacturers Research Predicts Performance of "Optimized" Connections Tested According to ISO 14801:2016 Standards

Shouldn't Dentists be able to Install Abutments According to Manufacturer's Specifications and Government Regulations?

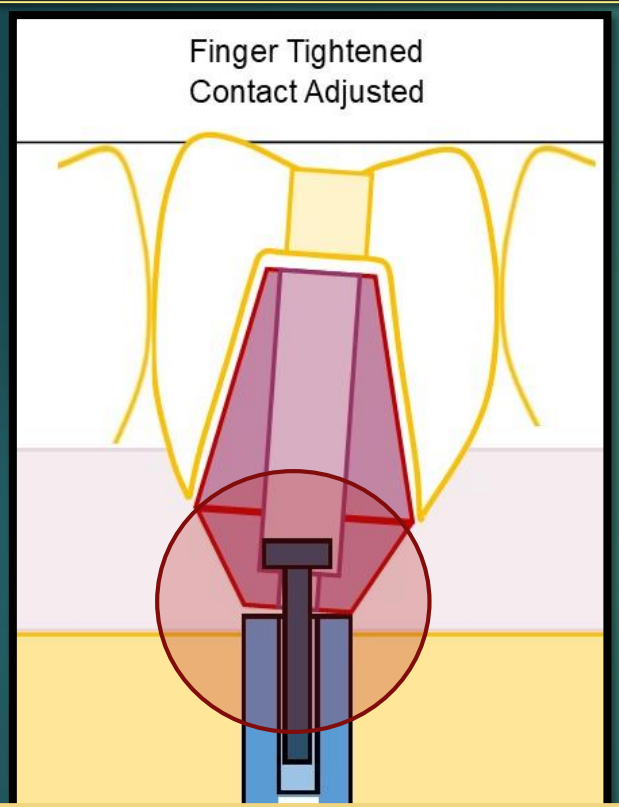
What Can Make the Problem of the Misfit Joint Worse?

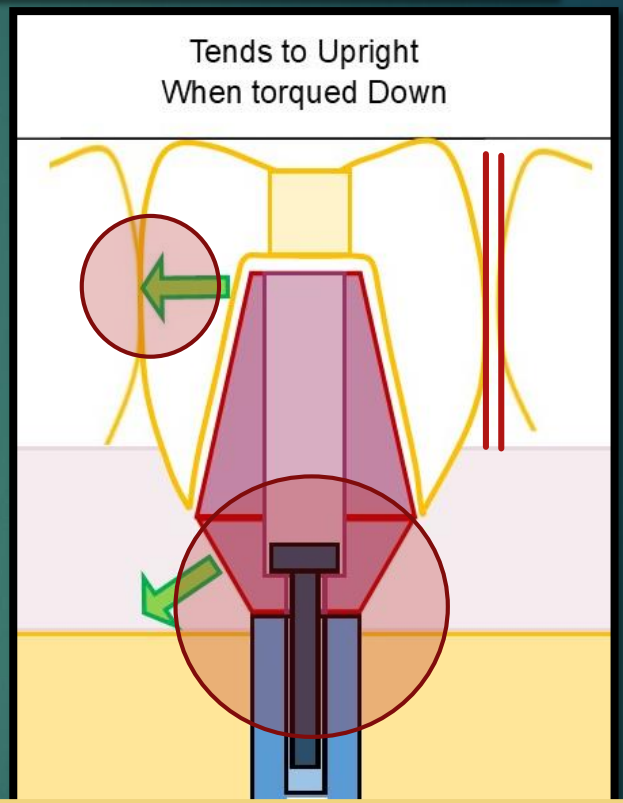


1) Tight Contacts
2) Subjecting it to Higher Forces
   Heavy Functioning Patient
   Cantilevering the Prosthesis
   - for Screw Access
   - to Accommodate Additional Teeth

Dental Implant Prosthetics, Carl E. Misch, Elseier Mosby, 2005 & 2015

After Adjusting the Prosthesis Contacts, Final Torqueing of the Abutment Screw May Upright the Abutment-Crown Complex





This Can Cause a Tight and/or Open Contact Problem, as well as leave a Macrogap

How Big Is this Problem?

Katsoulis J et al., Misfit of implant prostheses and its impact on clinical outcomes. Definition, assessment and a systematic review of the literature. Eur J Oral Implantol **2017**;10(Suppl 1):121-138

It is noteworthy that the misfit values at the clinical follow-up ranged between 95 and 232 µm

Conclusions: While the degree of tolerable misfit remains a matter of debate, the present data do not imply that clinicians should neglect good fit, **but aim to achieve the least degree of misfit possible.**

Would these Misfits Comply with ISO 14801: 2016 Standards?

*Acceptable Levels Model Error of ±150 µm "Passive Fit could not be achieved with Screwed-in Prosthetics!"

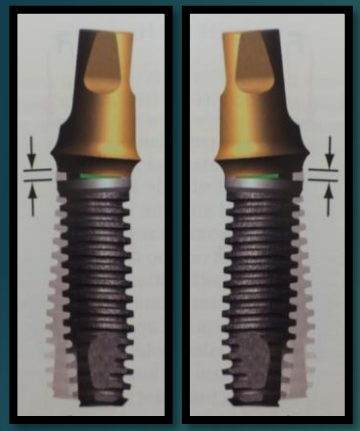
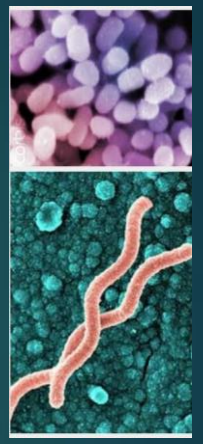


Figure of implants above from "Dental Implant Prosthetics, Carl E. Misch, Elseier Mosby, 2005 & 2015

PI Branemark in 1985
made the theoretical suggestion of
"not more than **10 microns error**"
Periodontal Pathogens are 1 µm in diameter



Misfit can Lead to Mechanical and Biological Instability

*Review: Passive Fit in Screw Retained Multi-unit Implant Prosthesis Understanding and Achieving: A Review of the Literature. MM Buzaya, NB Yunus. J Indian Prosthodont Soc. **2014**, Mar;14(1):16-23
Comparison of the Accuracy of Different Transfer Impression Techniques for Osseointegrated Implants. Zen BM et al. JOI Vol 41 No 6 2015: 662-667.
Tissue-integrated prostheses. Branemark PI, Zarb GA, Albrektsson T. Chicago: Quintessence;1985. p 253
Comparing the accuracy of master models based on digital intra-oral scanners with conventional plaster casts. C Vogtlin et al. Physics in Medicine. June 2016. Volume 1, 20–26

Implant-Abutment Misfit is Largely Determined by "Model/Prosthesis Accuracy"

	Comparing Sizes	Microns
1	Implant-abutment misfit (Macrogap)[1]	95-232 µm
2	Acceptable Laboratory Model Error[2]	± 150 µm
3	**Implant or Abutment Connector Machining Error (Microgap)[3]**	**± 5 µm**
4	Oral Pathogens Size - **estimate**	±1 µm

Human Hair ~100 µm

1 Katsoulis J et al. Misfit of implant prostheses and its im pact on clinical outcomes. Definition, assessment and a systematic review of the literature. Eur J Oral Implantol **2017**;10(Suppl1):121–138.

2 Buzaya M, Yunus N. Review: Passive Fit in Screw Retained Multi-unit Implant Prosthesis Understanding and Achieving: A Review of the Literature. J Indian Prosthodont Soc. **2014**, Mar;14(1):16-23

3 Mobilio N et al. Marginal Vertical Fit along the Implant-Abutment Interface: A Microscope Qualitative Analysis. Dentistry Journal, **2016**;4(3):1-6.

Proposed Definitions for the Implant-Abutment Misfit

Microgap

The Misfit that exists between components after their fit is optimized according to manufacturer's specifications. This misfit is predominantly due to the manufacturing processes.

Macrogap

This Misfit includes the Microgap and all other factors that can frustrate the optimized fit of components. For example, when the abutments are constrained by prosthesis prior to installation, all underlying errors can affect the size of the misfit. The Macrogap can be much larger than the Microgap.

Optimized Fit

When the Microgap equals the Macrogap and the fit meets current Government ISO standards for fit and stability.

The Dreaded Macrogap
AKA – Implant-Abutment Misfit

Caused by:

1. **Inaccurate impressions/Model Distortion**
2. **Tight Contacts**
3. **Tissue Interferences**
4. **Cheaper Inaccurate Parts**
5. **Use of Engaging Abutments (for multi-unit cases?)**
6. **Trying to Re-insert an Abutment that has been Previously Misfit (Implant-Abutment Deformation?)**

"When **bacteria** are able to colonize a **Macrogap**, implant failure can result due to **biologic failure** such as **peri-implantitis**. (4) In addition, **misfit** can lead to **mechanical failure** of the implant system because of factors such as **screw fracture** and/or implant fracture. (5)"

Top factors leading to dental implant abutment/implant fixture misfit: The dreaded microgap. **Scott Froum**, Perio-Implant Advisory, Feb 6, 2017
Clinical Associate Professor – Periodontist NYU

Risk Factors and Risk Stratification Using a Risk Score for Peri-implant Pathology

1. History of Periodontitis
2. Presence of Bacterial Plaque
3. Implant Close to other Teeth or Implants
4. Prosthetic Materials
5. Lack of Passive Fit or Prosthetic Loosening
6. Existing Bone Level
7. Smoking Patient

Attributable fractions, modifiable risk factors and risk stratification using a risk score for peri-implant pathology. M Nobre ….. **Paulo Malo … Jan 2017** Journal of Prosthodontic Research, Vol 61, Issue 1, 43-53 **www.for.org**/en/treat/peri-implant-pathology-risk-assessment/take

How Did They Detect Macro-gaps? Their X-ray Images are Insufficient!

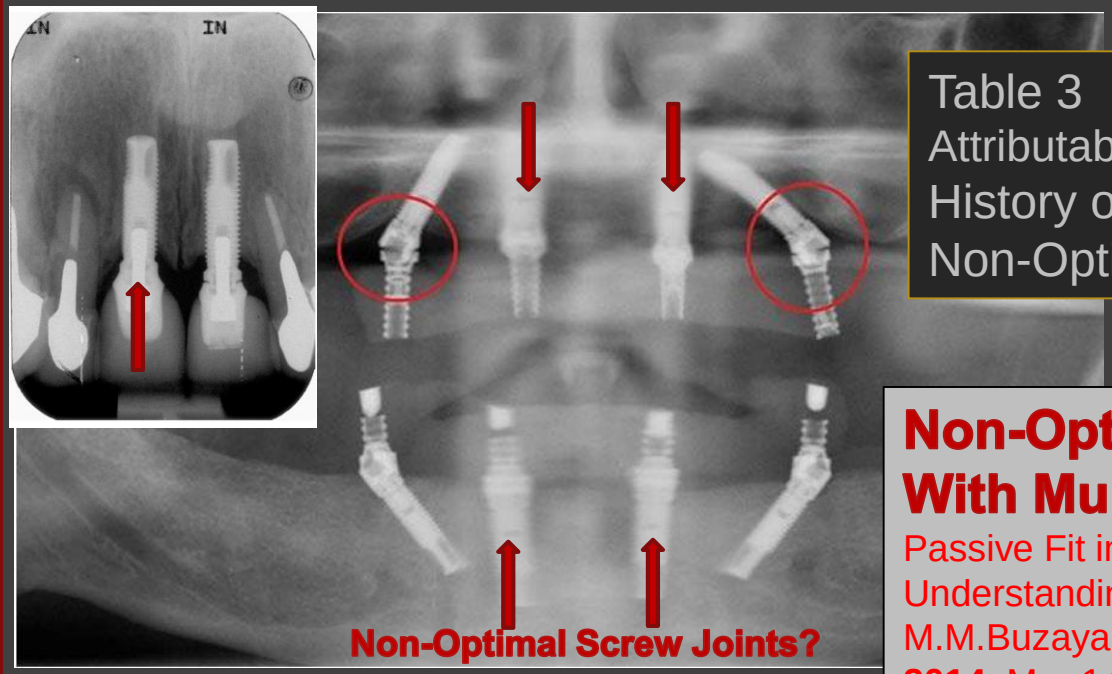


Table 3
Attributable Percent of **Peri-implant Pathology**
History of Periodontitis 74%
Non-Optimal Screw Joint 5%

Non-Optimal Screw Joint 100%
With Multi-Unit Screw-in Prosthetics
Passive Fit in Screw Retained Multi-unit Implant Prosthesis Understanding and Achieving: A Review of the Literature. M.M.Buzaya and N.B. Yunus. J Indian Prosthodont Soc. **2014**, Mar;14(1):16-23 **– An Elusive Goal!**

How Can We Detect Macrogaps?

Attributable fractions, modifiable risk factors and risk stratification using a risk score for peri-implant pathology. M Nobre ….. **Paulo Malo … Jan 2017** Journal of Prosthodontic Research, Vol 61, Issue 1, 43-53.

Risk Factors and Risk Stratification using a Risk Score for Peri-implant Pathology

History of Periodontitis	X	X	X	X	X	X	X	X
Bacterial Plaque Present				X			X	X
Bleeding on Probing					X	X	X	X
Lack of Passive Prosthesis Fit		X	X	X	X	X	X	X
Patient Smokes			X			X		X
Negative Points	4	7	7	9	9	11	11	11
Risk Level	M	H	H	VH	VH	VH	VH	VH

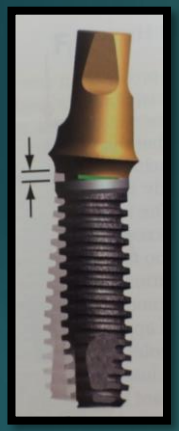
Low Risk (L)	<10%	6 Months
Moderate Risk (M)	10-20%	4 Months
High Risk (H)	**20-40%**	**3 Months**
Very High Risk (VH)	**>40%**	**2 Months**

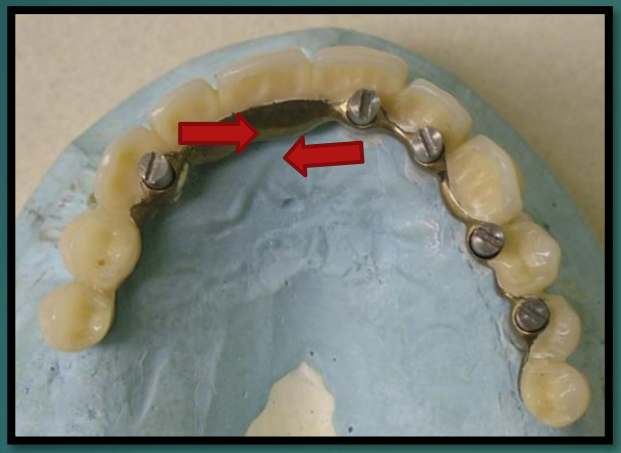
Recall Frequency Recommendation

How Does One Diagnose, Maintain or Treat An Implant-Abutment Misfit / Macrogap?

Attributable fractions, modifiable risk factors and risk stratification using a risk score for peri-implant pathology. M Nobre ….. **Paulo Malo** … **Jan 2017** Journal of Prosthodontic Research, Vol 61, Issue 1, 43-53. https://www.for.org/en/treat/peri-implant-pathology-risk-assessment/take

Multiple Unit Screwed-in Prosthetics AMPLIFY the Implant-Abutment Misfit Problem!





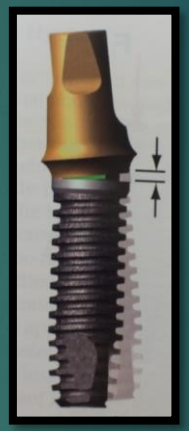


Figure of implants from "Dental Implant Prosthetics, Carl E. Misch, Elsevier Mosby, 2015 Pg 740

That is Why Do We Need a Specific Screw Tightening Sequence for Installing a Multi-Unit Prosthesis

Dental Implant Prosthetics. Carl Misch, 2nd Edition, Elsevier-Mosby, **2015**,Ch 28.
Passive Fit in Screw Retained Multi-unit Implant Prosthesis Understanding and Achieving: A Review of the Literature. M.M.Buzaya and N.B. Yunus. J Indian Prosthodont Soc. **2014**, Mar;14(1):16-23 – "Passive Fit is an elusive goal!"
Bacterial leakage of different internal implant/abutment connections. Nasar HI and Abdalla M. Future Dental Journal **2015**

Patients with 4 or more implants

were 15X

more likely to have Peri-implantitis

77% of their Prosthetics
were installed by the Screw-in Technique

Effectiveness of Implant Therapy Analyzed in a Swedish Population: Prevalence of Peri-implantitis. Derks et al. J Dental Research, **2016** Vol 95(1):43-49 **(588 patients with 2,277 implants)**

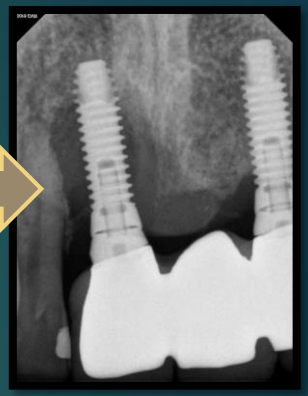
Prosthesis Dimensional Error

Is a Root Cause of the Implant-Abutment Misfit

And is a Common Consequence of the Screw-in Technique

Meta-analyses weighed mean prevalence per Implant

Peri-implant mucositis	43%
Peri-implantitis	22%
Peri-implant Disease	**65%**



Effectiveness of Implant Therapy Analyzed in a Swedish Population: Prevalence of Peri-implantitis. **Editorial** Emil L.A. Svoboda. Oct 2017, OralHealth pg 53-56.

Peri-implant diseases are common complications

Clinicians should inform their patients prior to treatment

Derks J, Tomasi C. Peri-implant health and disease. A systematic review of current epidemiology. J Clin Periodontol 2015; 42 (Suppl. 16): S158–S171. Department of Periodontology, Institute of Odontology, The Sahlgrenska Academy at **University of Gothenburg**, Gothenburg, Sweden

NO Predictable Treatment of Peri-Implantitis

Jepsen S et al.

Primary Prevention of peri-implantitis: Managing of peri-implant mucositis.

J Clin Periodontol **2015**;42 (Suppl. 16) S152-S157

Is Managing Mucositis Primary Prevention? How Should We Do That?

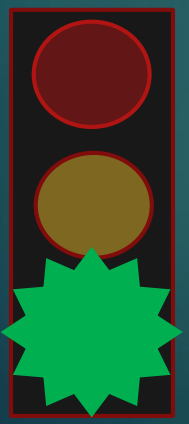
Primary Prevention is …

"Preventing Mucositis by Preventing the Macrogap"

The Macrogap
PROBLEM
Can be Prevented
by Intra-Oral
Cementation!

The Cement-in Prosthesis Installation Technique:

Abutments are attached individually
their Fit depends on
Manufacturing Accuracy ±5 µ
(NOT Model Accuracy ±150 µ)
… and No Tight Contacts
to keep the abutments from seating



Implant-Abutment
Fit
Can Be Optimized

The Cement-in Prosthesis Installation Technique

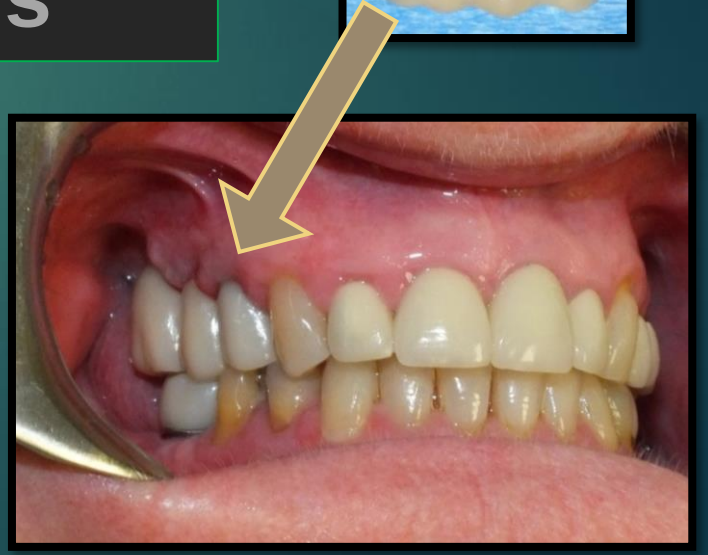
Can Comply

with

Manufacturer's Specifications

and

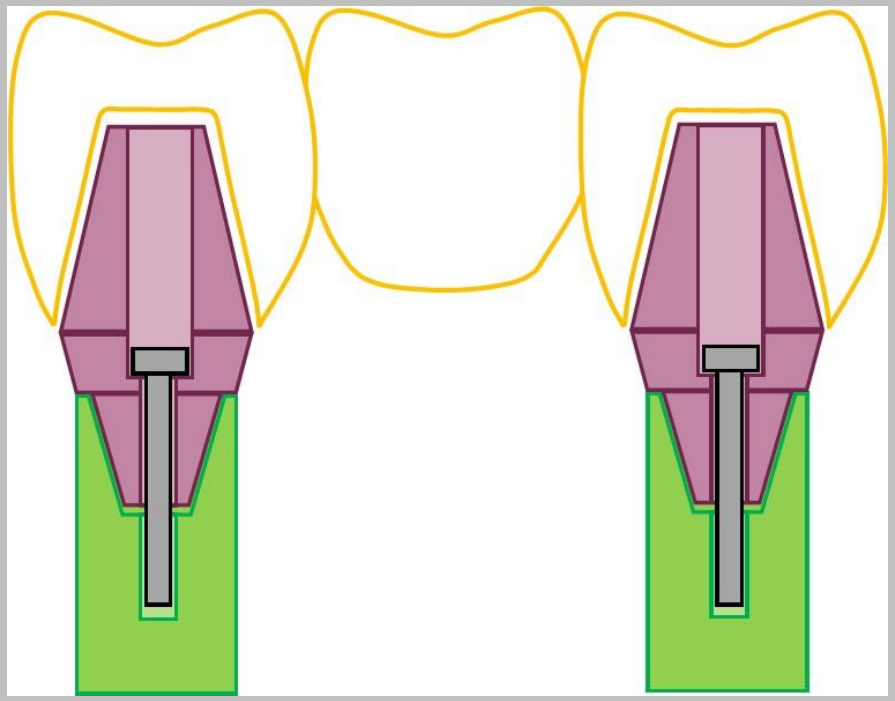
Government Regulations



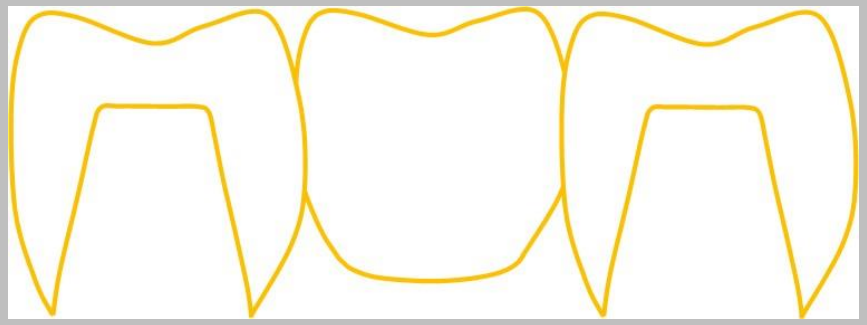
This Can Reduce Potential Liability Issues

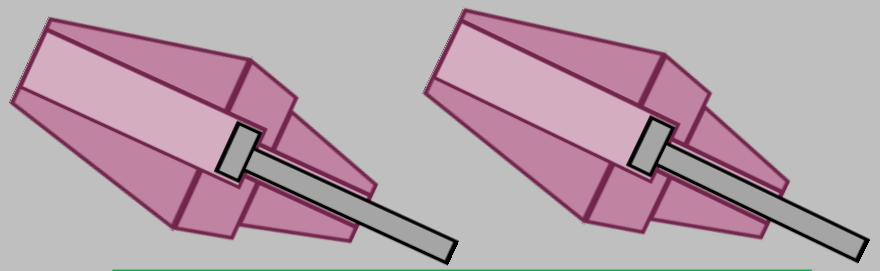
The Current Cement-in Technique

Lab does NOT JOIN the Prosthesis to Abutments On Lab Models



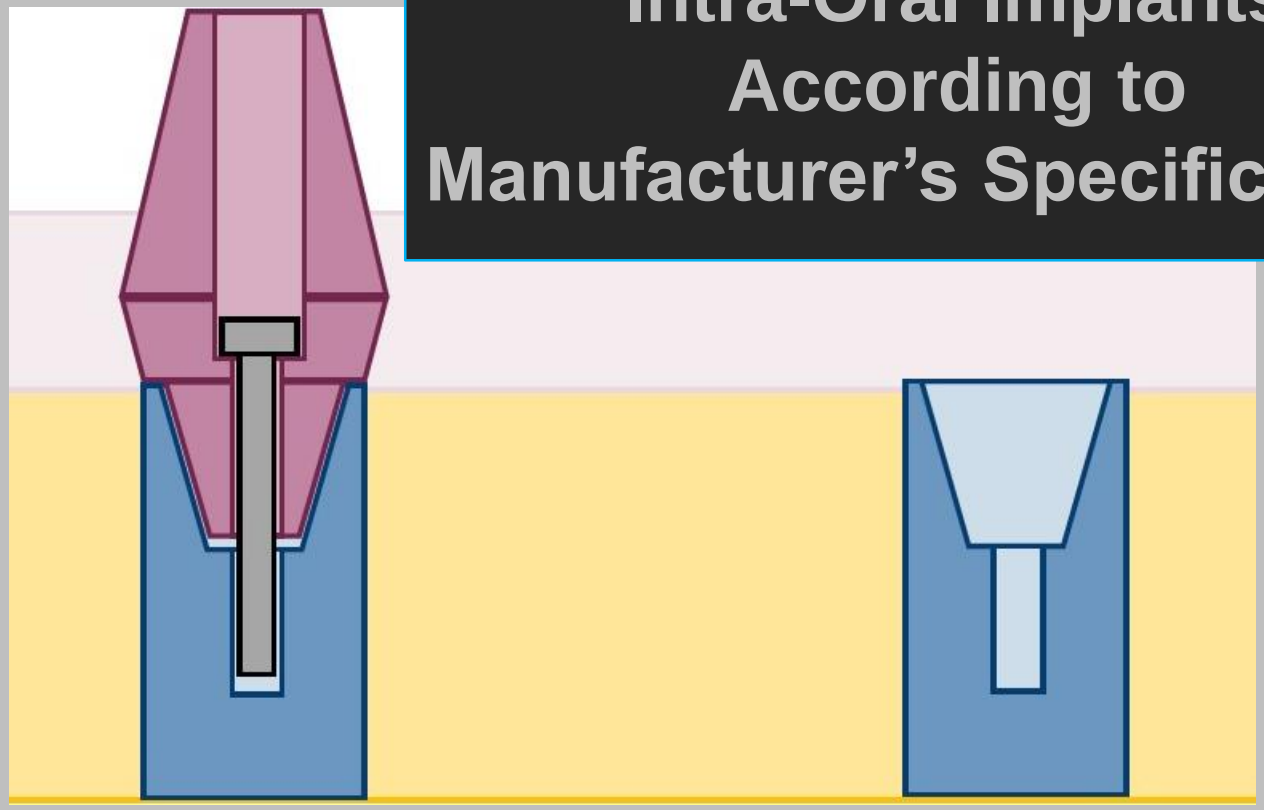
Parts are Transferred to the Mouth Individually

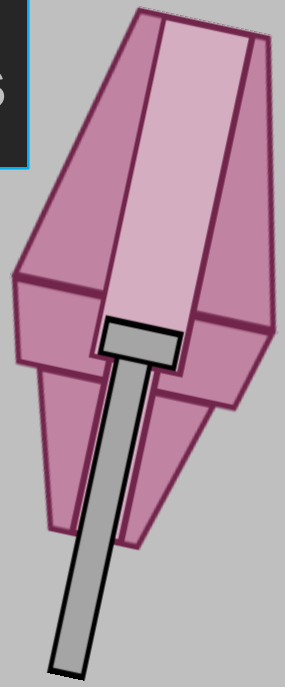




The Current Cement-in Technique

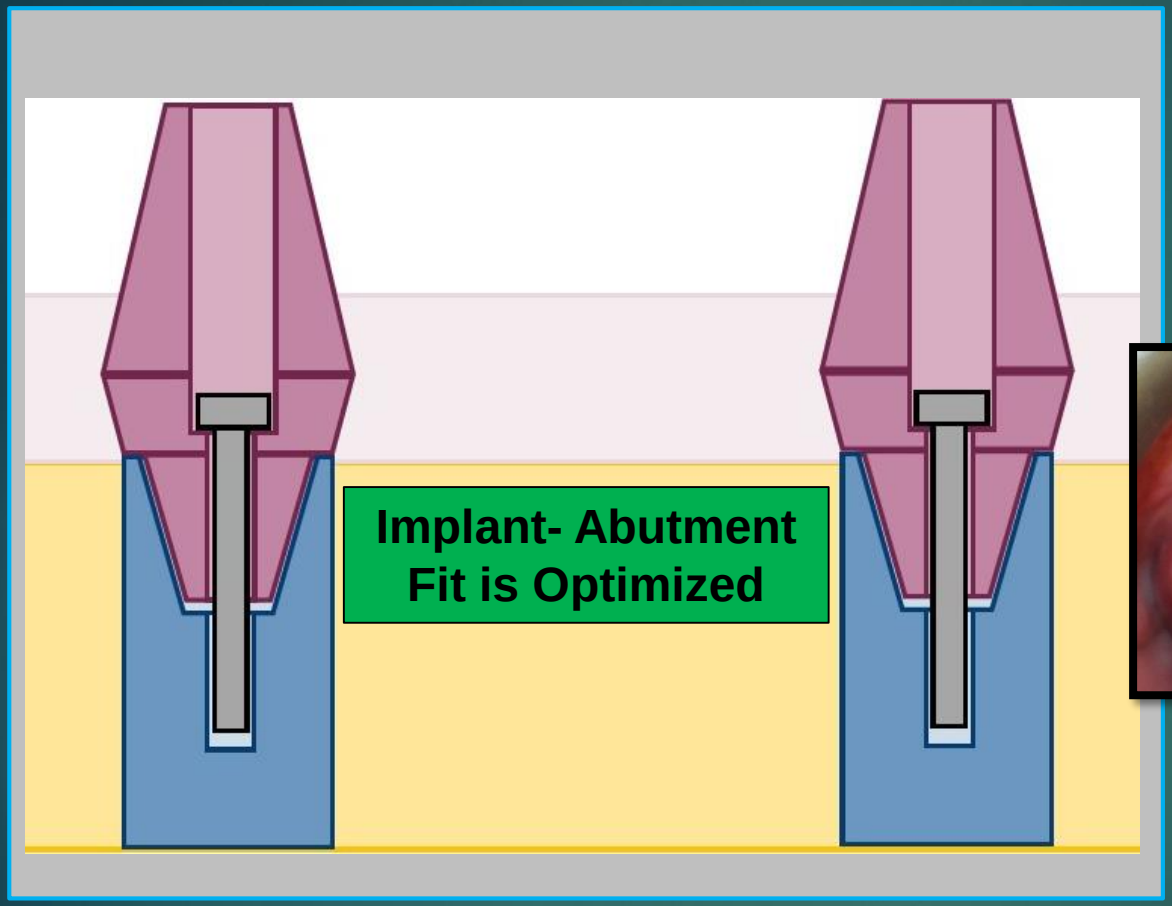
Abutments are Installed onto Intra-Oral Implants According to Manufacturer's Specifications





Manufacturing Accuracy (±5 µm) Determines Fit of the Connection, NOT Model Accuracy (±150 µm)

The Current Cement-in Technique

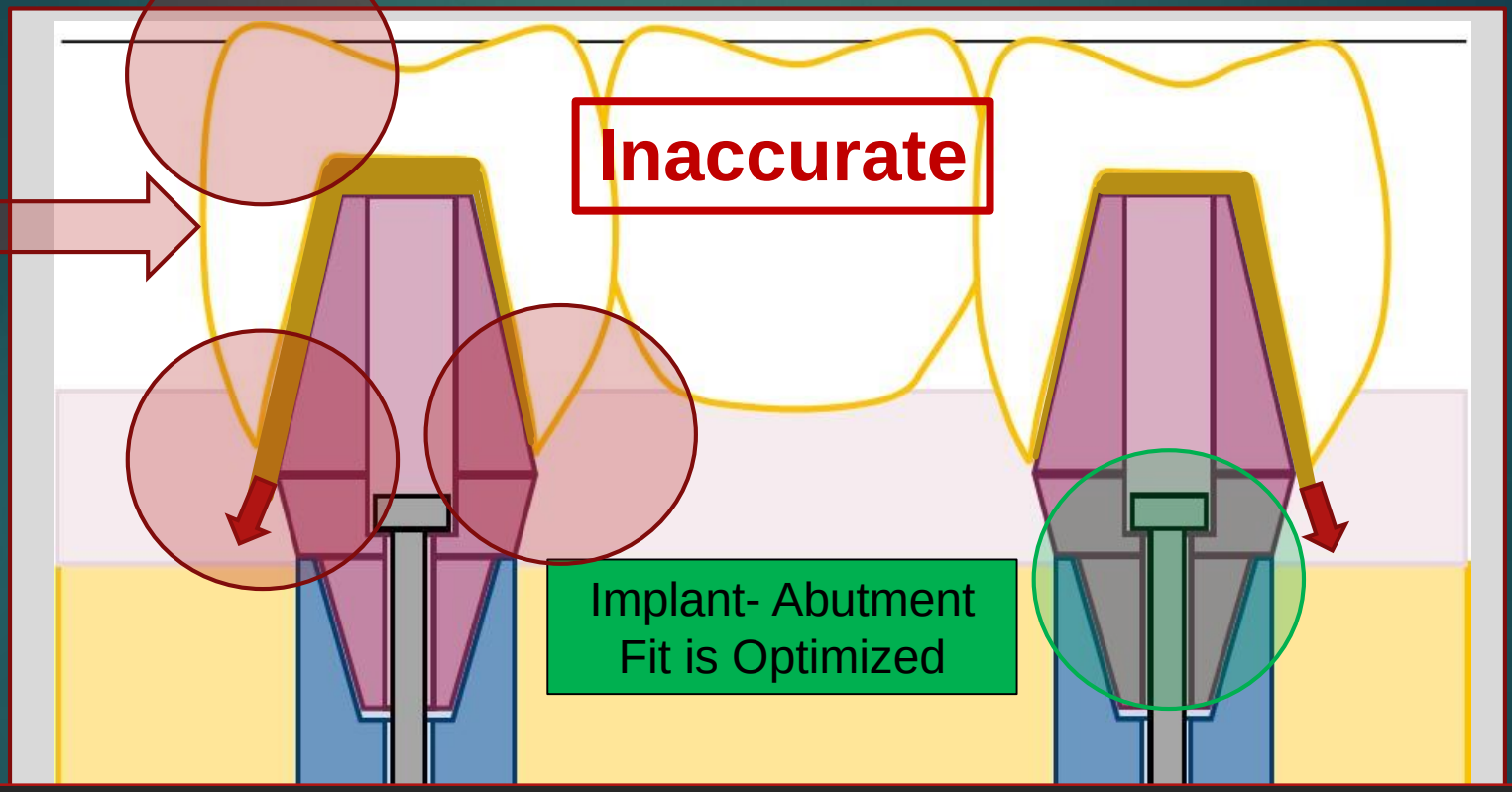


The Behavior of these Connections Can be Predicted According to Manufacturer's Research Results

Now You Know

How to Install Abutments According to Manufacturer's Specifications & Government Standards

BUT: Prosthesis Dimensional Error Can Still Cause Complications At the Abutment-Prosthesis Junction

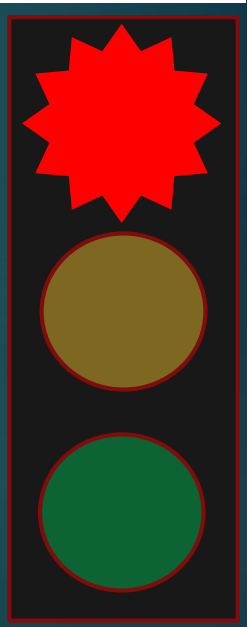


Subgingival Cement, Margin Overhangs,
Open and Short Margins, Hyperocclusion
Tight & Open Contacts

Is this Prosthesis Inaccuracy Problem Already Solved by Digital Technology?

Rutkūnas V et al., Accuracy of digital implant impressions with intraoral scanners. A systematic review. Eur J Oral Implantol. **2017**;10(Suppl1):101–120

In TOTAL: 1 *in vivo* and 15 *in vitro* studies.
The clinical study concluded that angular and distance errors were too large to be acceptable clinically.



Conclusions: Data on accuracy of digital records, as well as accuracy of printed or milled models are of high relevance and are still lacking.

NO – NOT YET!

So … Should We Install Implant Prosthetics by Screw or Cement?

The Dreaded Macrogap, Contact Issues, Residual Subgingival Cement, Margin Overhangs, the Dreaded Open Margin …….

Is it just "Pick Your Poison?"
Or Can We Do Better?

Screw Vs Cement for Dental Implant Prosthesis Installation Part 1: The Logic Behind the Argument. Emil LA Svoboda, Published to www.ReverseMargin.com, Update January 2, 2016
Screw versus Cement for Implant Prosthesis Installation. Part 2: The Game Changer the Tips the Balance to Favour Intra-oral Cementation. Emil LA Svoboda, Published to www.ReverseMargin.com, Update January 2, 2016

Relationship of Residual Excess Cement to Peri-implant Disease

Cemented Single Implant Retained Crowns

-39 consecutive patients referred to the Periodontist had 42 implants with peri-implant disease

-12 of the same patients had 20 implants without disease & without detectable subgingival cement

-34 of 42 diseased implants (81%) had subgingival cement

- After cement removal 25 of 33 (74%) no longer has signs of peri-implant disease after 30 days

Thomas G Wilson Jr. The Positive Relationship Between Excess Cement and Peri-implant Disease: A Prospective Clinical Endoscopic Study. J. Periodont **2009**;1388

There is a Predictable Treatment for Peri-implant Disease for Cemented Cases!

WOW!

74% of the Peri-implant Disease Cases Healed When Residual Subgingival Cement was Removed

Single Tooth Cemented Restorations

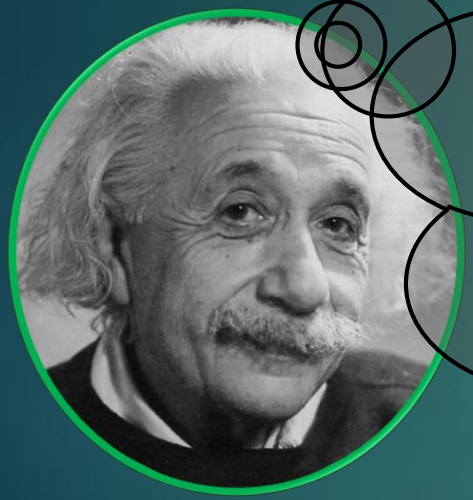
Thomas G Wilson Jr. The Positive Relationship Between Excess Cement and Peri-implant Disease: A Prospective Clinical Endoscopic Study. J. Periodont 2009;1388-1392

Now You Know

How to Treat Peri-implant Disease Associated with the Cement-in Technique

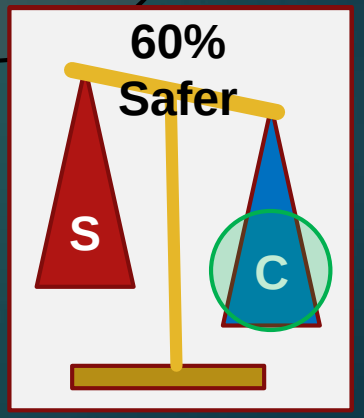

However
Prevention
Is
Our Goal!

Albert Einstein “Intellectuals Solve Problems, Geniuses **Prevent** them.”



Just Preventing
Residual Subgingival Cement
Could Reduce
Peri-implant Disease by 60%!

(74% X 81% = 60%)



Thomas G Wilson Jr. The Positive Relationship Between Excess Cement and Peri-implant Disease: A Prospective Clinical Endoscopic Study. J. Periodont **2009**;1388

So … Do Prosthodontists in a University Setting Leave Behind Residual Cement?

126 implants were restored with Cement-Retained Restorations by Prosthodontists and 60% had residual cement on follow-up ……

Do We Truly Understand the Mechanism by Which this Happens?

Korsch M, Obst U, Walther W. Cement-associated peri-implantitis: a retrospective clinical observational study of fixed implant-supported restorations using a methacrylate cement. Volume 25, Issue 7, July 2014, pgs 797-802

What do we understand about intra-oral cementation? It is a hydraulic event.*

Excess cement

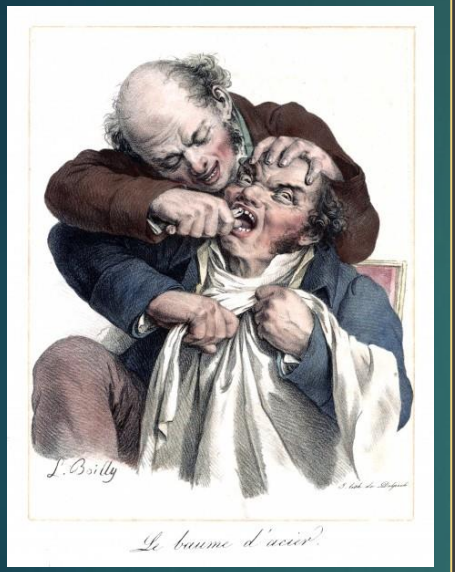
1. can be difficult to control**
2. can go deep into the subgingival spaces*,**
3. can be difficult to detect and remove**
4. is a risk factor for periodontitis and peri-implant disease***
5. can be removed by endoscopic means or after surgical access***

*Cementation in Dental Implantology. An Evidence Based Guide. Edited by Chandur P.K. Wadhwani. Published by Springer 2015.

****The Influence of the cementation margin position on the amount of undetected cement. A prospective clinical study. Tomas Linkevicius et al. Clinical Oral Implants Research. Vol 24,Issue 1, 71-76, Jan 2013.**

***Thomas G Wilson Jr. The Positive Relationship Between Excess Cement and Peri-implant Disease: A Prospective Clinical Endoscopic Study. J. Periodont 2009;1388-1392

What determined the margin design for replacement teeth?



Design of Margins Reflected OLD Technology

Feather Margin – soft gold at the thin margins were burnished towards the tooth retainers to form a seal.

Chamfer & Butt – responded to the needs of porcelain and the availability of the high speed handpiece.

The older cements also require high pressure installation to overcome back pressure caused by the small cement space necessary to reduce film thickness and compensate for their **low compressive strength and solubility at the margins**.

Effects of Margin Design on the Direction of Flow of Excess Cement “in vitro”

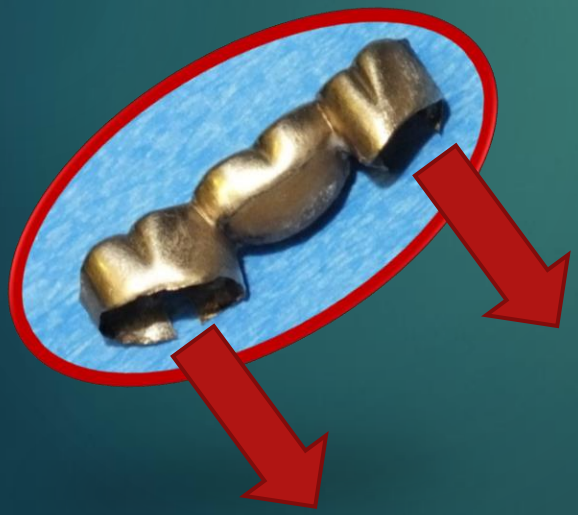
Arrows Indicate Margin Slope
1) Tapered
2) Chamfer
3) Reverse Margin

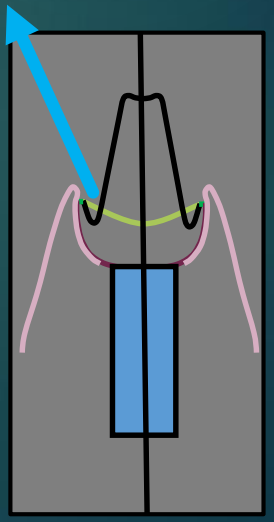
Arrows Indicate Cement Flow
1) Tapered - Down
2) Chamfer - Down
3) Reverse Margin - Up

Watch the Video at www.ReverseMargin.com

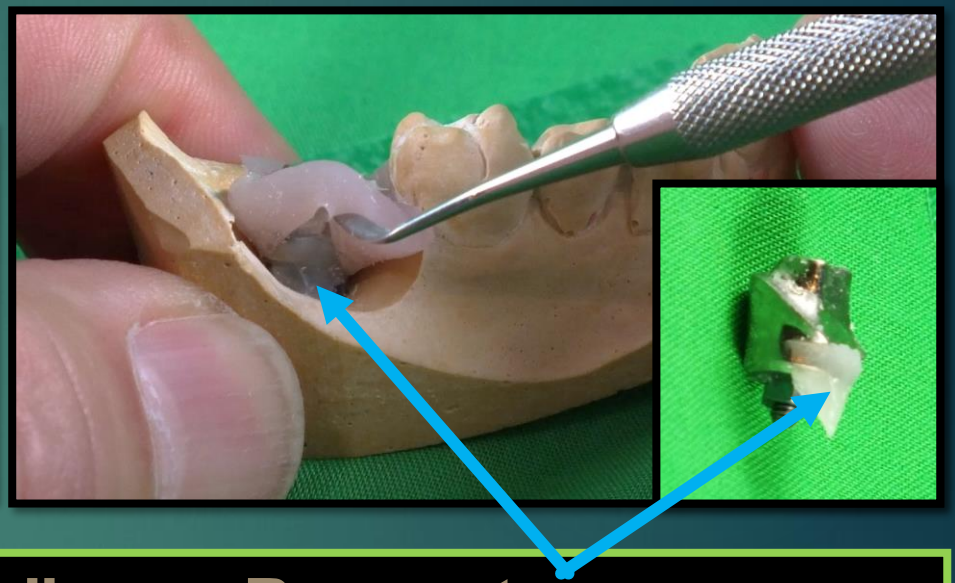
Margin Design Effects
the Direction of Cement Flow!

Why Choose
Margin Designs that
Direct Excess Cement into the Tissues??





“Gingival Effects” Discovered



When “Gingiva” was Present,
Excess Cement was Projected Under the Gingiva,
Regardless of Margin Design!

ELA Svoboda. Controlling Excess cement During the Process of Intra-oral Prosthesis Cementation: Overcoming the Gingival Effects. OralHealth, Oct 2015; 52-66.

The Gingival Effects

Are a Root Cause of Complications Common to the Cement-in Technique

The “Gingival Effects” can Increase the Problem of Subgingival Cement

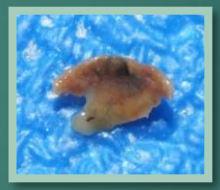
Three Margin Designs
1) Tapered
2) Chamfer
3) Reverse Margin
Clear Tygon Tubing Simulates Gingiva

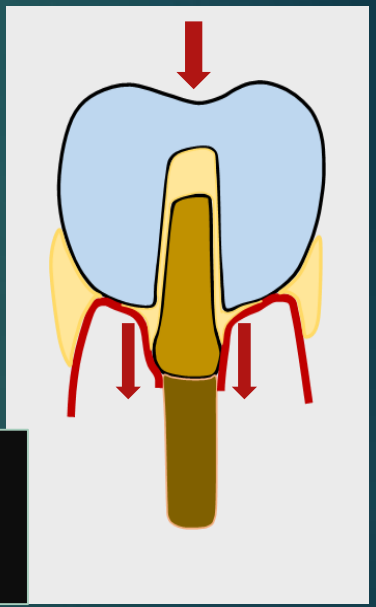
Regardless of Margin Design, the excess cement became trapped by a gingiva-crown seal during installation and was forced DEEP into the Subgingival Environment

Watch the Video at www.ReverseMargin.com

The Gingival Effects on Cement Flow Can Be HUGE

They include the 1) Deflection Effect, 2) Eddy Effect, 3) Plunger Effect, 4) Bellows Effect

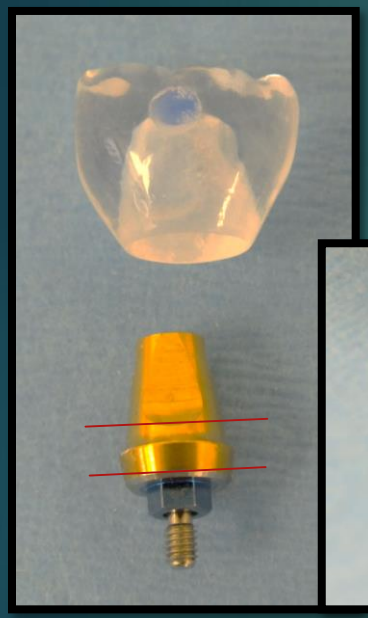


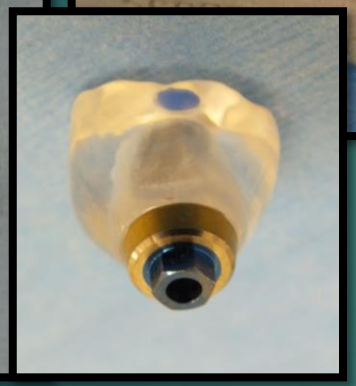


Skinny Abutments with Wider Profile Crowns are the Worst! We All Need to Understand Why!

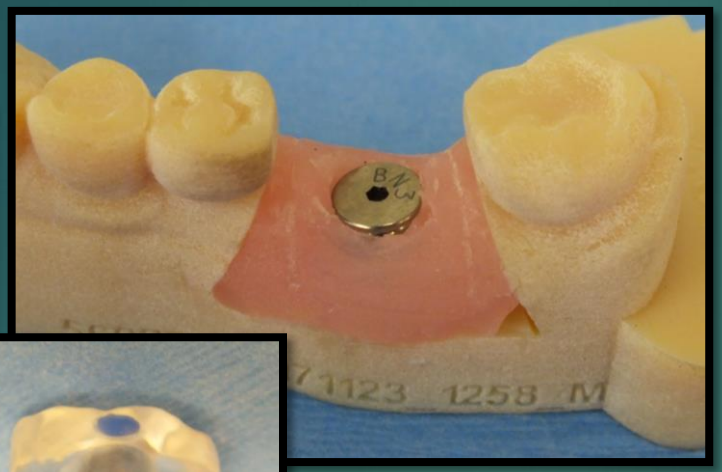
ELA Svoboda. Controlling Excess Cement During The Process of Intra-oral Prosthesis Cementation: Overcoming the Gingival Effects. OralHealth Oct 2015;52-66 and at www.ReverseMargin.com.

Lab Experiment 1:
Stock Abutment & the Gingival Effects

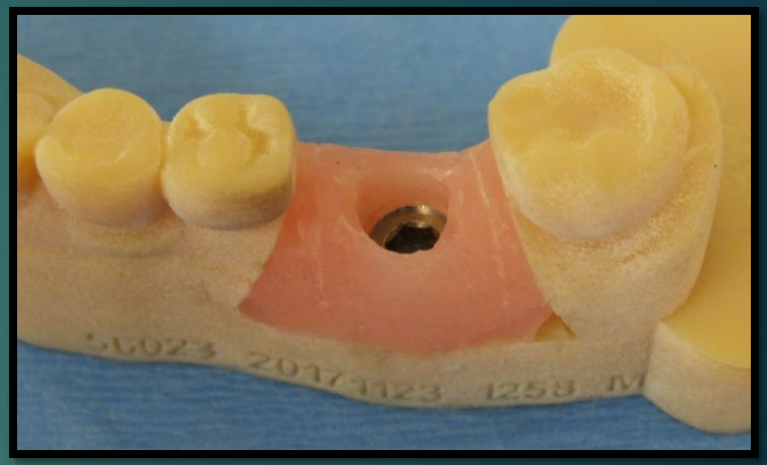


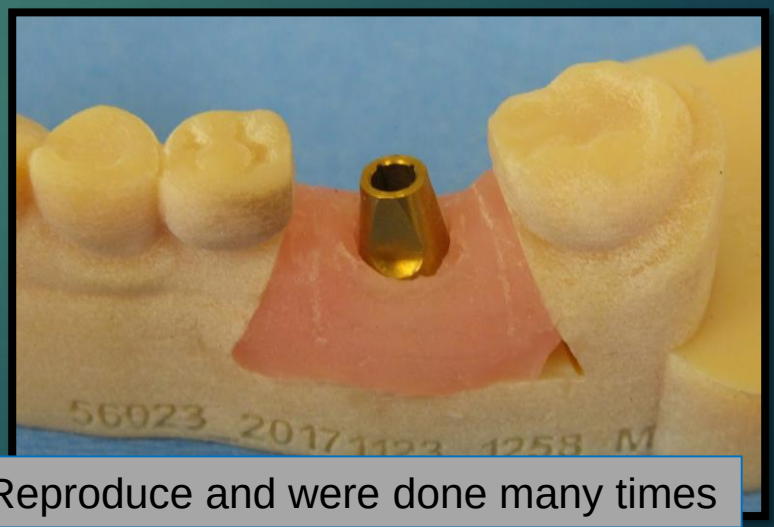


Excellent Fit of Solid Crown on Abutment



3 mm Cover



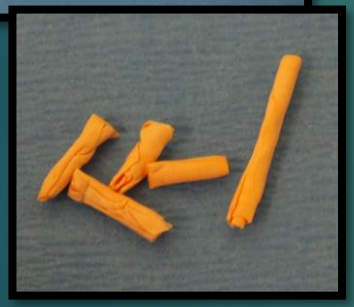


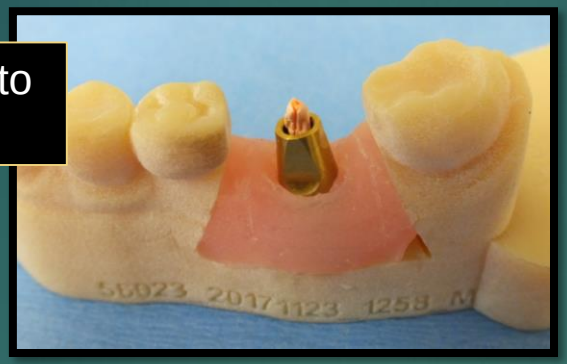
180112

This and other Experiments Shown are Easy to Reproduce and were done many times

Stuff Rolled Teflon Tape into Screw Access Hole to Prevent Cement Entry

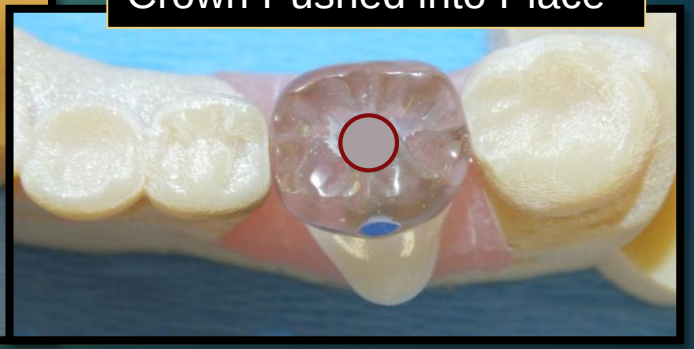
Rolled Teflon Packed into Screw Access Channel





Rely X Unicem, 3M

Crown Pushed into Place

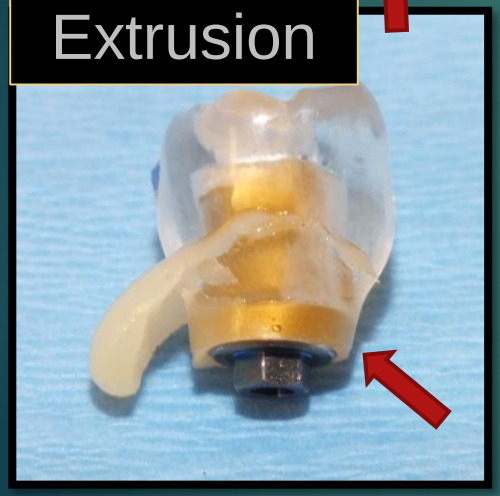


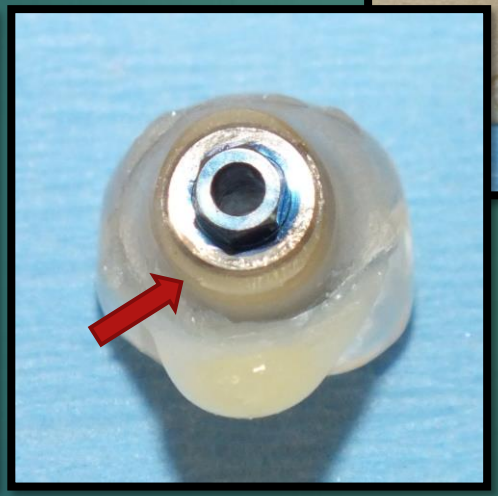
180112

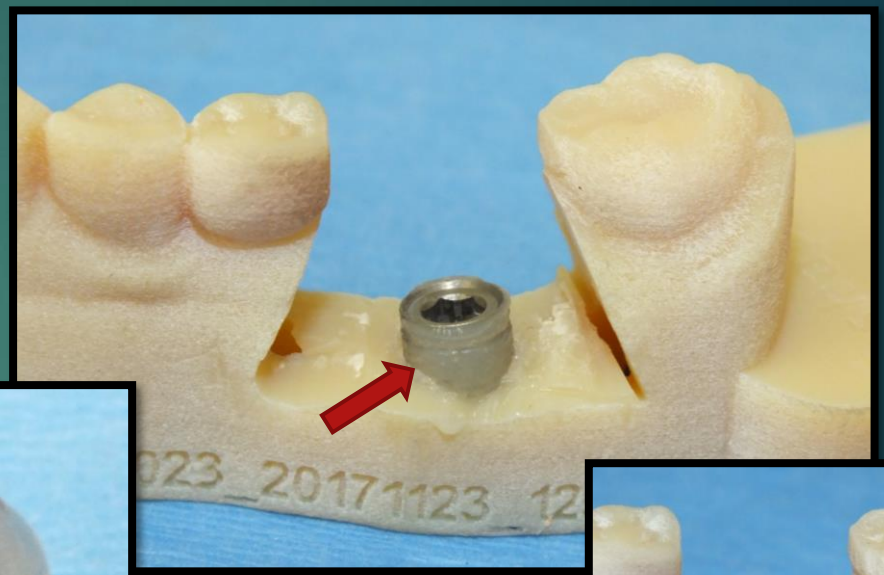
Put Excess Cement into Crown to Prevent Air Entrapment & Cement Voids

Red Arrows Point to Subgingival Cement Caused by the Gingival Effects

Uneven Extrusion







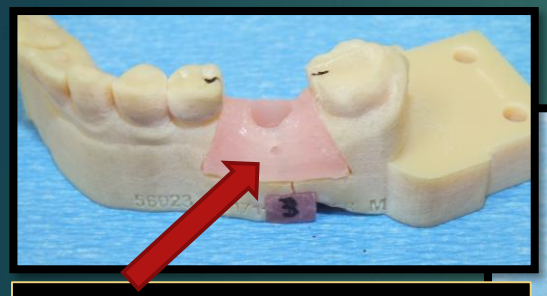
Cement Cleaned Off

180112

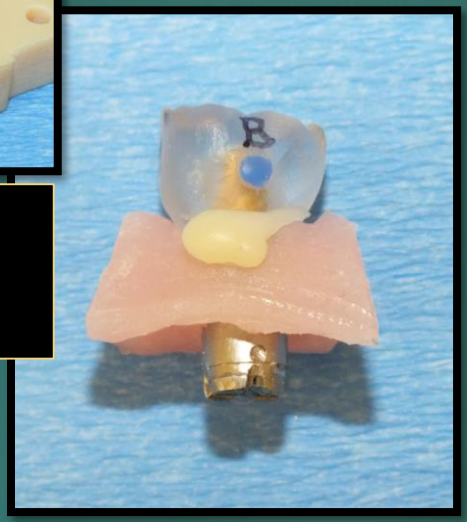
Wider Crown and High Seating Force caused a LARGE Volume of Subgingival Cement!

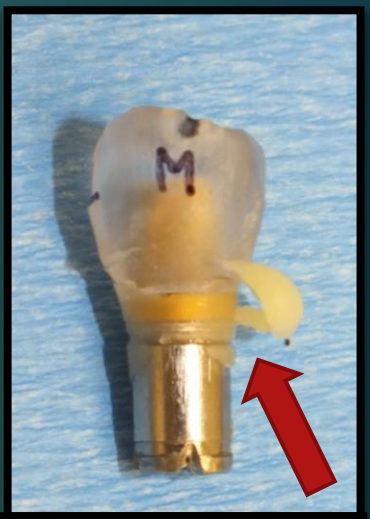
Stock Abutments – Excess Cement Squirts through Hole and Goes Subgingival

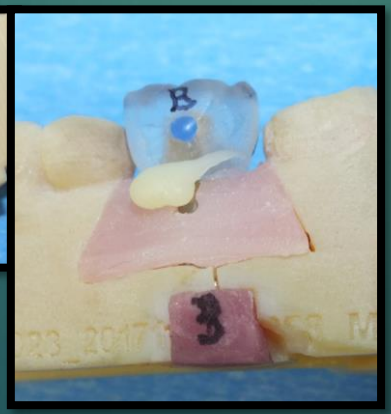
Cementation Pressure ~40 NCm



Hole -2 mm Subgingival

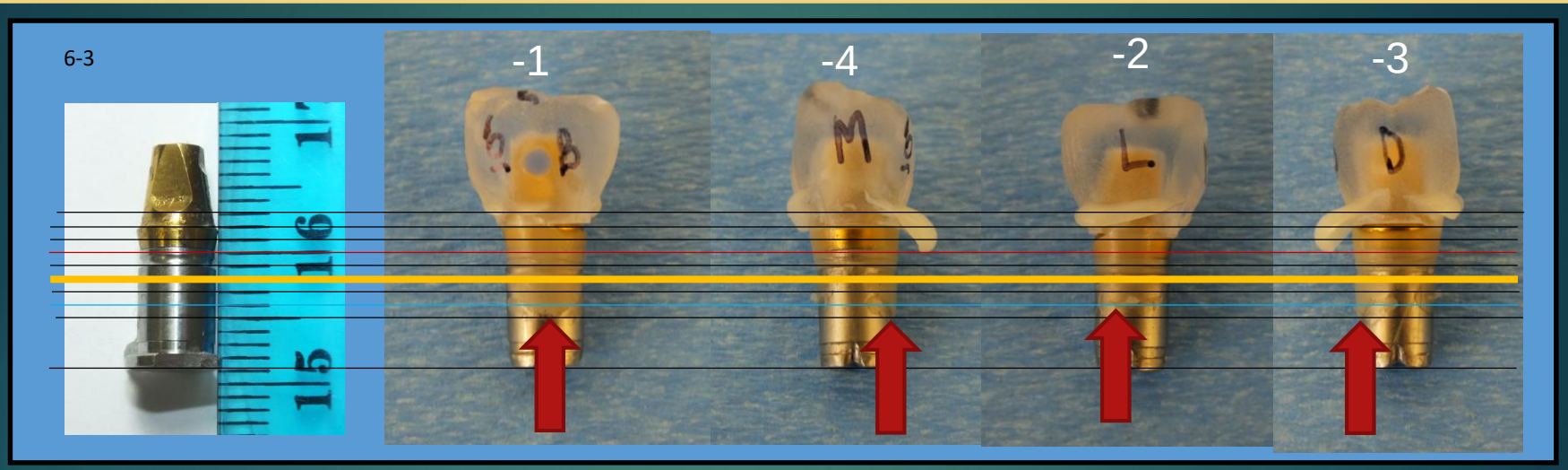


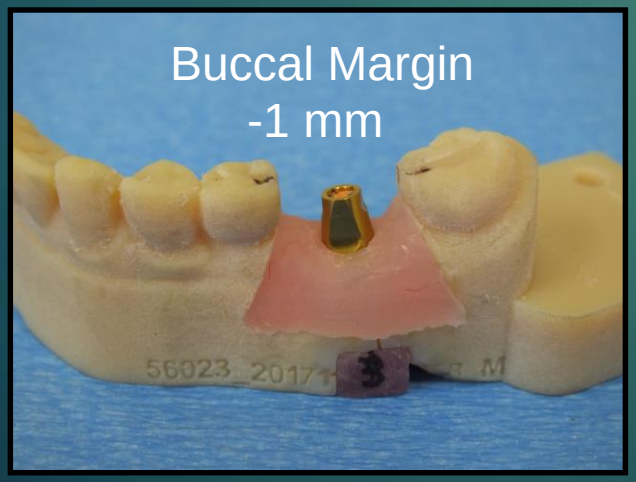




180329

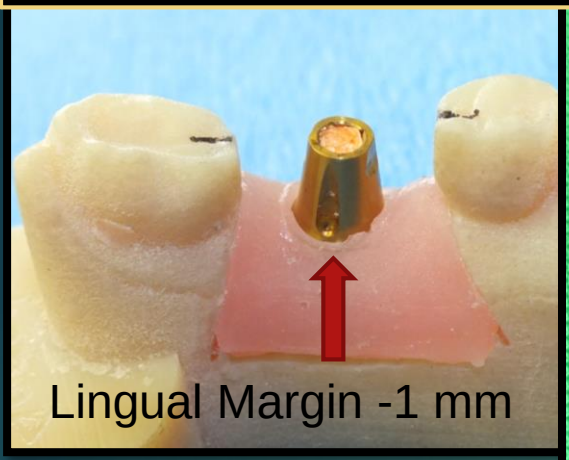
13 Stock Abutments, Subgingival Margin
Sub-Margin Extension of Excess Cement
Ave 4.5 mm, Range 3.2 – 6.0 mm

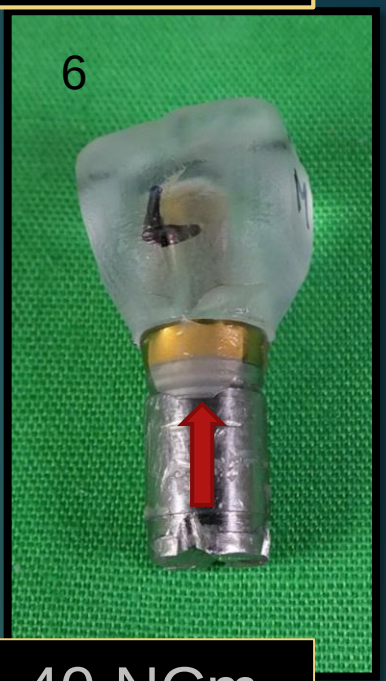




Cementation Pressure 40 NCm

13 Stock Abutments, 1 mm Subgingival Margin
Sub-Margin Extension of Excess Cement
Ave 3.5 mm, Range 2.6 – 4.0 mm





Cementation Pressure ~40 NCm

Clinical Experiment #1: Stimulating the Gingival Effects

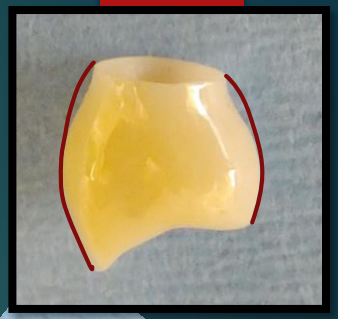
Biting Force to Seat Crown

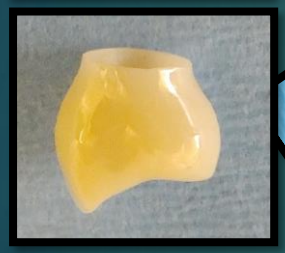
Excellent Fit of Crown on Abutment

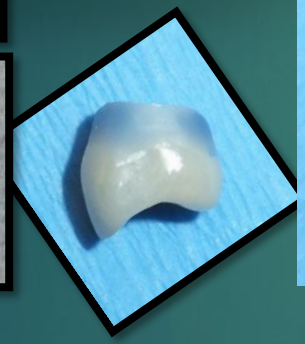
Abundant Residual Subgingival Cement

Wider Crown and High Seating Force Can Cause Subgingival Cement

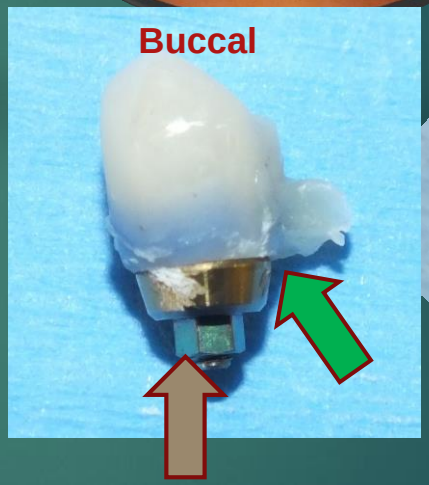
Clinical Experiment #2







MC 16

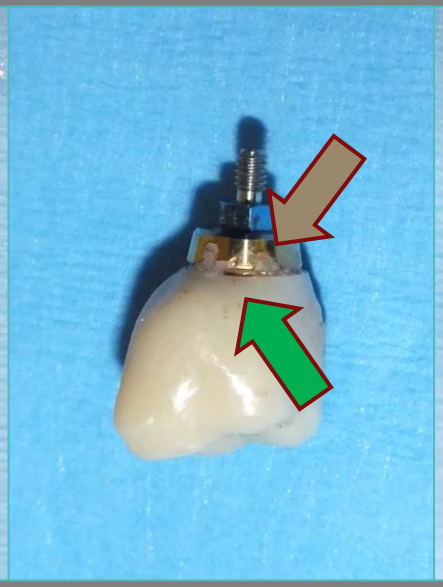


Gingival Effects Can Cause:

1) **Open Margins**
2) **Residual Subgingival Cement**

Clinical Experiment #3:

TN17



Mesial

Lingual

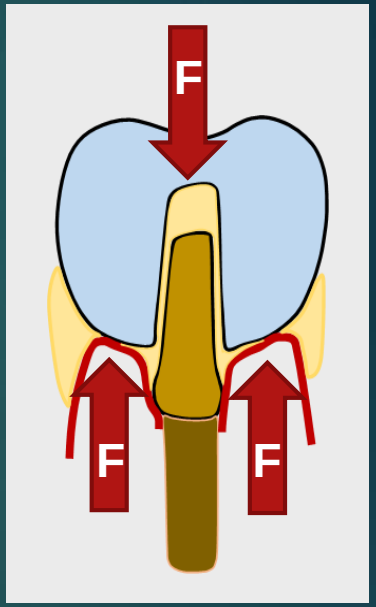
Buccal

In Addition to Residual Subgingival Cement, Gingiva Can Contribute to "Open Margins and Cement Voids"

Gingival Effect #5 called the "Resistance to Displacement Effect"

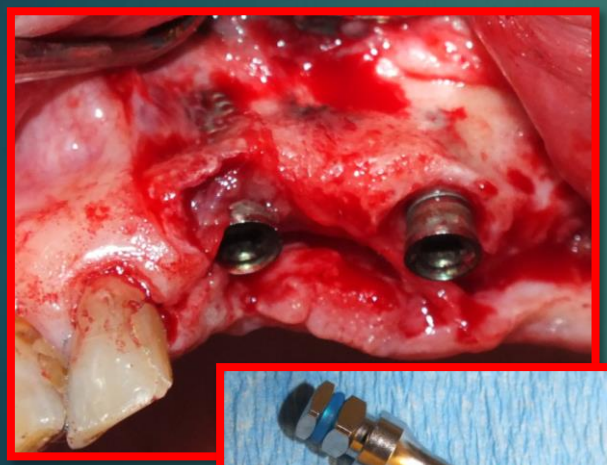
It Can Intensify the Other Gingival Effects

And Can Prevent the Prosthesis from Seating and Cause the "Dreaded Open Margin"



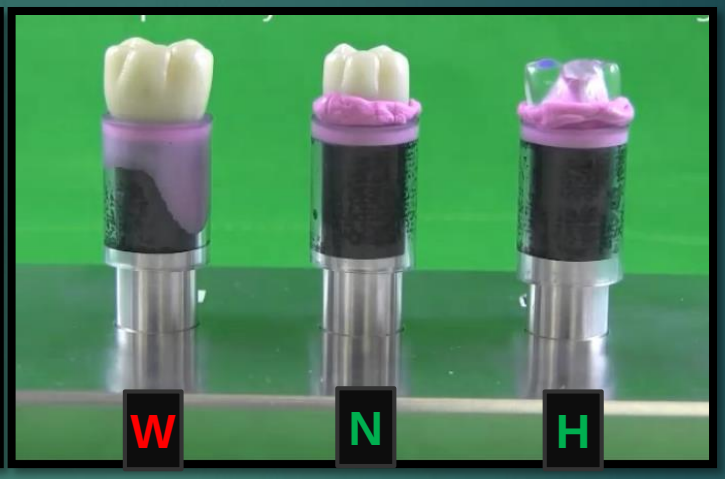
ELA Svoboda. Controlling Excess Cement During The Process of Intra-oral Prosthesis Cementation: Overcoming the Gingival Effects. OralHealth Oct 2015;52-66 and at www.ReverseMargin.com.

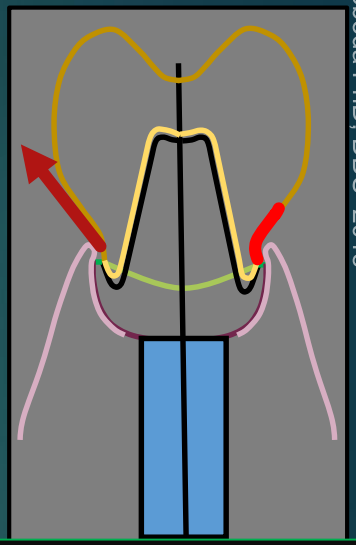
Can We Mitigate the Gingival Effects and Resulting Complications?



Can We Move the Gingiva Away ……. Out of Play?

Overcoming the "Gingival Effects" by Prosthesis Design





All Rods have Reverse Margins, Crowns Shapes are

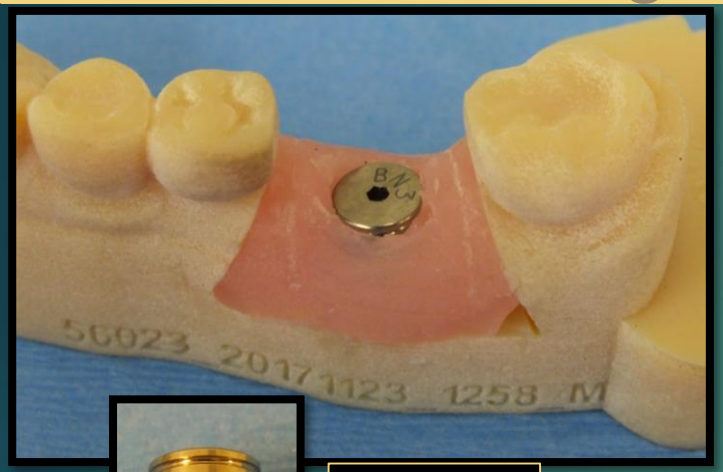
Wide, Narrow and Hybrid

The W is wider than the adjacent gingiva. N has a space between the gingiva and crown, and the H is like N but transitions to a W shape above the gingiva

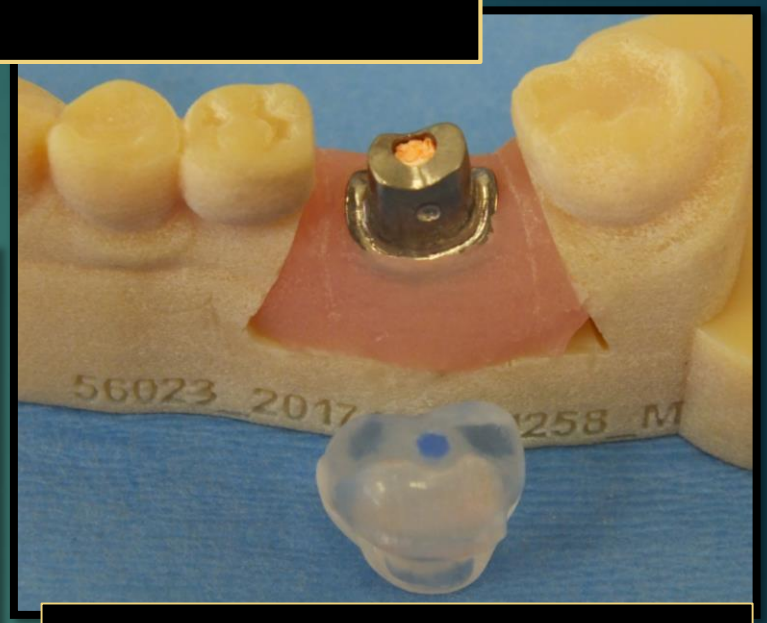
W causes subgingival cement but N and H do not!

Watch the Video at www.ReverseMargin.com

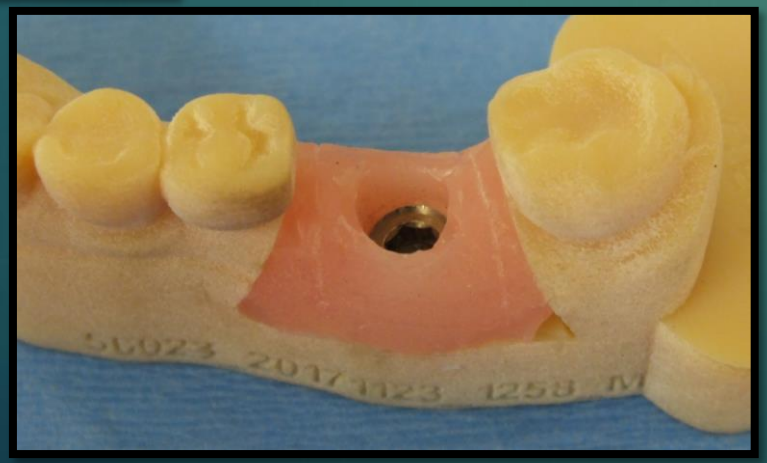
Lab Experiment #2: Custom Abutment & Crown Designed to Mitigate the Gingival Effects

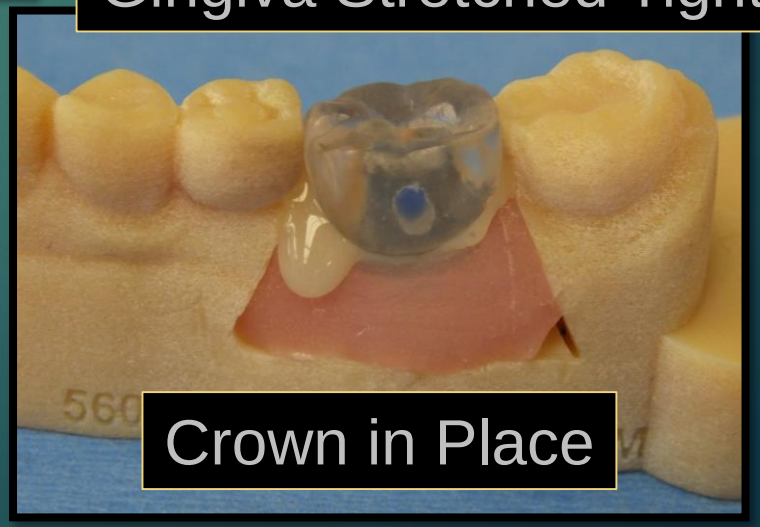


3 mm Cover



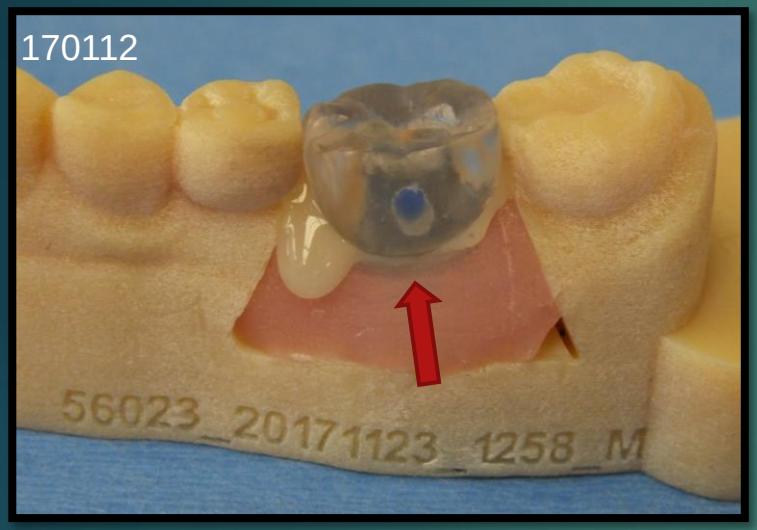
Gingiva Stretched Tight



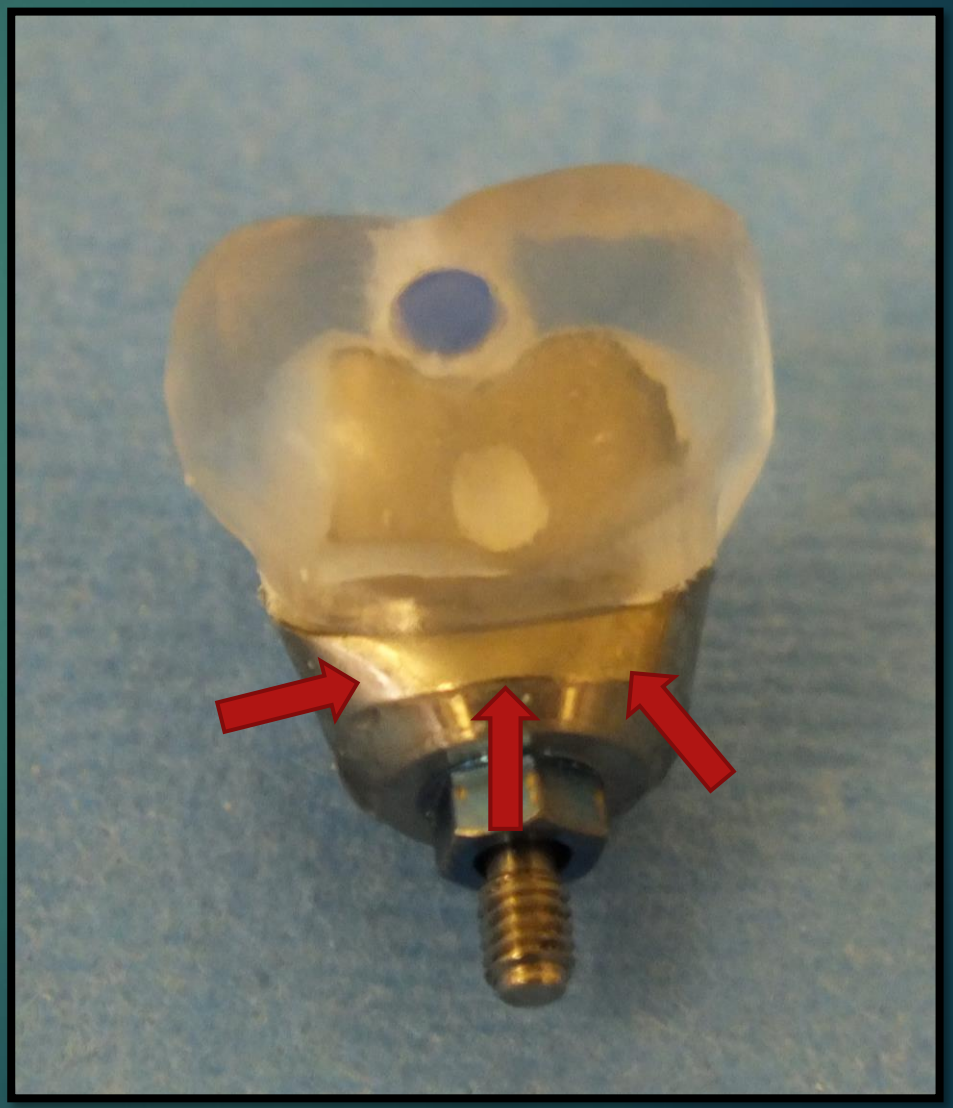


Crown in Place

Taut Gingiva Stretched Over Top of Abutment Margin Interacted with Crown



Some Cement Beyond Abutment Margin



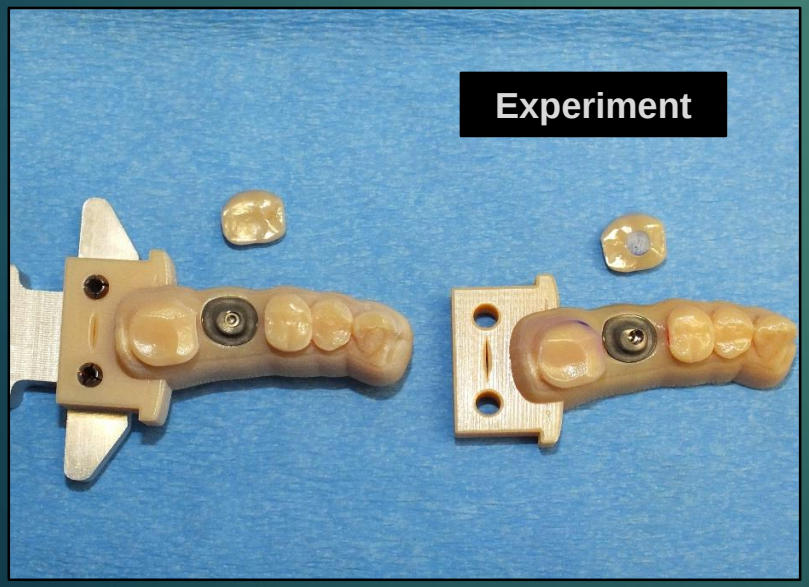
Buccal Margin 1 mm Under Gingiva Stretched Gingiva Interacted with Crown

Not Trimmed
All Sub-Marginal Cement

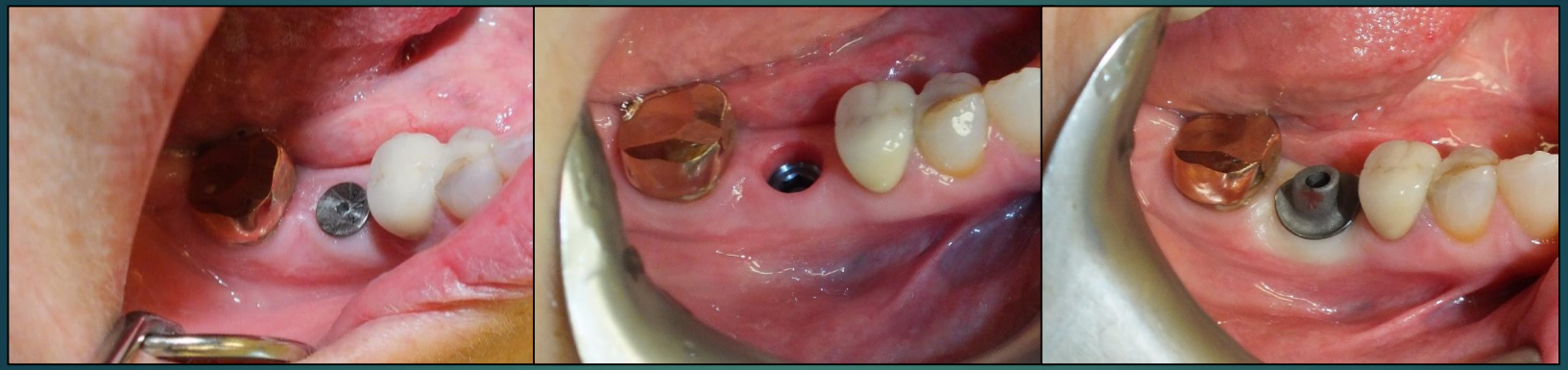
Trimmed
No Sub-Marginal Cement

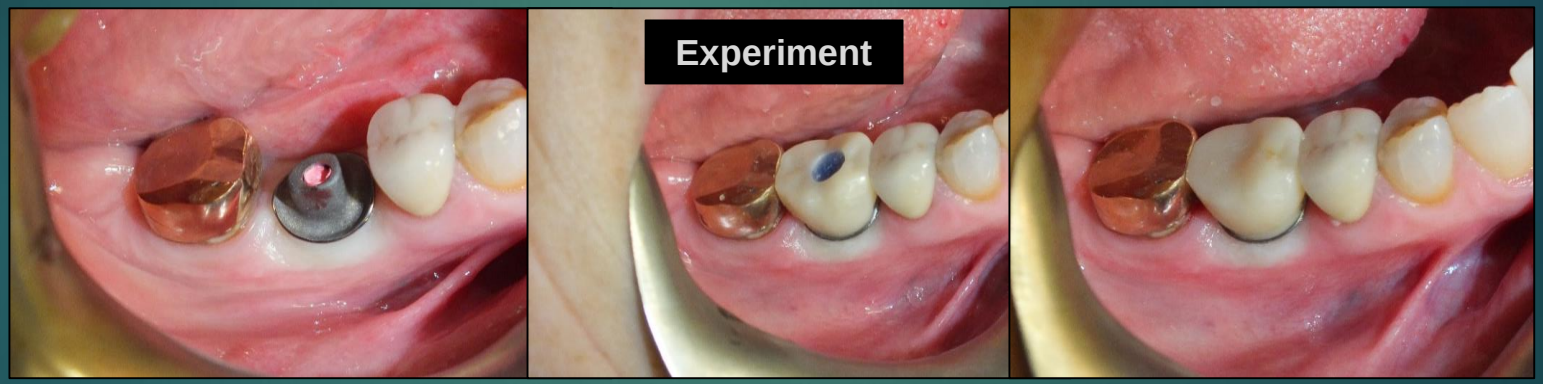
Crowns were Trimmed to Prevent Contact with Gingiva – Cement Problem Solved!

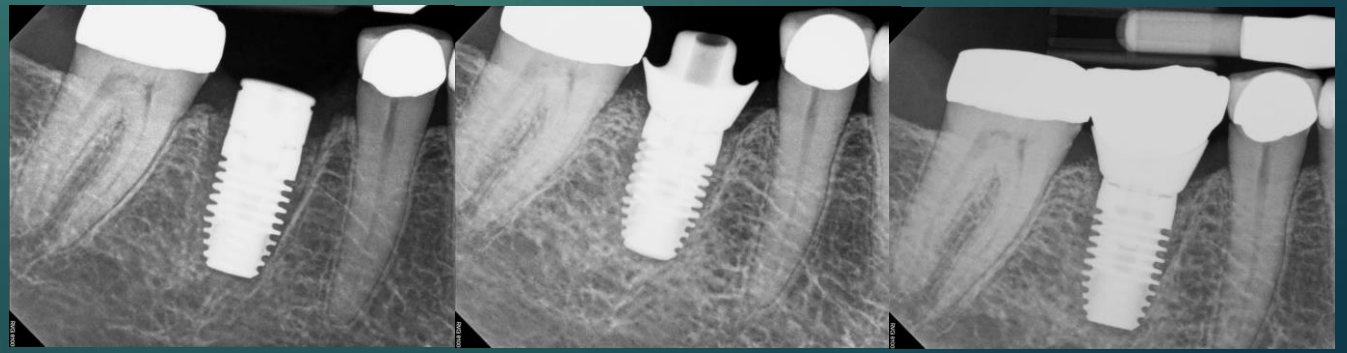
Clinical Experiment #4 – Take Prosthesis Out After Intra-oral Cementation



The Process – Supra-Gingival Margins

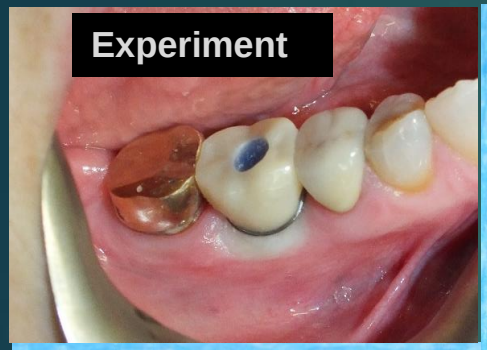


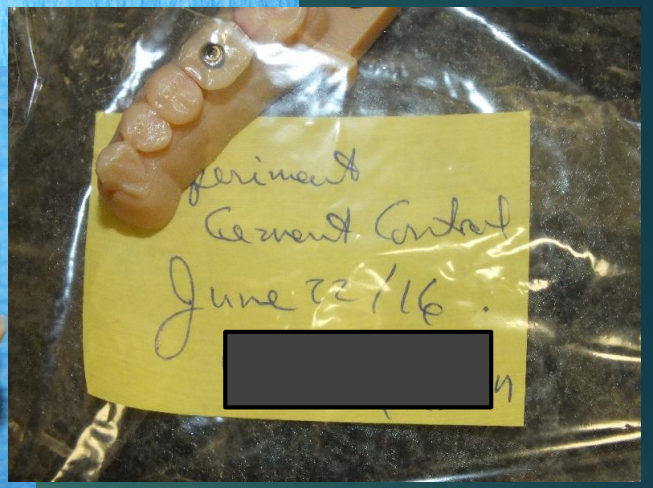




PE 16

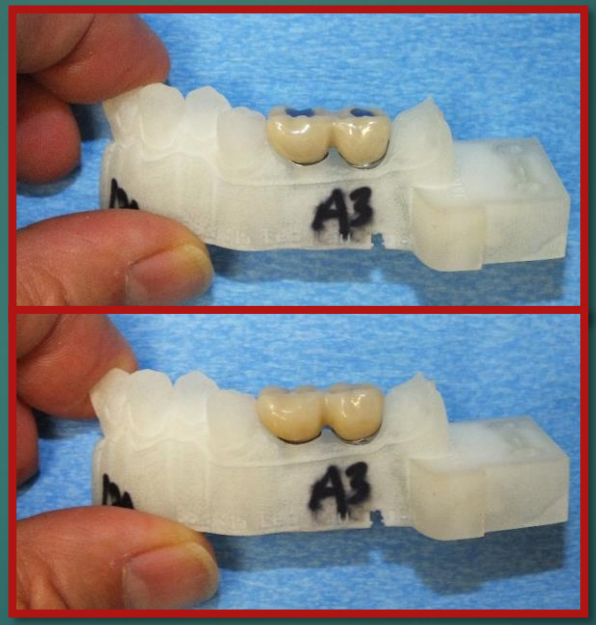
Experiment #4 Results





1) No Cement Beyond Margins
2) The Cemented Crown was Retrievable
3) Optimized Implant-Abutment Connection

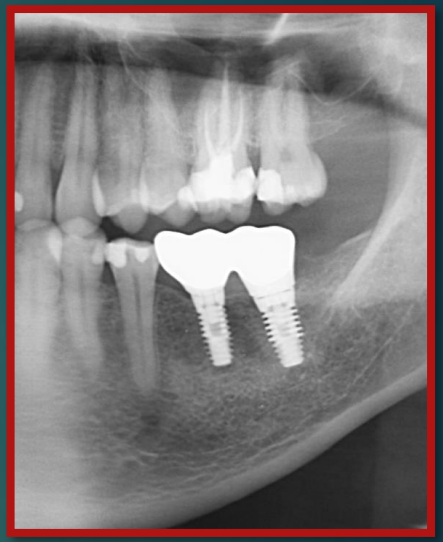
Experiment #5 – 2 Splinted Crowns



Margins Subgingival on Buccal

KL 15-16

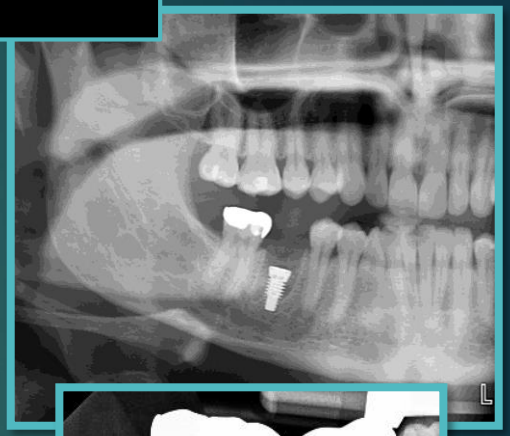
Experiment #5 – Prevents Gingival Effects

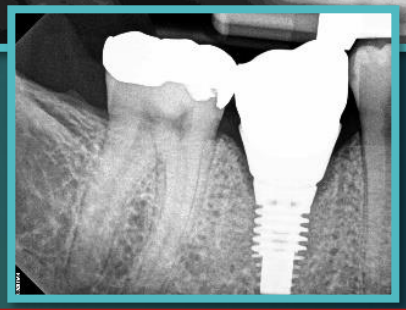


Gingiva Does Not Interact with the Prosthesis – By Design

1) No Cement Beyond Margins
2) The Cemented Crowns were Retrievable
3) Optimized Implant-Abutment Connection

New Version Experiment #6
Expressed Cement Not Removed





Gingiva Does Not Interact with the Prosthesis – By Design

1) No Cement Beyond Margins
2) The Cemented Crown was Retrievable
3) Optimized Implant-Abutment Connection

Mitigating the Gingival Effects

The **Well Designed Custom Abutment**

1. creates a relative barrier to excess cement going into the tissue spaces
2. Gets the Gingiva out of the way of the prosthesis during installation

The **Well Designed Prosthesis** is narrower in the subgingival zone to allow the easy flow of excess cement out of the tissue spaces

And Optimizing the Implant-Abutment Connection

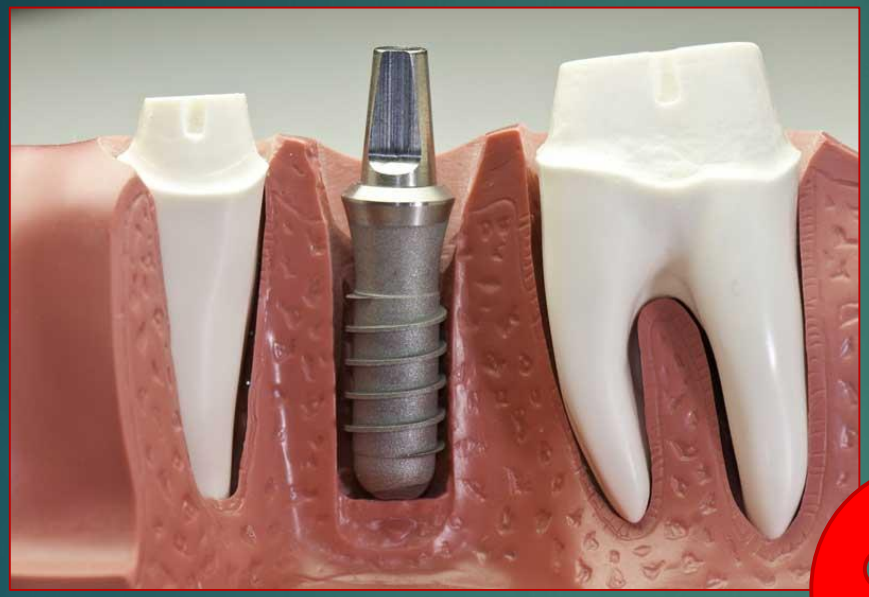
These Safer Designs are Not Limited to Particular Materials

HJ 15

Now You Can Use Intelligent Designs that Mitigate the Gingival Effects

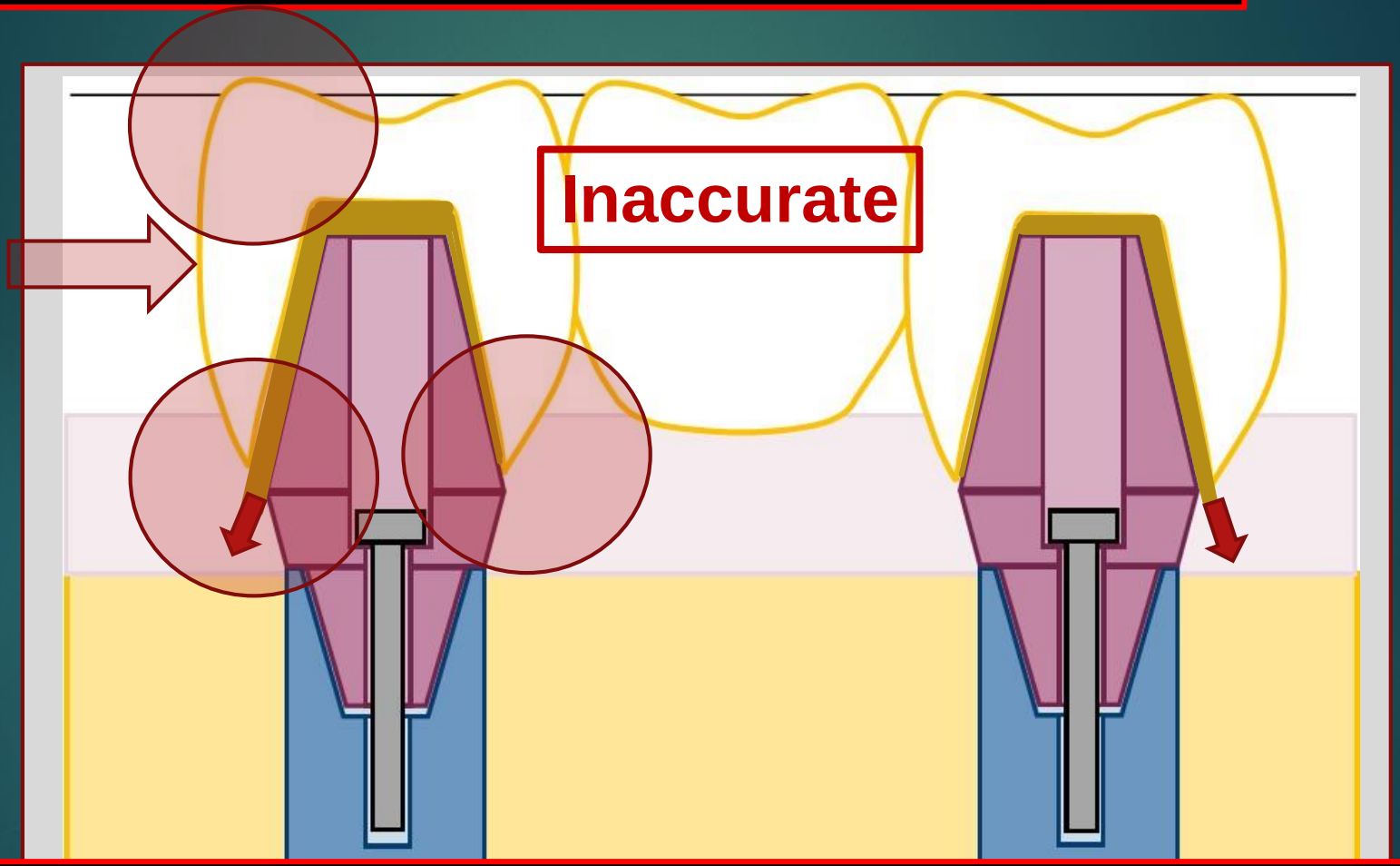
Avoid Those Designs that Cannot!

These are Not Sensitive to Gingival Effects & are Not Designed for Safe Cementation!



Replacement of multiple teeth with an implant-supported bridge – Adjacent natural teeth remain intact, and bone is preserved over time.

What about Prosthesis Dimensional Error?



Can We Fix This Problem Too?

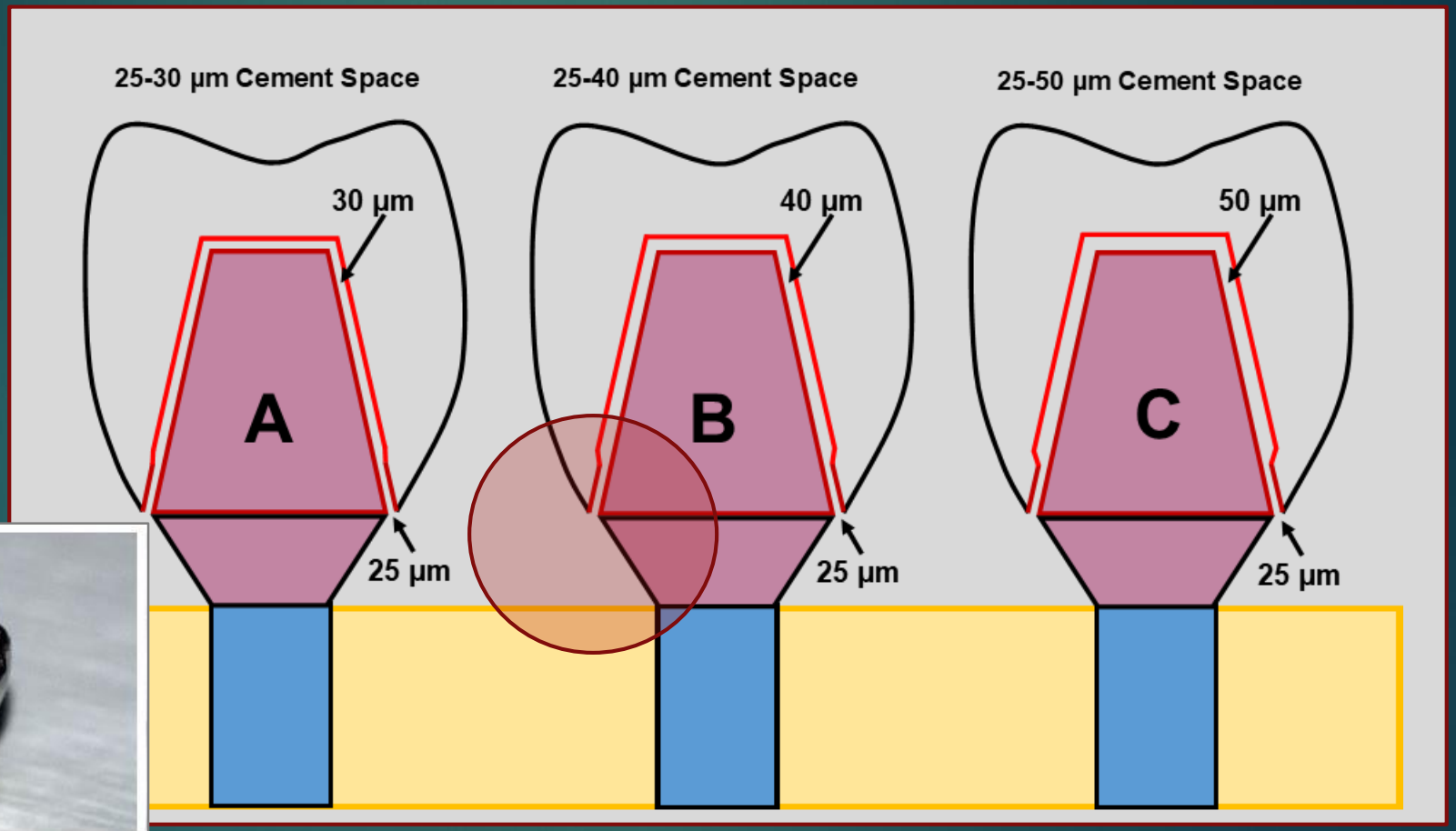
Prosthesis Dimensional Error

Is also a Root Cause Of Multiple Risk Factors Related to the Cement-in Prosthesis Installation Technique

Prosthesis Dimensional Error

Can We Do Something About this **BIG** Problem?

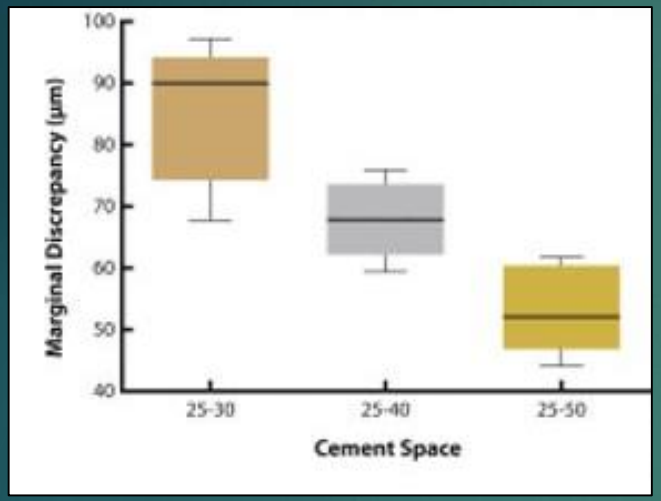
What happens to Marginal Fit when we increase Cement Space?



Single Tooth Cemented Restorations

Kale E et al. Effect of cement space on the marginal fit of CAD-CAM-fabricated monolithic zirconia crowns. J. Periodont 2009;1388-1392

With Increased Cement Space
Marginal Fit Gets Better



Vertical Dimension Misfit

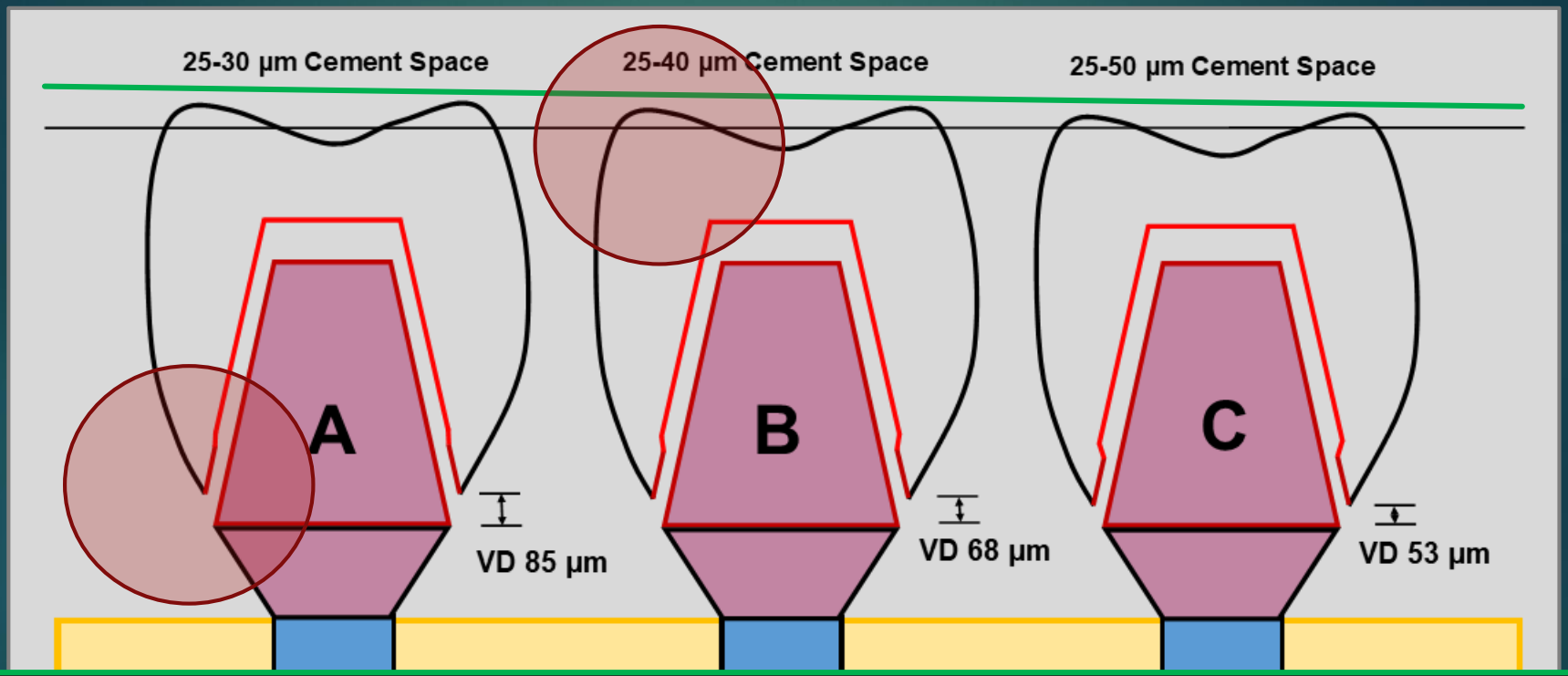
A (25 – 30) Ave 85 µm
B (25 – 40) Ave 68 µm
C (25 – 50) Ave 53 µm

However - What About the 25 µm Default Cement Space at the Margin?

Single Tooth Cemented Restorations in vitro

Kale E et al. Effect of cement space on the marginal fit of CAD-CAM-fabricated monolithic zirconia crowns. J. Periodont 2009;1388-1392

We Like to Imagine the Results Like this Diagram

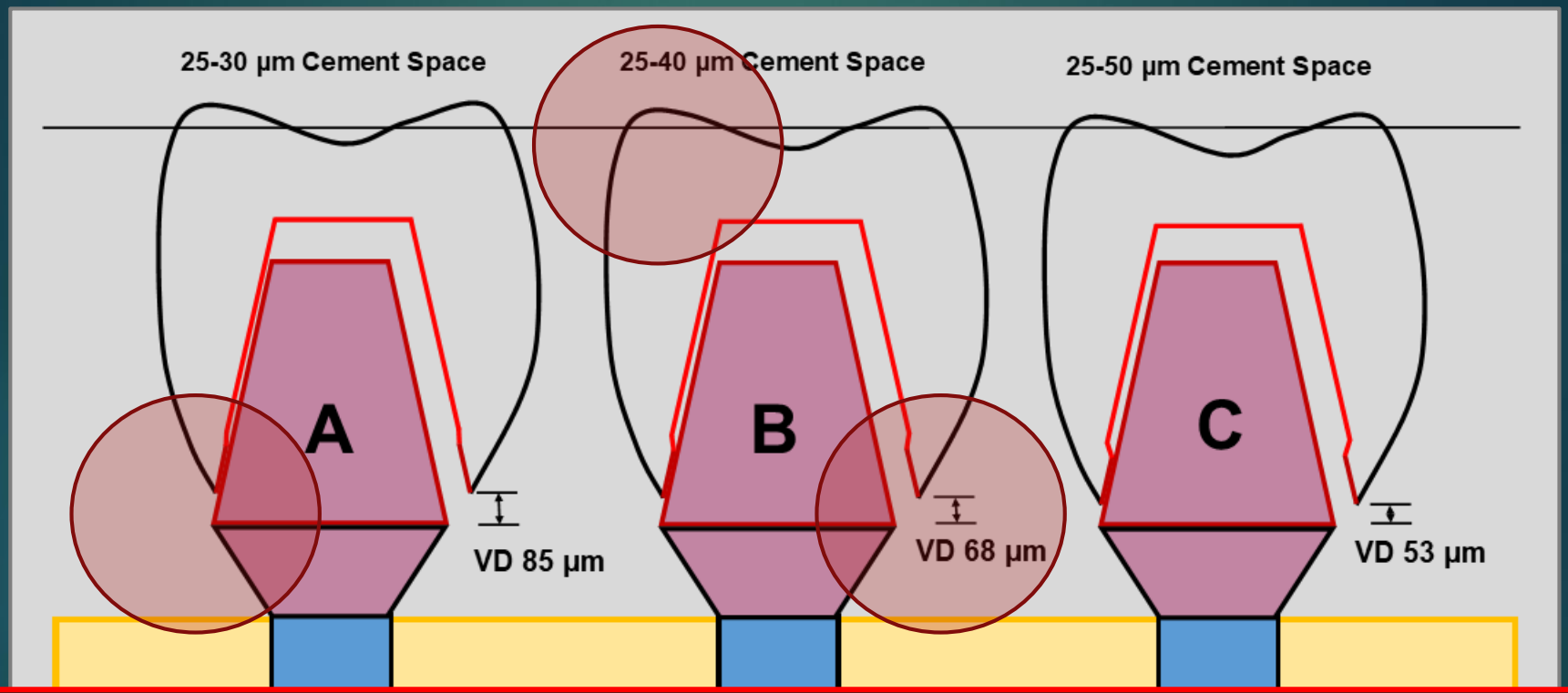


25 µm Margin Overhang, BUT Hyperocclusion and Open Margins are Reduced by Bigger Cement Space

Single Tooth Cemented Restorations

Kale E et al. Effect of cement space on the marginal fit of CAD-CAM-fabricated monolithic zirconia crowns. J. Periodont 2009;1388-1392

A Lateral Crown Shift during Installation Can Give a 50 µm Overhang

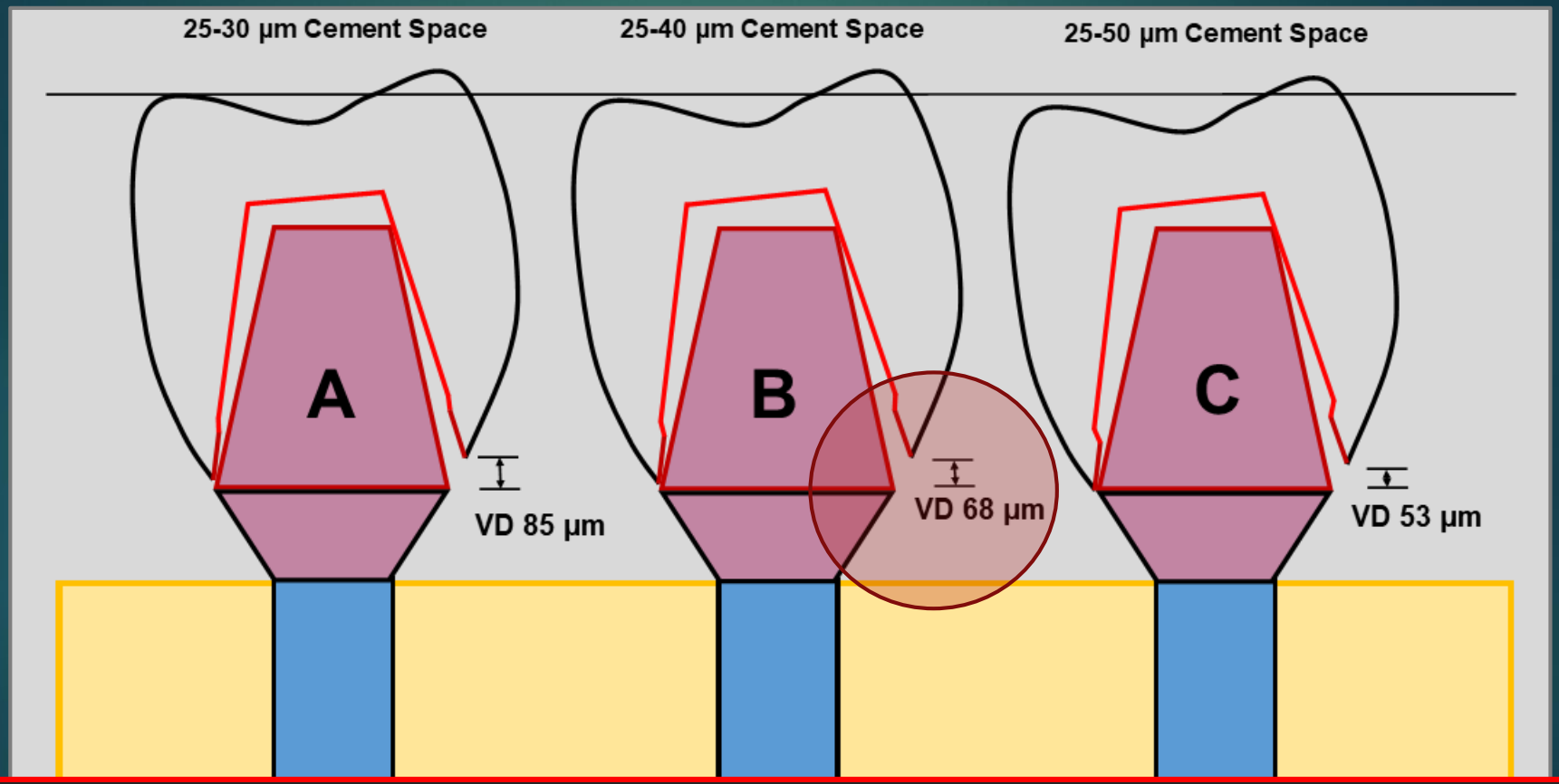


Increased Margin Overhang, Short Margins, Open Margins and Hyperocclusion

Single Tooth Cemented Restorations

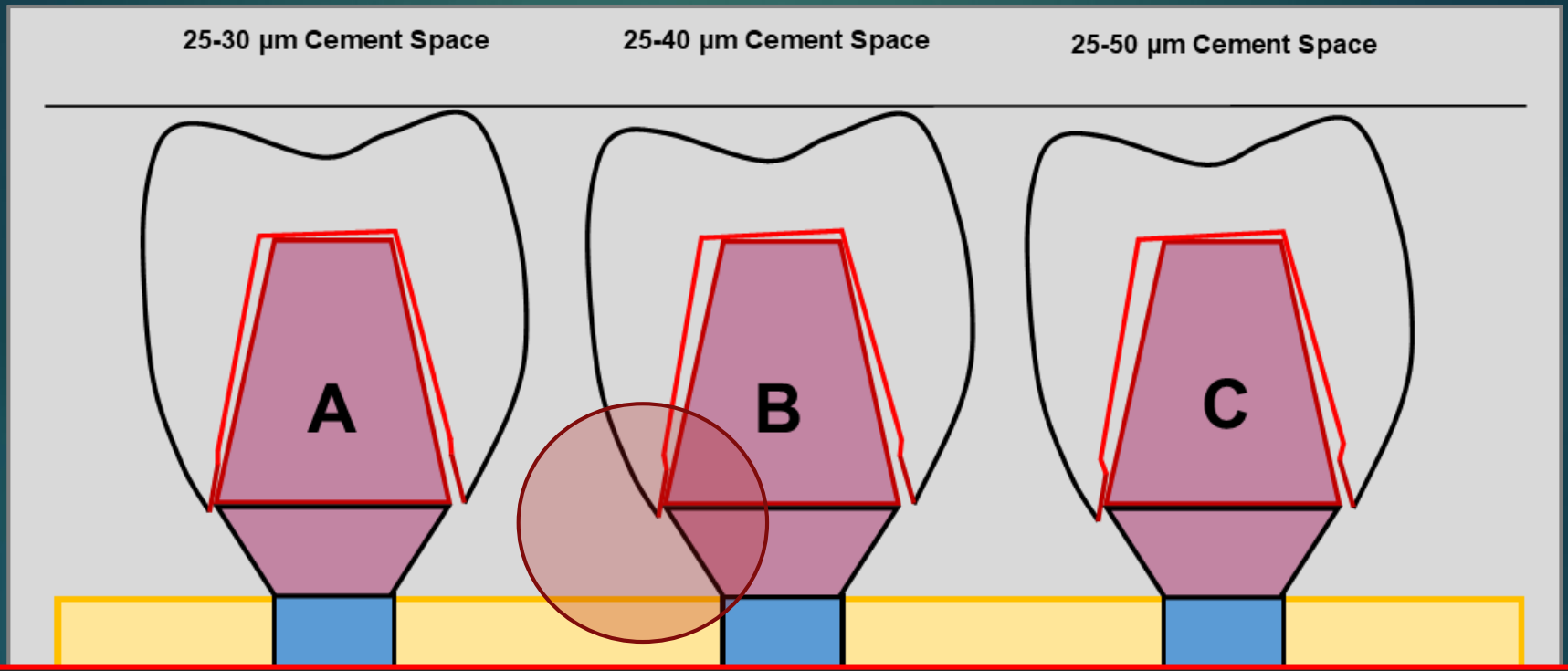
Kale E et al. Effect of cement space on the marginal fit of CAD-CAM-fabricated monolithic zirconia crowns. J. Periodont 2009;1388-1392

A Crown Rotation during Installation can also Produce an Unwanted Overhang



Increased Margin Overhang, Short Margins, Open Margins and Hyperocclusion

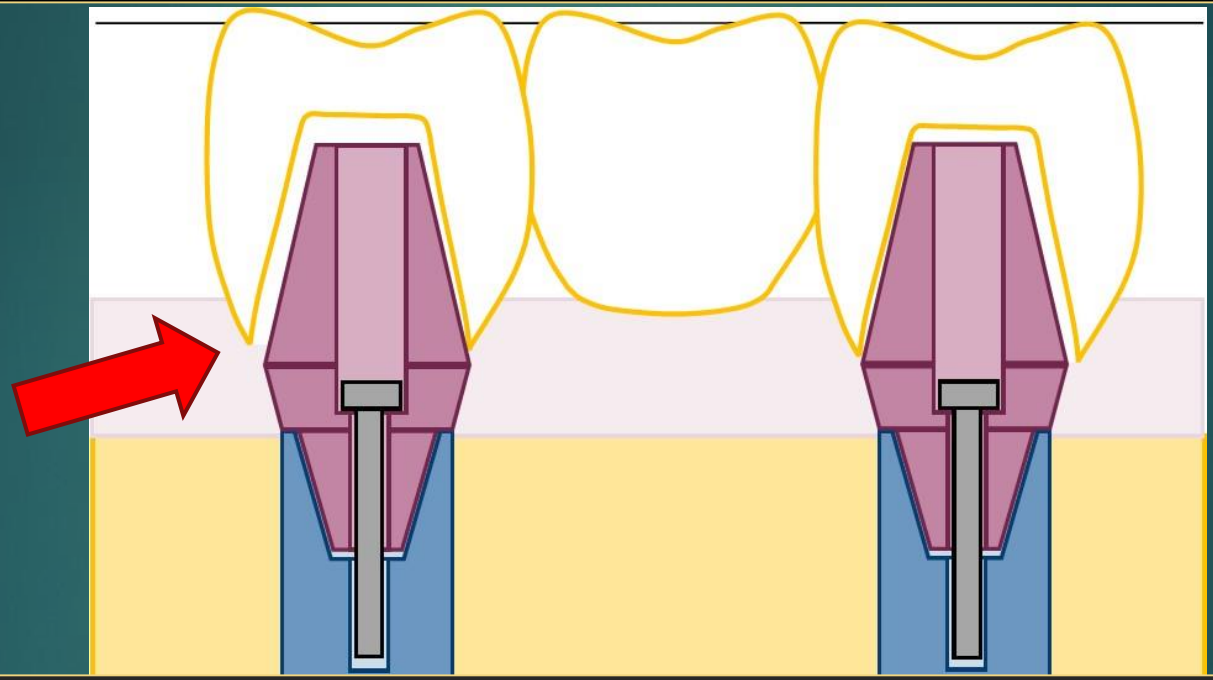
What about the Possibility of Long Margins or Over-Extended Margins



Wider Crowns were found in 86-97% of Cases
Longer Margins 57-72% of Cases
Precise Fit of Crown Margin is Very Rare!

Kissov HK, Popova EV, Katsarov SG. **Position of crown margin in relation to the tooth preparation line.** Folia Med (Plovdiv). 2008 Apr-Jun;50(2)57-62.

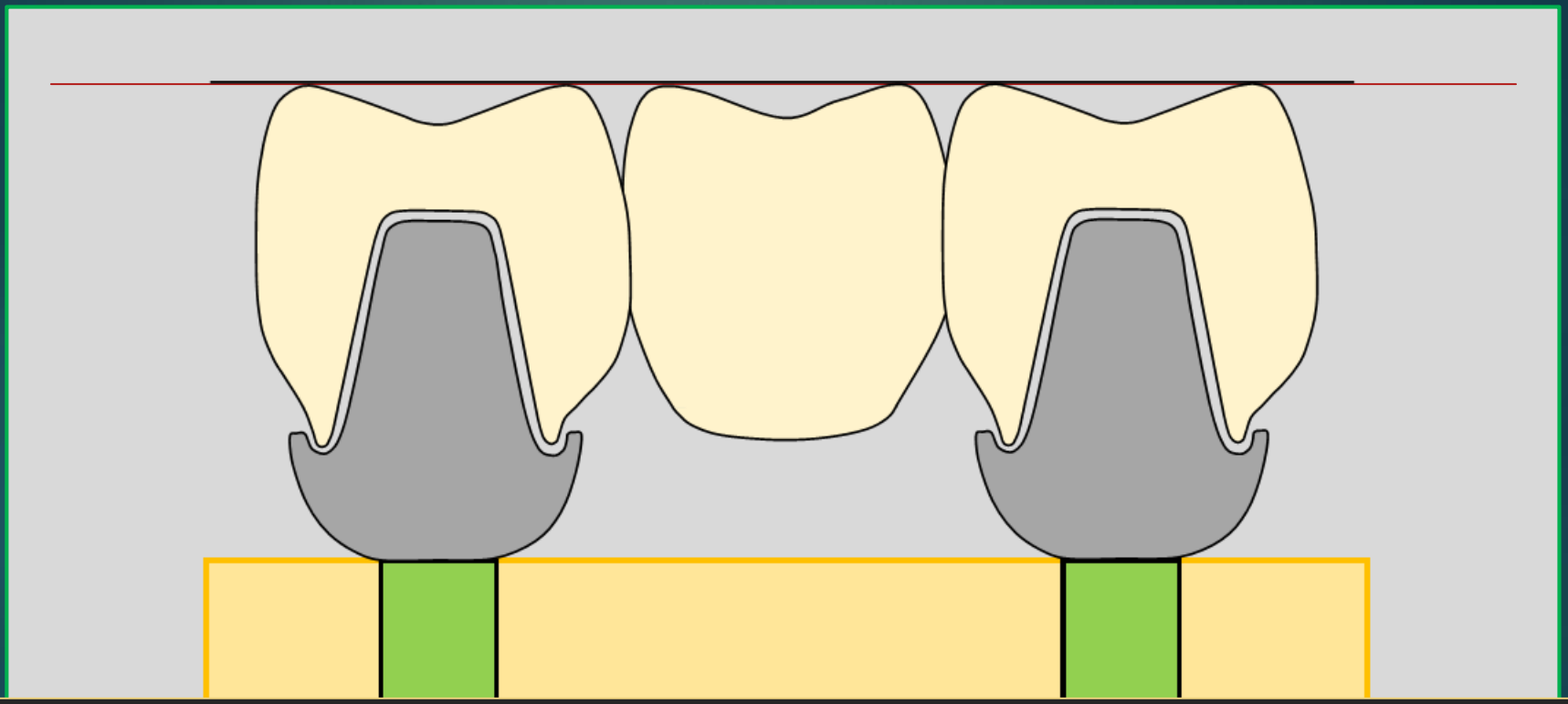
Can We Safely Increase Cement Space to Compensate for Prosthesis Dimensional Error?



NOT With Downwards Facing Margins

Overhangs and Open Margins Get Worse!

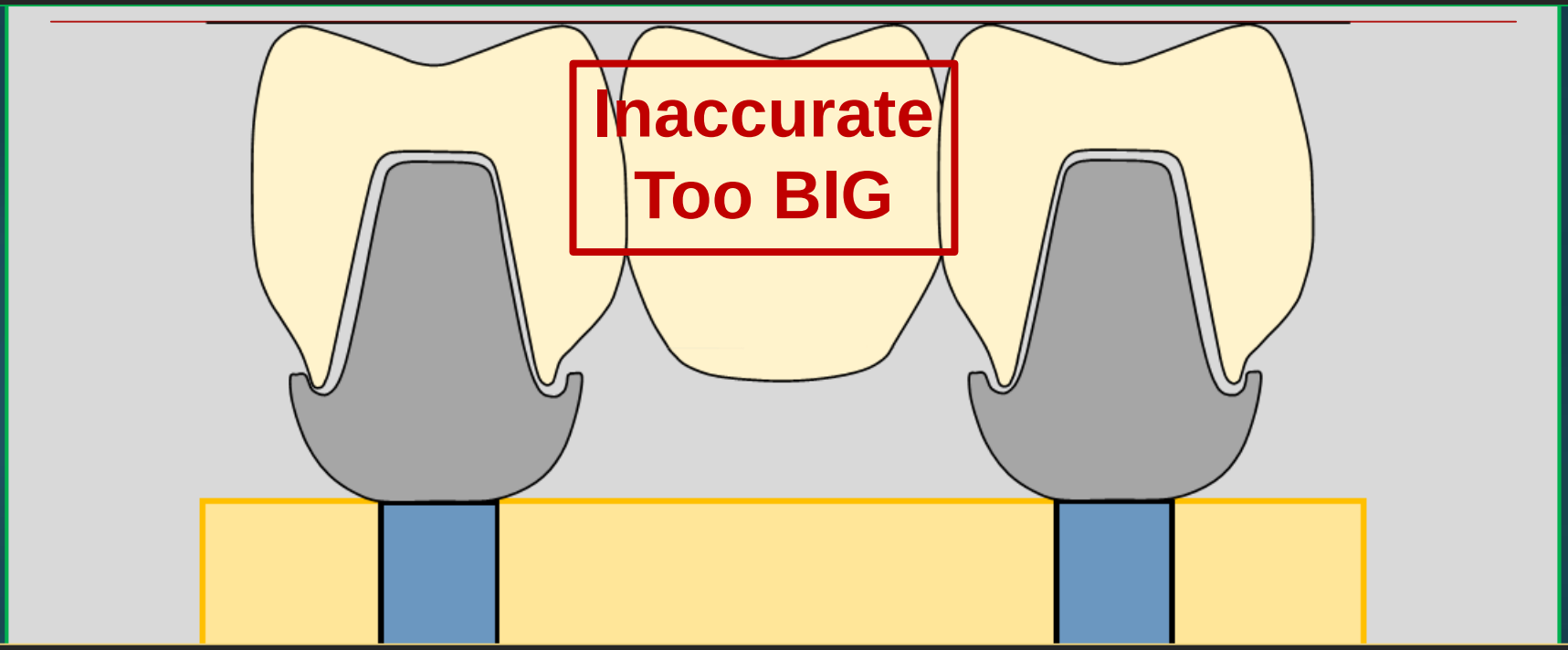
Can We Safely Use Cement Space to Compensate for Prosthesis Dimensional Error?



Prosthesis Made to Fit Model
BUT Not Attached to Abutments

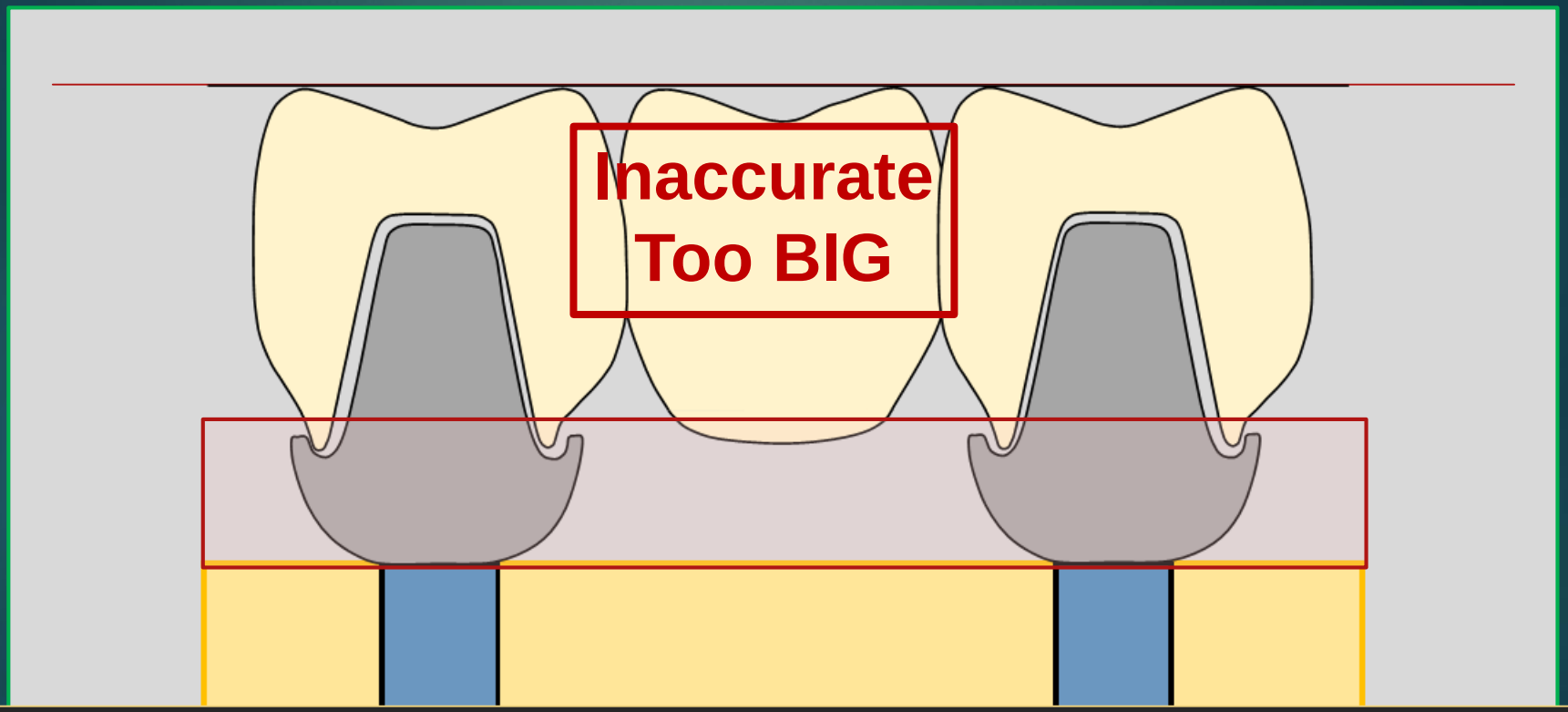
We Can Safely Use Cement Space to Compensate for Prosthesis Dimensional Error

Compensate for 80 µm 3-D Error with 80 µm Space



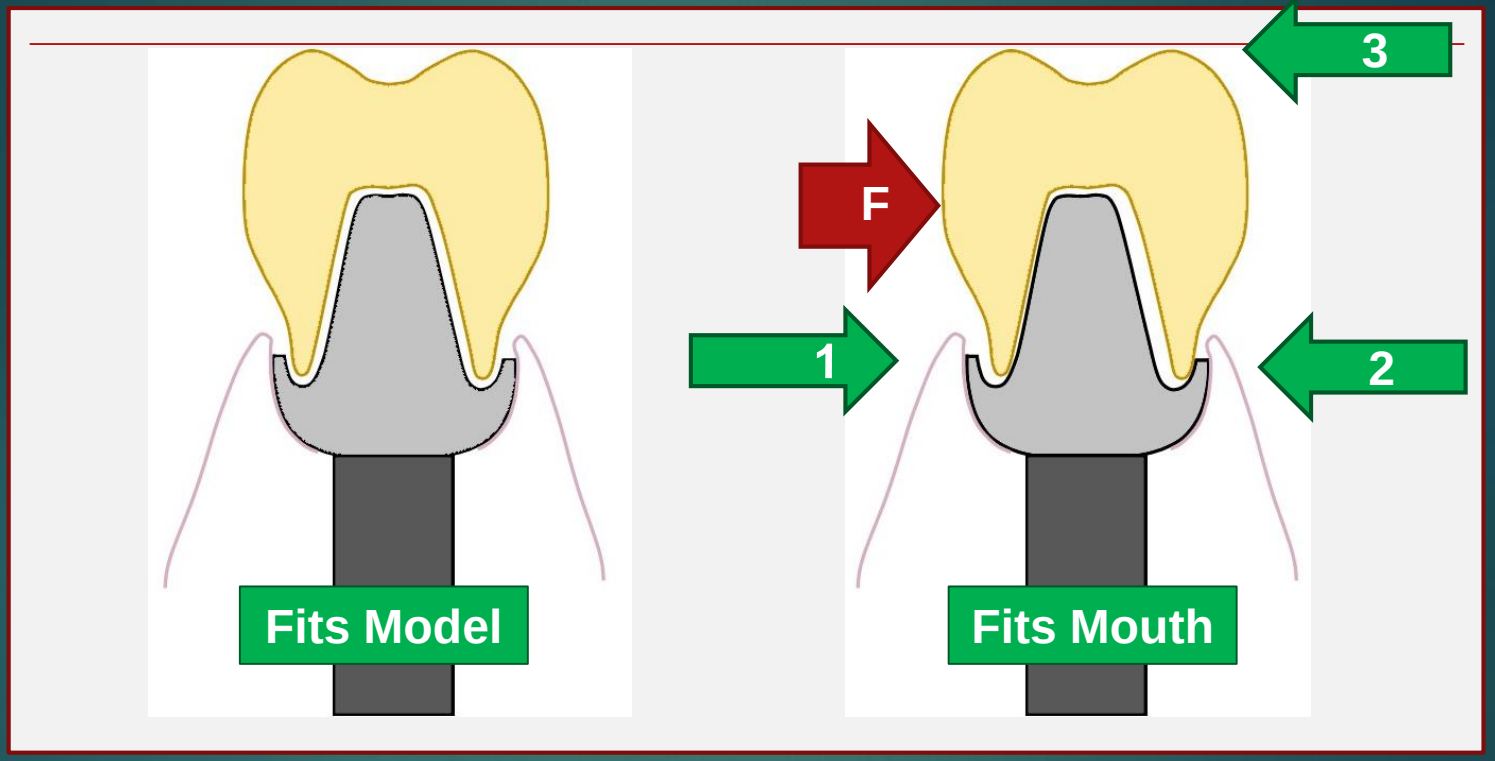
Cement Filled Margin Facing Upwards
No Hyperocclusion, No Margin Overhangs

We Can Also Safely Go 0.5 mm Subgingival because the Designs are Sensitive to the Gingival Effects



Two Root Causes of Prosthesis Related Peri-Implant Disease are Mitigated

Floating Prosthesis with Reverse Margin & Large Cement Space

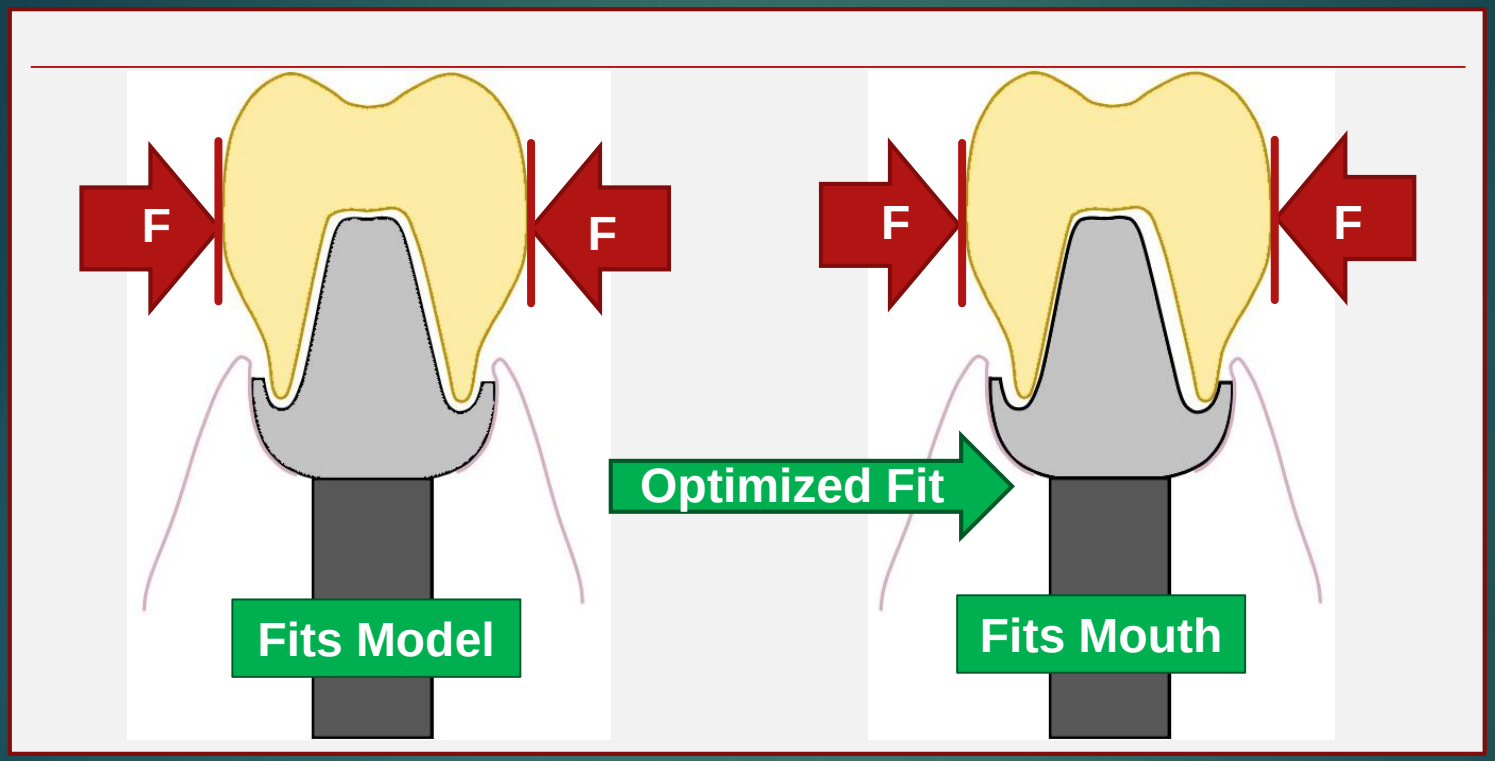


Tight Contact (F) Can Still Push Crown Laterally

1. Cement Filled Margin Facing Upwards

2. No Overhang 3. No Hyperocclusion

What About 2 Tight Contacts (F) Aligning the Floating Prosthesis?



Human Hair 100 µm

Self Centering & No Hyperocclusion = Easier Installation

Increased Cement Space allows for Super Lower Pressure Cementation and Increased Excess Cement Control

Bridge loaded with Rely X Ultimate Cement (3M) and tapped into place. Once seated, the bridge is held with higher pressure while setting cement with light.

Watch the Video at www.ReverseMargin.com

For Safer Cementation We Need to Use An Appropriate Cement Space, Cement and Cementation Pressure

	Solubility	Compressive Strength	Cement Space	Cementation Pressure
Zinc Phosphate Cement	High	Low (90 -100 Mpa)	30-40 microns	40 NCm
Resin Cement	**Very Low**	**High (262 Mpa Rely X Ultimate, 3M)**	**80-150 microns**	**1 NCm**

Resin Cements Have High Compressive Strength over a Wide Range of Thicknesses

Safer Intra-oral Cementation System Includes:

1. **Adequate Cement Space** to compensate for model and prosthesis inaccuracy (80 - 150 µm)
2. **Appropriate Cement** that maintains high compressive strength and low solubility over a wide range of thicknesses
3. **Reverse Margin Design** that supports the safe use of an increased cement space
4. **Abutment and Prosthesis designs that mitigate to the Gingival Effects**

Controlling Excess Cement During the Process of Intra-oral Prosthesis Cementation: Overcoming the Gingival Effects. ELA Svoboda, OralHealth Oct 2015; 52-66 and at www.ReverseMargin.com.

Identifying and Mitigating 2 Root Problems

Can Reduce Intra-oral Cementation Related Peri-implant Disease

And Make Prosthesis Installation Easier

What Else Can we do to make Intra-Oral Cementation Safer?

STAY SUPRA-GINGIVAL WITH PROSTHESIS MARGINS WHENEVER POSSIBLE

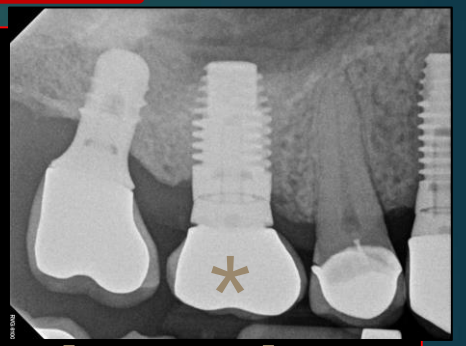
Can WE Now Make the Screw-in Installation System Safer Too?

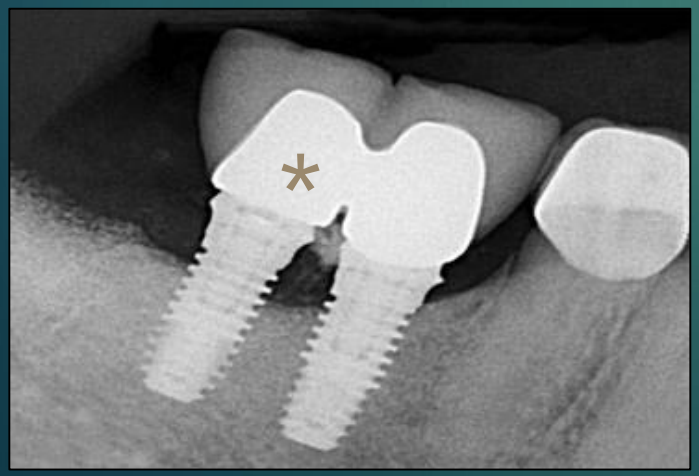
Fixing the Screw-in System

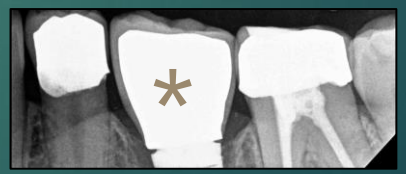
Svoboda E. Dental Implant Prosthetics: Achieving Retrievability and Reducing Treatment Complications by Using a Modified Installation Technique. OralHealth October 2016, pp 8-18

Why Do Some Clinicians Choose the Screw-in Installation Technique?

RETRIEVABILITY &/or
***Frustrated by Open Margins**
and Residual Subgingival Cement
(Open Margins are really BAD for Business)



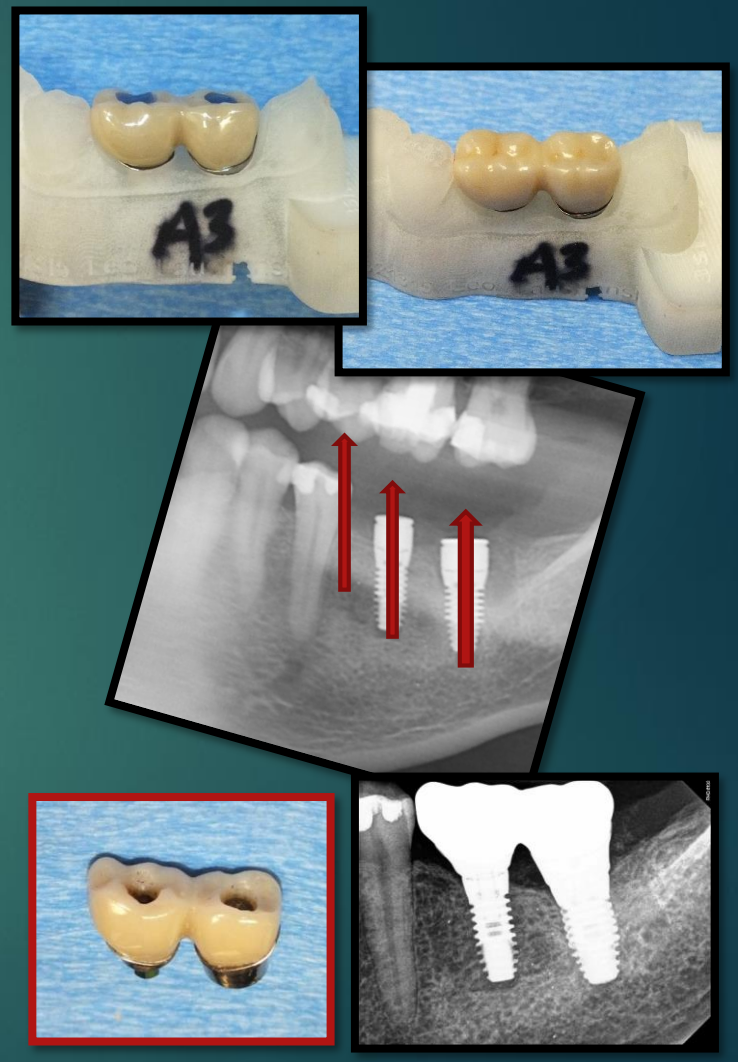




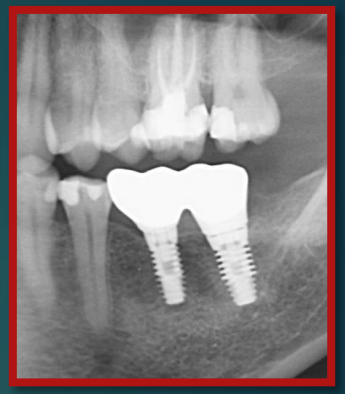
Dental Implant Prosthetics: Achieving Retrievability and Reducing Treatment Complications by using a Modified Installation Technique. ELA Svoboda, Oral Health October 2016, pgs 8-20

What is Retrievability?

It is a
Feature
that can be incorporated
into Treatment that
Allows a Prosthesis
to be removed from the
mouth and re-installed
without any critical damage



Retrievability is NOT Specific to the Screw-in Technique!

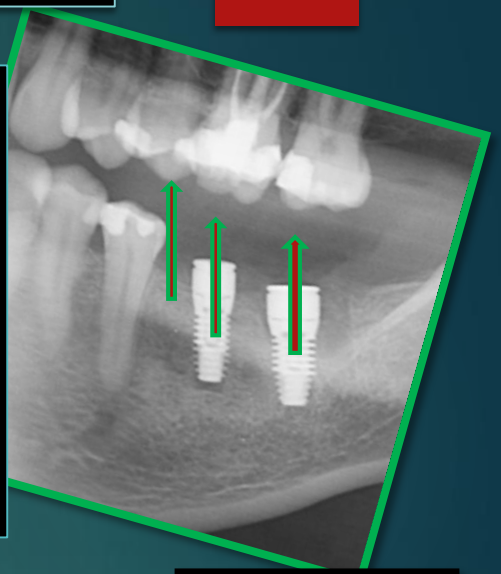


It is a Result of "Retrievability Features" Incorporated into Treatment

*Many Cases shown in this Presentation were Installed by the Cement-in Technique and were Easily Retrievable

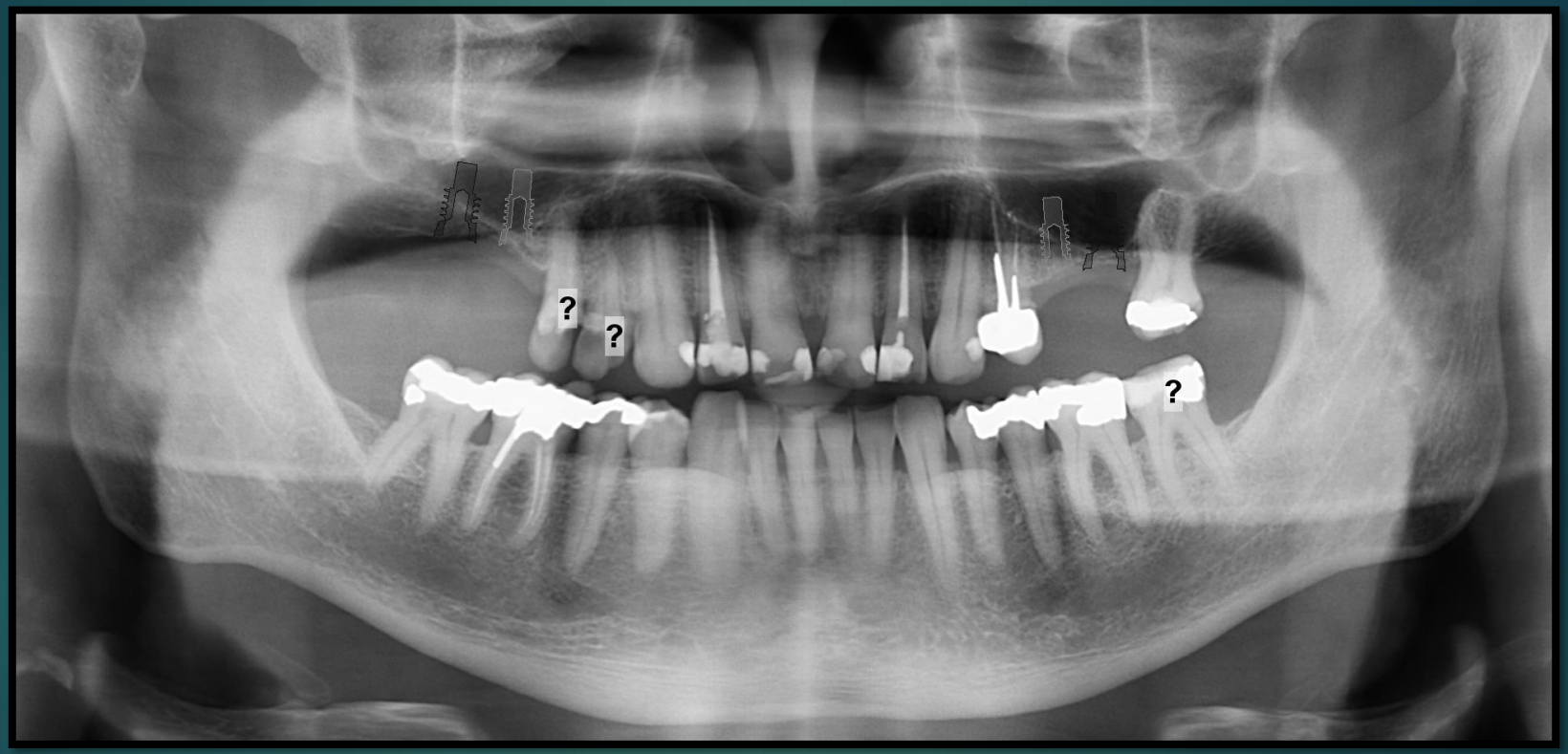
Retrievability Features

1) Working path of insertion
2) Detachable abutments
3) Detachable prosthetics
4) Non-engaging multi-unit abutments
5) Angled screw channel



Each Feature has
Risk / Reward Considerations

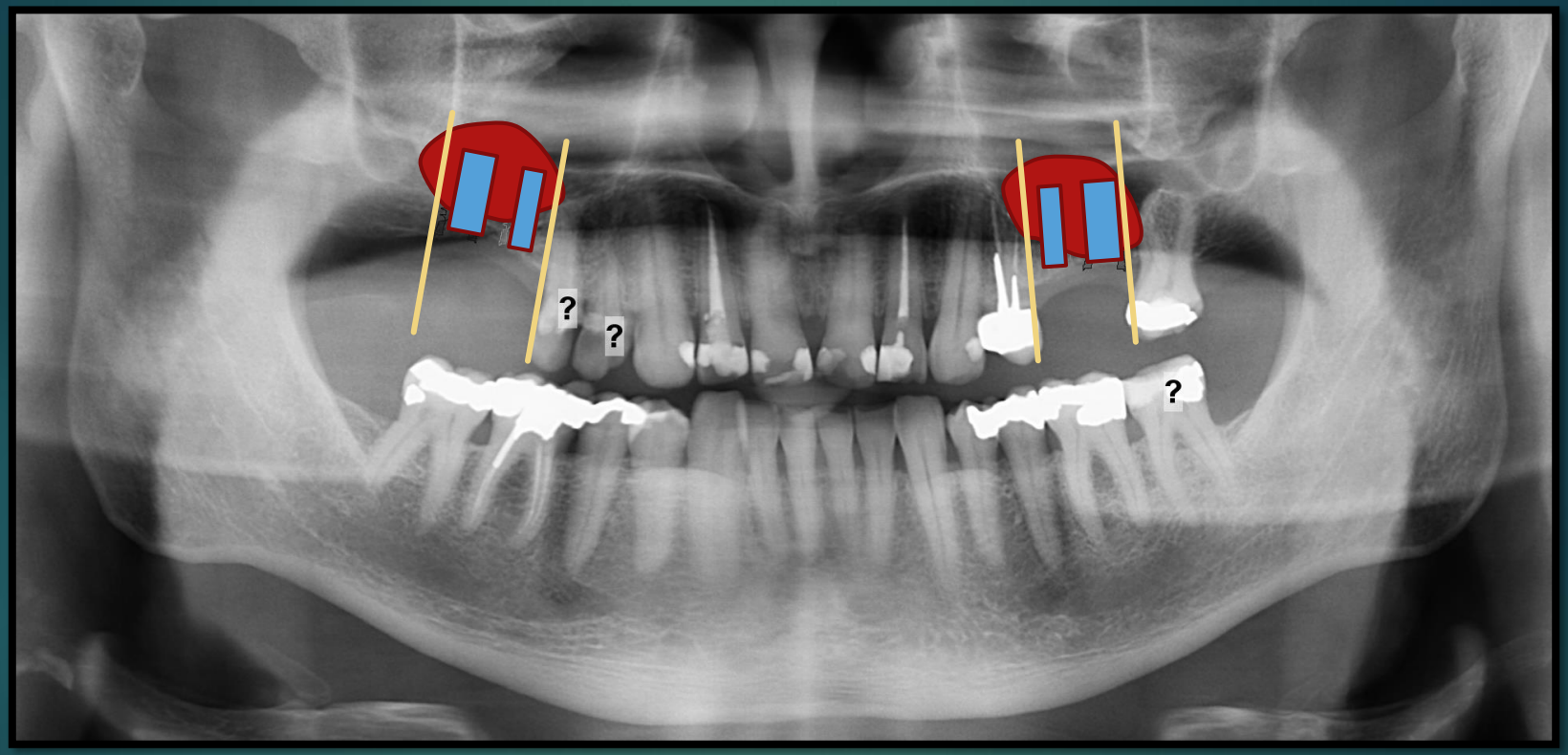
Retrievability Features can Add Risk to Treatment



Heavily restored and missing teeth

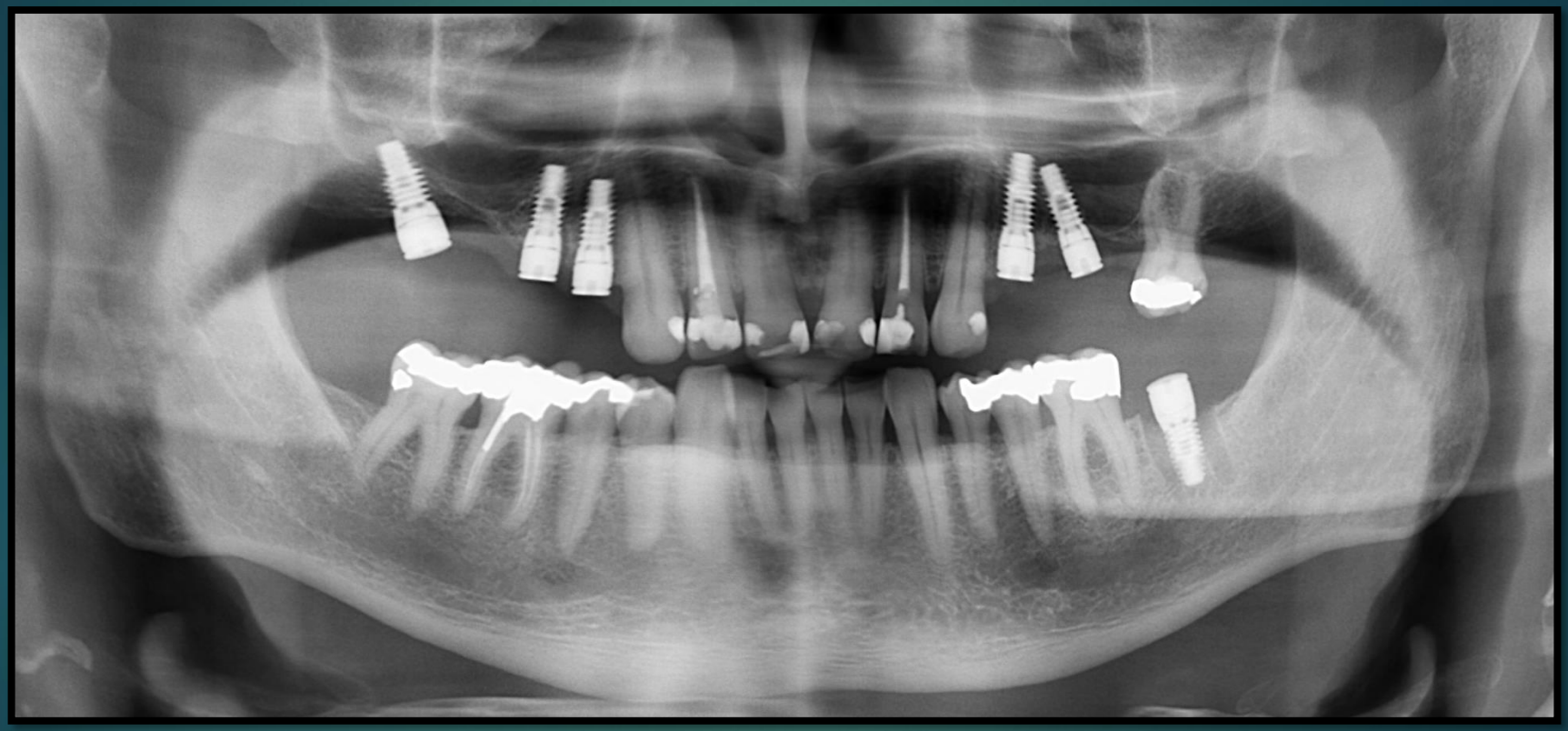
SD 17

Retrievability May Require Grafts



Sinus Grafts and Working Path of Insertion Could make the Prostheses Retrievable

Non- Retrievable Treatment used Bone Spreading Graft



Immediate Implant Placement is Efficient

Retrievability Features can Add Risk and Cost to Treatment

This Maxillary Treatment was More Efficient

SD 17

Retrievability Features can Add Risk and Cost

Maxillary Prostheses not Easily Retrievable

Retrievability Features can Add Risk and Cost to Treatment

1. site development procedures $$$$
2. use of guided implant surgery $$
3. expensive additional parts and lab work dealing with screw access holes and their maintenance $$$
4. may create difficult to maintain cantilevers, that are unstable and create space for oral pathogens $$$$
5. **Currently - can cause an implant-abutment misfit** $$$$$

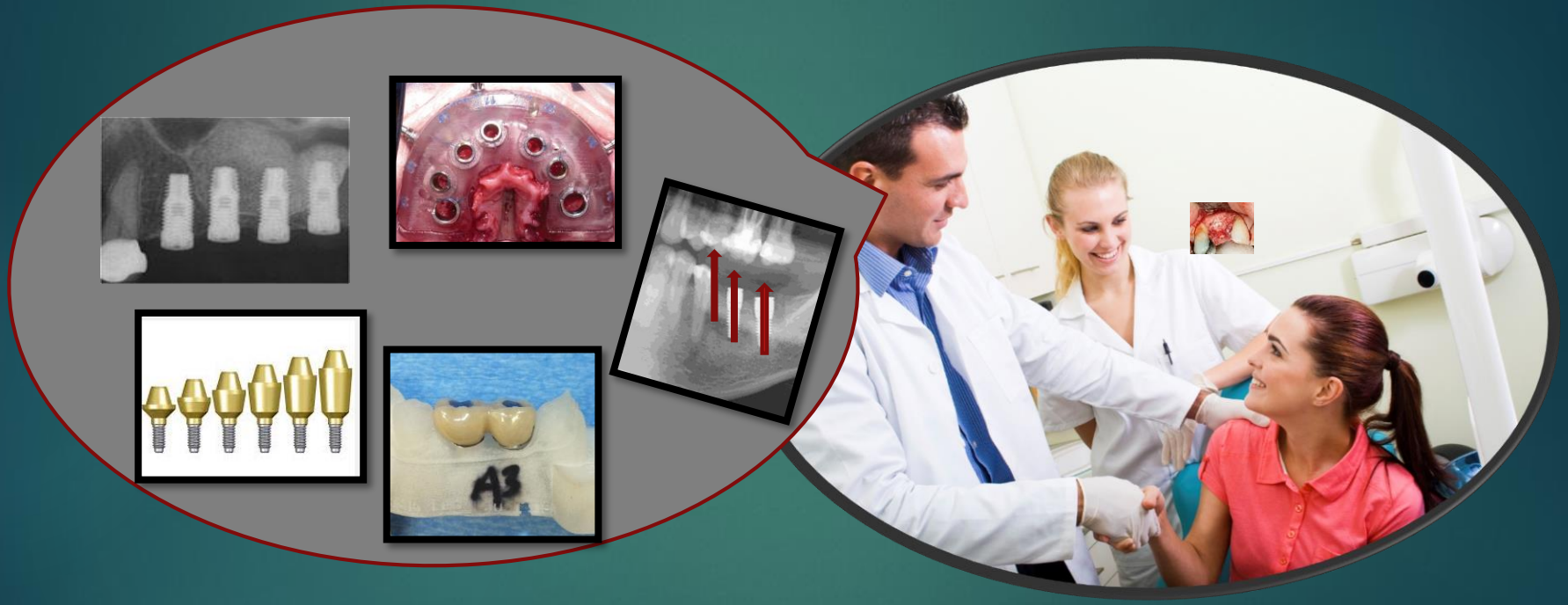
Retrievability Features can be Expensive!
The Dentist must weigh the cost and benefit for each case

Can We Reduce the Need for Retrievability by Making Treatment more Durable?

1. **Reduce Need to Repair Hybrid Prosthetics** - Use Durable Materials (Zirconia)
2. **Reduce Loose Abutment Screws** - **Optimize the Implant-Abutment Fit**, use stable abutment connection designs, optimize torque (2X), reduce/avoid cantilevers, use genuine parts, use night guards
3. **Reduce Peri-implant Disease** – **Use a Safer Installation Protocol**

A Prosthesis May Still Need to be Replaced
Even if it Was Retrievable.
Is That Cost Effective for the Patient?

OK - You Have Convinced Your Patient to Buy a Retrievable Screw-in Fixed Restoration



Can You NOW Prevent the Dreaded Macrogap?

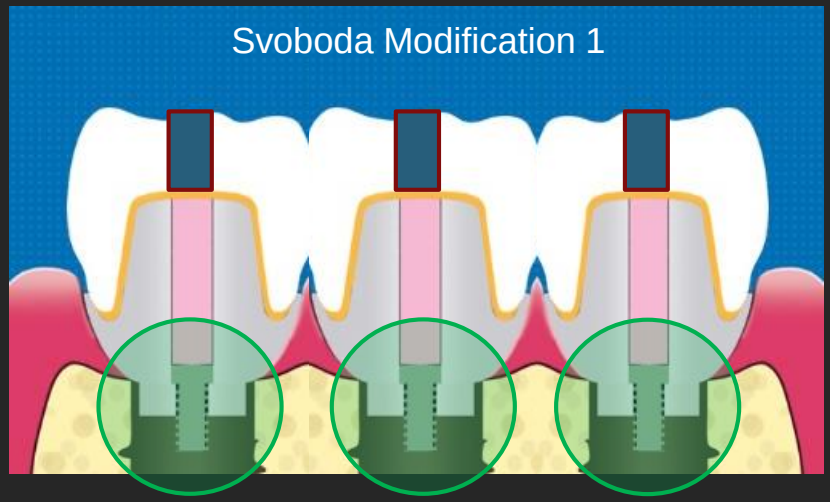
Safer Intra-oral Cementation

Is Key to Eliminating the Implant-Abutment Macrogap Inherent to The Screw-in technique

Retrievability Features in Place

Svoboda Modification – Option 1

1. Lab delivers abutments and prosthesis separately with …
2. …access holes sealed with acrylic plugs
3. Dentist installs abutments individually to optimize their fit
4. Access channels are filled with Teflon plugs
5. The prosthesis is cemented into the mouth
6. Excess cement is removed
7. The access holes are drilled out
8. Prosthesis is taken out of the mouth
9. Excess cement removal can be confirmed and refined
10. Assembled Prosthesis is screwed back into place (with a new abutment screws)
11. Teflon plugs are reinstalled
12. New Acrylic plugs are remade by dentist
13. Occlusion is adjusted



Assembled in Mouth

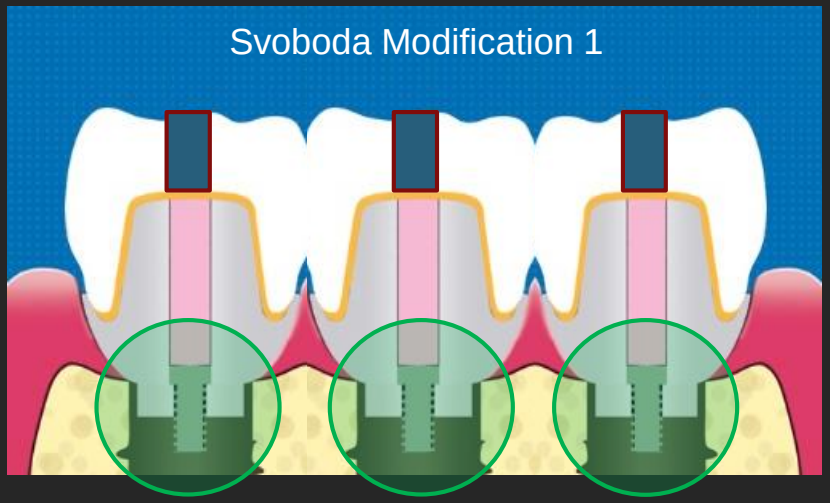
Optimized Implant-Abutment Fit

Prosthesis Seating and Excess Cement Removal Facilitated by use of a Cement Control System.

Screw access holes are available for easy access on a needs basis.

Option 1 Comments

Prosthesis Seating can be facilitated by Design by using adequate cement space to compensate for prosthesis error and it can move the Gingiva Out of the Way of the Prosthesis during Installation.
Without Intelligent Design, the Gingival Effect "Resistance to Displacement" may frustrate the clinician's ability to prevent the open margins and other prosthesis mi related issues.



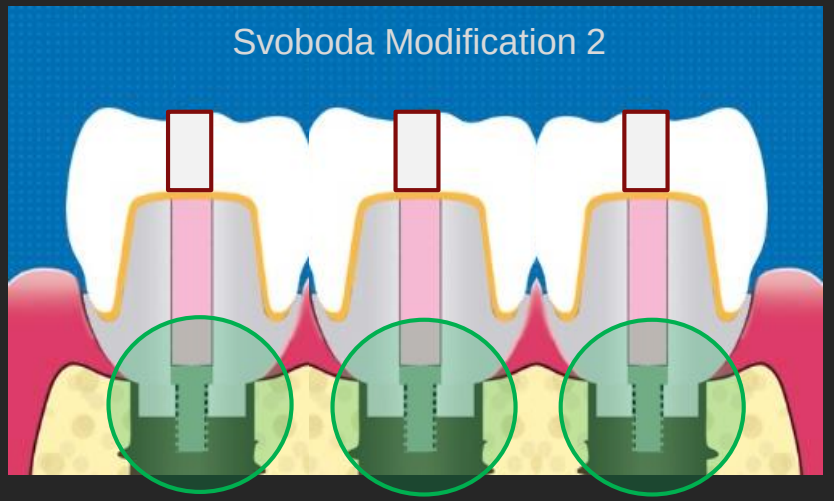
Assembled in Mouth
Optimized Implant-Abutment Fit
Prosthesis Seating and Excess Cement Removal Facilitated by use of a Cement Control System.
Screw access holes are available for easy access on a needs basis.

Retrievability Features in Place

Svoboda Modification – Option 2

1. Lab delivers abutments and prosthesis separately with …
2. … access holes sealed with crown colored acrylic plugs
3. Dentist installs abutments individually to optimize their fit
4. Abutment-screw access channels are filled with Teflon plugs
5. The prosthesis is cemented into the mouth
6. Excess cement is removed
7. Occlusion is adjusted

This option TRUSTS the Cement Control System to prevent Residual Cement and other cement related problems and is More Efficient than Option 1.



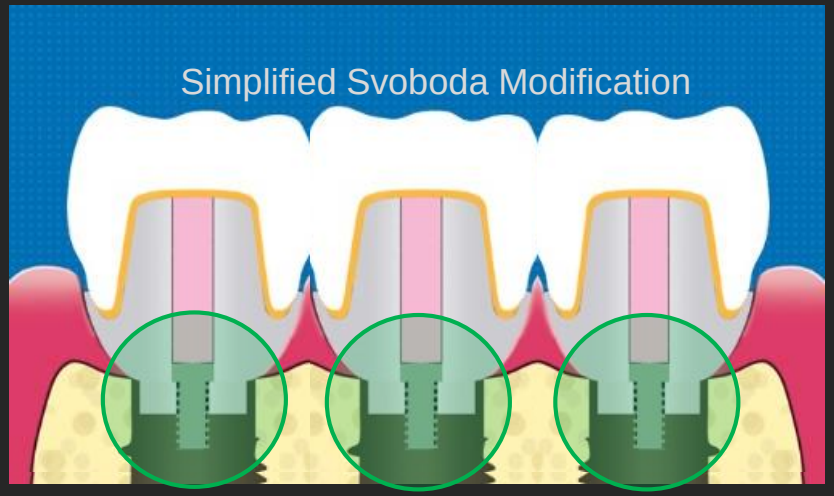
Assembled in Mouth
Optimized Implant-Abutment Fit
Prosthesis Seating and Excess Cement Removal Facilitated by use of a Cement Control System.
Screw access holes are available for easy access on a needs basis.

Retrievability Features in Place

Simplified Svoboda Modification

Can be Most Efficient and Reduces Dental Services Related Deterioration of the Resin Screw Access Hole Cover

1. Lab delivers sterilized abutments and prosthesis separately without access holes (access holes marked by lab)
2. Dentist installs abutments individually to optimize fit
3. Abutment-screw access channels are filled with Teflon plugs
4. The prosthesis is cemented in the mouth
5. Excess cement is removed
6. Occlusion is adjusted



Assembled in Mouth

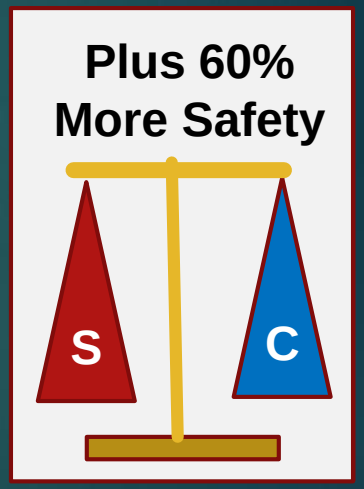
Optimized Implant-Abutment Fit

Prosthesis Seating and Excess Cement Removal Facilitated by use of a Cement Control System.

Abutment Screw access holes can be made on a needs basis.

WOW!

We Have Optimized the Implant-Abutment Connection and made Screwed-in Prosthetics 60% Safer Too



Svoboda E. Dental Implant Prosthetics: Achieving Retrievability and Reducing Treatment Complications by Using a Modified Installation Technique. OralHealth October 2016, pp 8-18


This Is Great!
We Can Now Make
Both Prostheses
Installation Techniques
Safer for Our Patients!

We Can Now

Prevent Peri-implantitis

By Using

Prosthesis Designs &Protocols

that

Mitigate Complications Related to Prosthesis Dimensional Error & The Gingival Effects

The Svoboda Way

Prevention is Genius!

PREVENTION IS BEST!

Thank You for Your Attention

I Look Forward to Your Questions AGAIN

www.ReverseMargin.com

drsvoboda@rogers.com

Let's Explore

An Alternative System for Controlling Excess Cement

"Not Recommended by Me"

Because

The Proposed Techniques Are Not Yet Sensitive to the Root Causes of the Problems!

1) Prosthesis Dimensional Error
2) The Gingival Effects

*Retainer Replica Technique

Concept:

Reduce the amount of cement in the prosthesis to ….

Reduce the amount ejected into the subgingival environment

*Technique for controlling the cement for an implant crown. C Wadhwani, A Pineyro, Journal of Prosthetic Dentistry. 2009:102;V1; 57

Effects of a Cementing Technique in Addition to Luting Agent on the Uniaxial Retention Force of a Single-Tooth Implant-Supported Restoration: An In Vitro Study. International Journal of Oral & Maxillofacial Implants . Santosa RE, Martin W and Morton D. 2010, Vol. 25 Issue 6, p1145-1152.

Effect of implant abutment modification on the extrusion of excess cement at the crown-abutment margin for cement-retained implant restorations. C. Wadhwani et al. The International journal of oral & maxillofacial implants 11/2011; 26(6):1241-6.

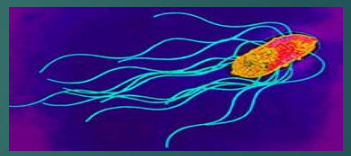
Cementing an Implant Crown: A Novel Measurement System Using Computational Fluid Dynamic Approach. C Wadhwani, S Goodwin, K Chung. Clinical Implant Dentistry and Related Research, 2014.

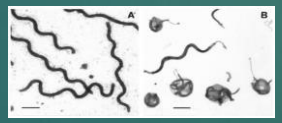
*Cemented implant restoration: A technique for minimizing adverse biologic consequences. G Galvan, **J Kois**, Y Chaiyabutr and **D Kois**. J Prosthet Dent 2015;114:482-485

Can Cement Volume be Controlled Sufficiently to Avoid Both Overfilling and Underfilling the Prosthesis?

Can You Ensure an Even Flow of the Cement Out of the Prosthesis?

No - Not Really!





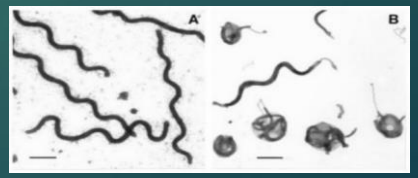
Cement Voids Under a Prosthesis can be Very Difficult to Detect and Correct

Why Do We Cement Restorations?

1) Retention
2) Fill Space to Prevent VOIDS

Are VOIDS Dangerous?

a) Breading grounds for oral pathogens – top 3 reasons prosthetics on natural teeth fail & can cause periodontal and peri-implant-disease
b) Very difficult to detect and treat
c) Reduce retention
d) Discoloration
e) Stink and taste bad



Can VOIDS be Prevented?

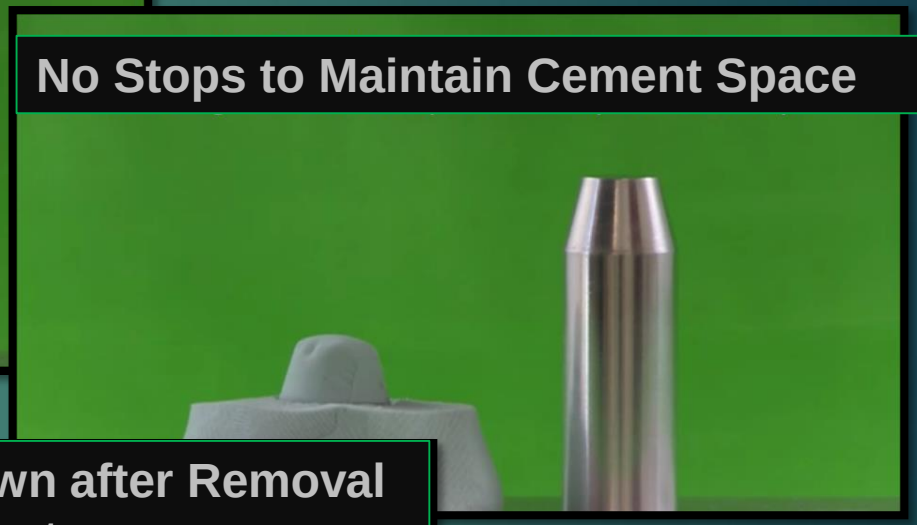
V4. Preventing Cement Voids

This is Important New Information!

Preventing Cement Voids

Silicone Retainer Replica made According to Published Technique, using Teflon Tape as Spacer for Cement

No Stops to Maintain Cement Space



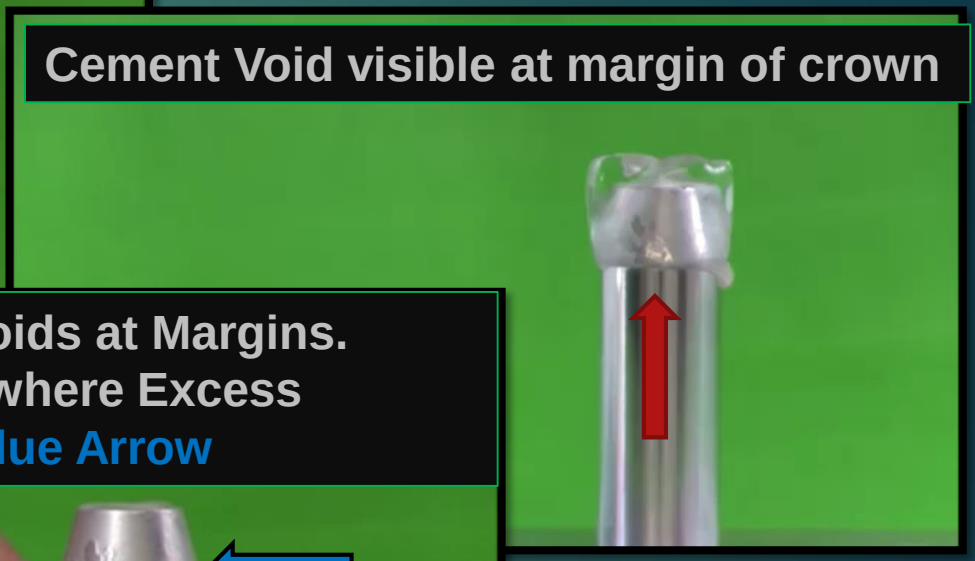
Irregular Cement Pattern in Crown after Removal from Replica due to Suction Effect

Watch the Video at www.ReverseMargin.com

Preventing Cement Voids

Huge Cement Voids visible as Crown is Placed over Retainer for Cementation

Cement Void visible at margin of crown

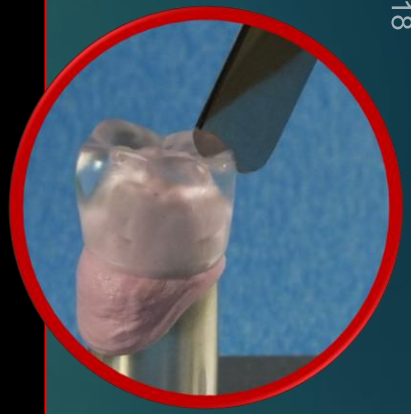


Red Arrows show Cement Voids at Margins. There are No Cement Voids where Excess Cement Exists at Margins. Blue Arrow

Watch the Video at www.ReverseMargin.com

Control of Cement Exiting the Prosthesis Margins Can Be Very Difficult

1) Angled forces on a prosthesis affect flow of excess cement
2) Fingers, teeth and gingiva may obscure clinicians view of cement flow
3) Tight contacts and gingiva may affect the direction of seating of a prosthesis
4) Hydroplaning of prosthesis can cause changes in available cement space for cement flow

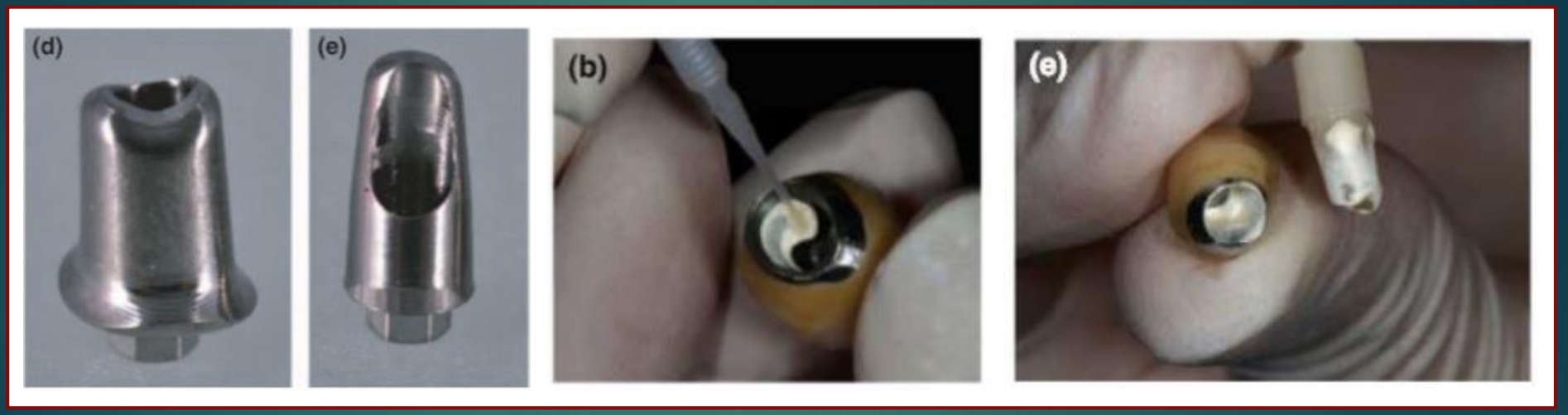


Safer Intra-oral Cementation: Prevention of Cement Voids under the Prosthesis.
ELA Svoboda, Nov 2017 www.ReverseMargin.com

Control of Cement Exiting the Prosthesis Margins Is Effected by Many Things

5) Irregularities in the margins can affect cement flow pattern of exiting cement
6) Constrictions at the margins can restrict cement flow
7) Premature setting of cement or poor cement mix can prevent flow of cement out of the margins
8) Gingiva can have a huge effect on excess cement flow

Testing Feather and Chamfer Margin and Retainer Replica Technique



Canullo L et al. Clinical evaluation of an improved cementation technique for implant-supported restorations:a randomized controlled trial. Clin Oral Impl Res 27, 2016, 1492-1499.

Prevent Subgingival Excess Cement and Cement Voids? 62 patients Maximum Subgingival Margins 1 ½ mm,

Quite High

	Cement remnants (mm^2)	Voids (mm^2)	Gap (mm)
Shoulderless abutment Intraoral Cementation	0.455 (SD:0.80) 7X	0.404 (SD:0.377)	0.062 (SD:0.033)
Chamfer abutment Intraoral Cementation	0.380 (SD:0.84) 5X	0.413 (SD:0.39)	0.064 (SD:0.035)
Shoulderless abutment Extraoral Cementation	0.065 (SD:0.13)	0.485 (SD:0.48) 1.2X	0.055 (SD:0.016)
Chamfer abutment Extraoral Cementation	0.072 (SD:0.14)	0.477 (SD:0.43) 1.2X	0.054 (SD:0.024)

Canullo L et al. Clinical evaluation of an improved cementation technique for implant-supported restorations:a randomized controlled trial. Clin Oral Impl Res 27, 2016, 1492-1499.

Can We Prevent Subgingival Cement and Cement Voids by the Retainer Replica Technique? NO!

Tendency of intra-oral cementation to have a higher amount of residual subgingival cement

The presence of voids was higher in the case of the replica technique.

Canullo L et al. Clinical evaluation of an improved cementation technique for implant-supported restorations:a randomized controlled trial. Clin Oral Impl Res 27, 2016, 1492-1499.

VOIDS Should BE PREVENTED by Technique!

1) OVERFILL the prosthesis with cement and extrude excess cement from around the entire margin
2) Prevent air entrapment during the process of loading cement into the prosthesis
3) Hold prosthesis firmly in place while the cement sets

VOIDS can be Very Difficult to Detect and Correct

Safer Intra-oral Cementation: Prevention of Cement Voids under the Prosthesis. ELA Svoboda, Nov 2017
www.ReverseMargin.com

We Can Now Make Prosthesis Installation Safer by Preventing:

1. Implant-Abutment Misfits / Macrogaps
2. Residual Subgingival Cement Plus
3. Cement Voids
4. Open and Overhanging Margins by mitigating both Gingival Effect #5 and Prosthesis Dimensional Error

The Svoboda Way

Controlling Excess Cement During the Process of Intra-oral Prosthesis Cementation: Overcoming the Gingival Effects. ELA Svoboda, OralHealth Oct 2015;52-66 and at www.ReverseMargin.com.

The Inconvenient Implications of my Work

1. Stock Abutments with Subgingival Margins are not usually sensitive to the Gingival Effects and thus are NOT Safe to use as Retainers for Prosthetics that are to be cemented into the mouth
2. Many expensive custom abutments and prostheses with subgingival margins are not usually sensitive to the Gingival Effects or Prosthesis Dimensional Error and are thus NOT Safe to use as Retainers for Prosthetics that are to be cemented into the mouth

SORRY!

More Inconvenient Implications of my Work

3. The Current Screw-in prosthesis installation techniques cannot usually prevent the Dreaded Macrogap and thus cannot comply with the spirit of Government ISO Standards regarding the fit and stability of the implant-abutment connection …. but the Cement-in System can.
4. Appropriate cement space cannot safely be used with downward facing margins to compensate for prosthesis dimensional error … unlike the Reverse Margin design.

SORRY!

PREVENTION IS BEST!

Thank You for Your Attention

I Look Forward to Your Questions

www.ReverseMargin.com

drsvoboda@rogers.com