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Research Overview: C1 Implants

July, 2020

This research overview document presents recent clinical studies evaluating the performance of the MIS C1 implant system. Featuring a conical connection, platform-switching design concept, and delivered with a single-use final drill, C1 is the leading MIS implant. Its design facilitates achieving primary stability, enabling its implementation across a wide range of demanding clinical protocols.

In conventional delayed loading protocols, the C1 implant demonstrated high success rates, even when placed by inexperienced post-graduate students treating a diverse patient population at the Oral Implantology Department of a university in Barcelona, Spain. Notably, the success rates achieved by the students were comparable to those of experienced practitioners.

More advanced and demanding approaches, such as early and immediate loading protocols, have also proven equally successful with the C1 implant. This overview includes the first published study on early loading with the C1 implant, demonstrating a 100% success rate at 5 years, with reduced crestal bone loss similar to the marginal bone loss measured after 1 year. Even in cases of thin gingiva, bone loss was minimal in the longer term. The immediate loading study further shows that the C1 implant can be safely used for multi-risk patients, in both healed and post-extraction sites.

MIS extends its gratitude to all the researchers who participated in these studies for their time, effort, and commitment to advancing our understanding of the C1 implant system's clinical performance.



Corresponding paper published in COIR, Vol 21, issue 9, September 2020

The Effect of soft tissue thickness on crestal bone loss of early loaded implants with platform switching

Research Group: Alper Saglanmak, B. Alper Gultekin, Caglar Cinar, Serge Szmukler-Moncler, Z. Cuneyt Karabuda
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Study objective:

To evaluate the effect of soft tissue thickness on crestal bone loss of early loaded implants after 1 and 5 years.

Materials and Methods:

44 tapered implants with platform switching (C1, MIS) were crestally placed in the posterior mandible and maxilla to rehabilitate edentulous sites; healing followed a 2-stage surgical protocol. The implants were loaded after 6-8 weeks. the loading average was 7.2 weeks. Mesial and distal crestal bone loss (CBL) and soft tissue thickness (STT) were measured on standardized panoramic radiographs. The number of thin gingiva sites was 21, average thickness was 2.0 ± 0.3 mm; The number of thick gingiva sites was 23, average thickness was 3.0 ± 0.8 mm. Success rate and crestal bone loss were measured after 1 and 5 years. The Student t-test was used to compare the CBL differences between groups; significance was set at 0.05.

Results:

- No early loaded implant failed at the 1- and 5-year of follow-up.
- Success rate was 100%.
- After 1 year, the CBL of the thin and thick gingival groups were 0.96 ± 0.49 and 0.55 ± 0.41 mm, respectively; the difference was statistically significant ($p = 0.004$).
- After 5 years, the CBL of the thin and thick gingiva groups increased to 1.12 ± 0.84 and 0.65 ± 0.69 mm, respectively. Difference was not statistically significant ($p = 0.052$).

Clinical Implications:

- Early loading of C1 implants within 6 to 8 weeks is safe.
- After 1 year, CBL was more pronounced at sites with a thin gingiva ; at 5 years the difference between the groups was levelled.
- Pairwise comparison of CBL between the 1- and 5-year follow-up for the thin and thick gingiva groups showed no statistically significant differences.

Radiographic findings of CBL measurements after 1 and 5 years

Time Point	Group	N	Mean	SD	SE	Min	Max	P
	Overall	44	0.74	0.49	0.07	-0.10	1.63	
1 year	Thin	21	0.96	0.49	0.10	0.90	1.63	*0.004
	Thick	23	0.55	0.41	0.08	-0.10	1.32	
	Overall	44	0.87	0.79	0.12	0	2.82	
5 year	Thin	21	1.12	0.84	0.18	1	2.82	0.052
	Thick	23	0.65	0.69	0.14	0	2.51	

* Student t test with statistical significance ($P > 0.05$).



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Paper submitted to *The Journal of Prosthetic Dentistry*

Factors affecting implant failure and marginal bone loss of implants placed by post-graduate students: a 1-year prospective cohort study

Research Group: Gian Maria Ragucci, Maria Giralt-Hernando; Irene Méndez-Manjón; Oriol Cantó-Navés; Federico Hernández-Alfaro
Department of Oral and Maxillofacial Surgery; International University of Catalonia, Spain

Study Objective :

To record failure rates and identify contributing factors to implant failure and crestal bone loss (MBL) of C1 implants placed and rehabilitated by inexperienced post-graduate students at the 1-year follow-up.

Material and Methods:

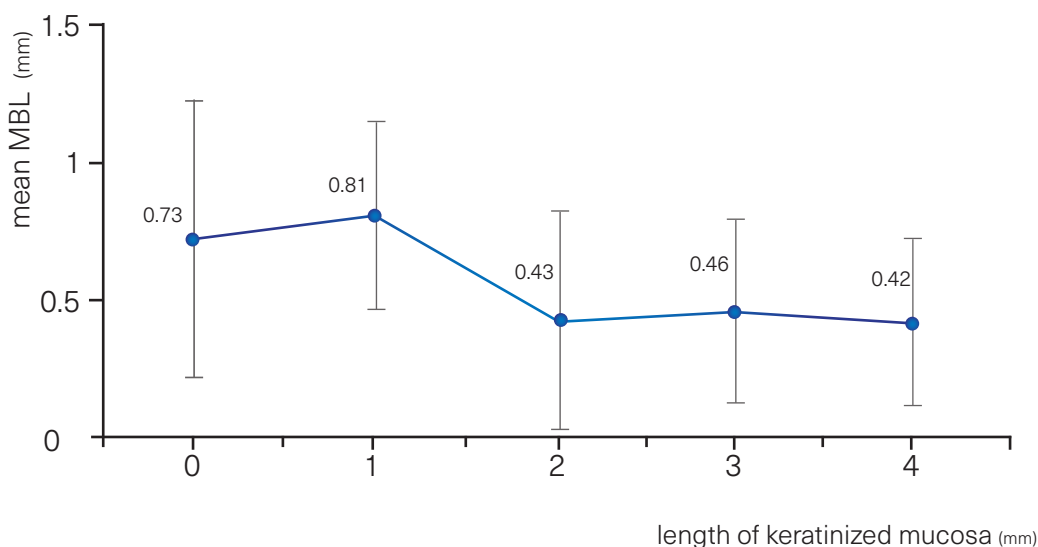
This prospective study was conducted at the International University of Catalonia (UIC). 130 implants (C1, MIS) were placed and rehabilitated by postgraduate students. Implant failure rate and contributors to implant failure and MBL were investigated among 24 variables related to patient health, local site, implant and prosthetic characteristics.

Results:

- Survival and success rates were 96.15% and 94.62%.
- None of the investigated variables significantly affected the implant survival rate.
- At the 1-year follow-up, the mean MBL was $0.53\text{mm} \pm 0.39\text{mm}$.
- The following independent variables significantly affected the MBL: diabetes and implant depth placement.
- Width of keratinized tissue and probing depth above 3mm were found to be good indicators of MBL, each additional mm of probing depth resulted in 0.11 mm more MBL.

Clinical implications:

- Survival and success rates of C1 implants placed and rehabilitated by inexperienced postgraduate students were high at 1- year follow-up, similar to experienced practitioners.
- No contributing factors were identified to affect implant failure.
- Factors found to significantly affect the MBL were: diabetes, implant depth placement, probing depth (PD) and keratinized tissue (KM).





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Published in Journal of Oral Implantology, Vol 44, issue 5, 2018

Clinical and Patient-Related Outcomes of a Tapered Implant System With Switched Platform Conical Abutments: A Private Practice Field Trial

Research Group: Jacob Horwitz, Eli E. Machtei, Shai Frankental, Yaniv Mayer, Livia Joseph, Omer Cohen

Study Objective:

To examine 1-year survival and success rates of the C1 implant system with switched platform conical abutments and to evaluate patient related outcomes of therapy.

Material and Methods:

A total of 60 patients were recruited by 7 periodontists in their respective private practices and received 117 implants. Dental implants were installed according to standard implant therapy protocol. 3 to 6 months postoperatively, after evaluating interim implant success, implants were restored by the referring dentists.

Results:

- Two implants failed during the first year, resulting in a 1-year survival rate of 98.3%.
- Mean crestal bone loss at the mesial and distal sites after 1 year was 0.52 ± 0.45 mm and 0.54 ± 0.55 mm, respectively, resulting in a success rate of 95.4% (see table below).
- General patient satisfaction evaluation was 10 on a scale of 1 to 10.

Clinical Implications:

- The tapered conical connection dental implant system, used in private dental practices, showed a high survival rate of 98.3% after 1 year.
- Success rates were found similar to other implant systems on the market.

Implant data at 1 year*			
Clinical Parameter	Mean $\pm$ SD	Median	Significance
PII †	0.45 ± 0.47	0.33	
GI †	0.41 ± 0.44	0.33	
PPD †	2.29 ± 0.84	2.33	
PPD max †	3.07 ± 1.03	3.00	
Δ bone M, mm‡	0.52 ± 0.45	0.48	P<0.001
Δ bone D, mm‡	0.54 ± 0.55	0.55	P<0.001

*Wilcoxon signed rank test, $\alpha=.05$.
 PII indicates plaque index; GI, gingival index; PPD, probing pocket depth.
 † Number of implants = 83.
 ‡ Number of implants = 65.



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Paper submitted to COIR

Crestal bone loss of early loaded implants with a multiphosphonate coated surface: A randomized clinical trial

Research Group: Pablo Galindo-Moreno, Lourdes Gutierrez-Garrido, Lucia Lopez-Chaichio, Claudia Guerra-Lorenzo, Roque Rodriguez-Alvarez, Miguel Padial-Molina.

Department of Oral Surgery and Implant Dentistry, School of Dentistry, University of Granada, Granada, Spain

Study Objective :

To analyze the influence of early loading initiated 4 weeks after placement of C1 implants with a thin multi-phosphonate coated surface on peri-implant marginal bone loss.

Material and Methods:

34 patients were included in the study, 18 were assigned to the 4-week loading group. Dental impressions were obtained after either 4 weeks (test) or 8 weeks (control) and single crowns screwed-in 2 weeks later. Several variables were evaluated including radiographic marginal bone level (MBL) as well as several patient's level variables and those related to the restoration and surrounding tissues. This data was obtained at several time points up to a 1-year follow-up.

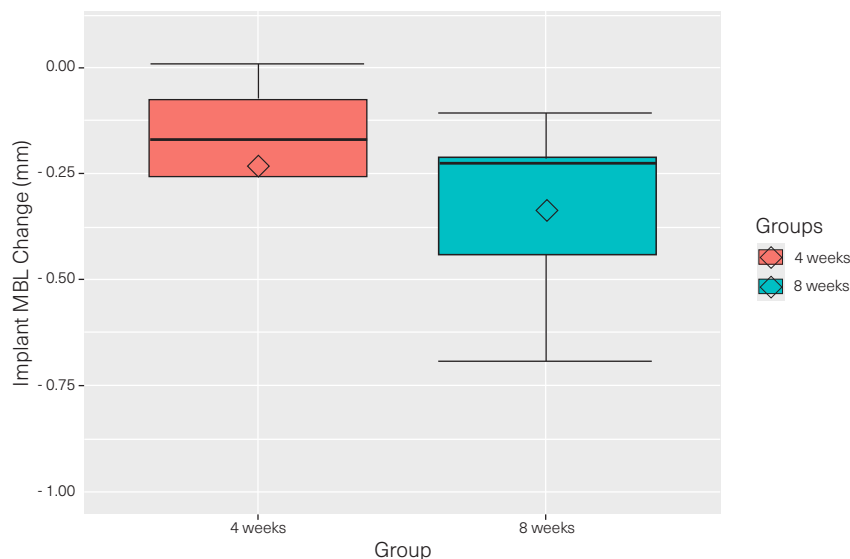
Results:

- Tissue was thinner in the 4 weeks group so shorter abutments were used in this group. No significant changes in marginal bone level were detected neither within group along time nor between groups.
- Average crestal bone loss at the 1- year follow-up was 0.15 ± 0.32 vs. 0.22 ± 0.37 ($p=0.443$), 4 vs. 8 weeks groups, respectively.

Clinical Implications:

- Use of C1 implants with a multi-phosphonate coated surface offered successful radiographical outcomes after 1 year of follow-up.
- Marginal bone levels were not affected by the time the loading protocol was initiated.
- No other clinical variable has shown to be of any influence on the final outcome.

MBL change from loading to the 1- year follow-up





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Immediate loading of the edentulous multi-risk patient jaw – An up to 3-year cohort study

Research Group: Mithridade Davarpanah, Philippe Rajzbaum, Keyvan Davarpanah, Pascal Zyman, Sarah Sater
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Study Objective:

To record the failure rates of C1 and V3 implants (MIS) placed in healed (H) and post-extraction (PE) sites in the mandible and the maxilla of the multi-risk patient following a 36-hour immediate loading protocol. Aim was to check the predictability of implants placed in PE and H sites.

Material and Methods:

Patients with several health risks attended implant therapy because of a failing bridge relying on teeth in the mandible or maxilla or had an edentulous jaw. They required an immediate fixed solution. Patients were affected by at least 2 of the following risks: advanced periodontal disease, poor hygiene, bruxism, diabetes, smoking, cholesterol, cardiovascular issues and blood pressure. Implants were placed in either H and or PE sites, 4–7 implants in the mandible and 6–9 implants in the maxilla; some implants were also left unloaded. When insertion torque was ≥ 40 Ncm, multi-unit abutments (MUA) of various heights were affixed. Following impression, the lab prepared a temporary acrylic prosthesis; After 36 hours, the prosthesis was delivered. After 3 months in the mandible and 6 months in the maxilla, the final prosthetic steps were undertaken and included the unloaded implants. Variables contributing to failure rates were investigated using the Kaplan- Meier survival estimate method and the Chi- square test.

Results:

215 C1 and V3 implants ($\varnothing 3.3-5 \times 8-16$ mm) were placed in 16 mandibles and maxillae of 9 men and 17 women. 25 prostheses relied on implants rehabilitated mixed H and PE sites. All implants passed the 1 year control; 57 implants passed 2 year and 21 implants passed the 3-year follow up. Five implants failed, 1 in the mandible and 4 in the maxilla. Failure rate was 2.3%, the failures occurred in 4 patients during the healing time only; **no temporization was interrupted.**

No variable was a significant contributor to implant failure. Failures occurred in mixed situations only, none happened when placed in H or PE sites only. Most failures happened in the maxilla, in healed sites but not in post extraction sites.

Clinical Implications:

- Immediately loaded prostheses relying on C1 and V3 implants placed in the multi-risk patient were highly predictable when 4–7 and 6–9 implants were placed in the mandible and the maxilla, respectively.
- More implants failed in the maxilla but not in PE sites.
- The low number of failures did not permit to identify any variable as a contributor to failure.
- Our experience showed that the multi-risk patient is willing to cope with implant failure as far as temporization is not interrupted during the healing phase.

Failure rates vs. healed and post-extractive sites in the mandible and the maxilla.

	healed	post-extraction
Maxilla	0%	2.0%
Mandible	5.3%	1.6%