

All-on-Four Concept of Immediate Functional Implant Supported Prosthesis ; 1 to 10 Years Retrospective Study

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Abstract: Prosthetic rehabilitation of All-on-4 concept implant treatment with immediate loading is a well-documented and predictable treatment option for patients with atrophic edentulous arch. This study reports on the treatment outcomes regarding this concept; Success Rate, Failure Rate, Surgical Complications and Prosthetic Complications. Retrospective 10 years chart review on All-on-4 immediate concept rendered at Center for Implant Dentistry at Loma Linda University between years 2012-2022 was assessed.

Purpose:

The purpose of this study was to evaluate **outcomes** of All-on-4 concept of implant supported prosthesis with immediate loading treatment within years 2012-2022, **10 years**.

Methods:

- Retrospective Chart Review
- Measurement of Marginal Bone Loss (MBL) on Radiographic Data
- Implant Success Evaluation
 - ➔ Life table analysis
- Implant Failure Rate Evaluation
 - ➔ Descriptive statistics
- Prosthetic Complication Analysis

Result:

A total of **39** patients received **43** full-arch immediately loaded maxillary and /or mandibular All-on-4 concept of Implant Supported Fixed Complete Dentures (ISFCDs).

The subject population comprised **11** male and **28** female patients between the ages of 28 and 81 (mean age = 63.0).

4 patients were treated with **both**-arches, and the remaining **35** patients received **single**-arch of All-on-4 ISFCDs.

A total of **172** implants were placed **43** jaws for 10years at Implant Dentistry Clinic. **28** implants in **7** maxillary arches, **144** implants in **36** mandibular arches.

Only **120** implants, **30** jaws; (**28** implant in **7** maxillary arches, **92** implants in **23** mandibular arches) were eligible for the measurements of MBL on Radiographic Data while the follow-up period.

Measurement:

(Sample Implant: ***4.3 x 11.5 mm** on the cite of #23; **T0**=Sep. 2017, **T1**=Sep. 2021)

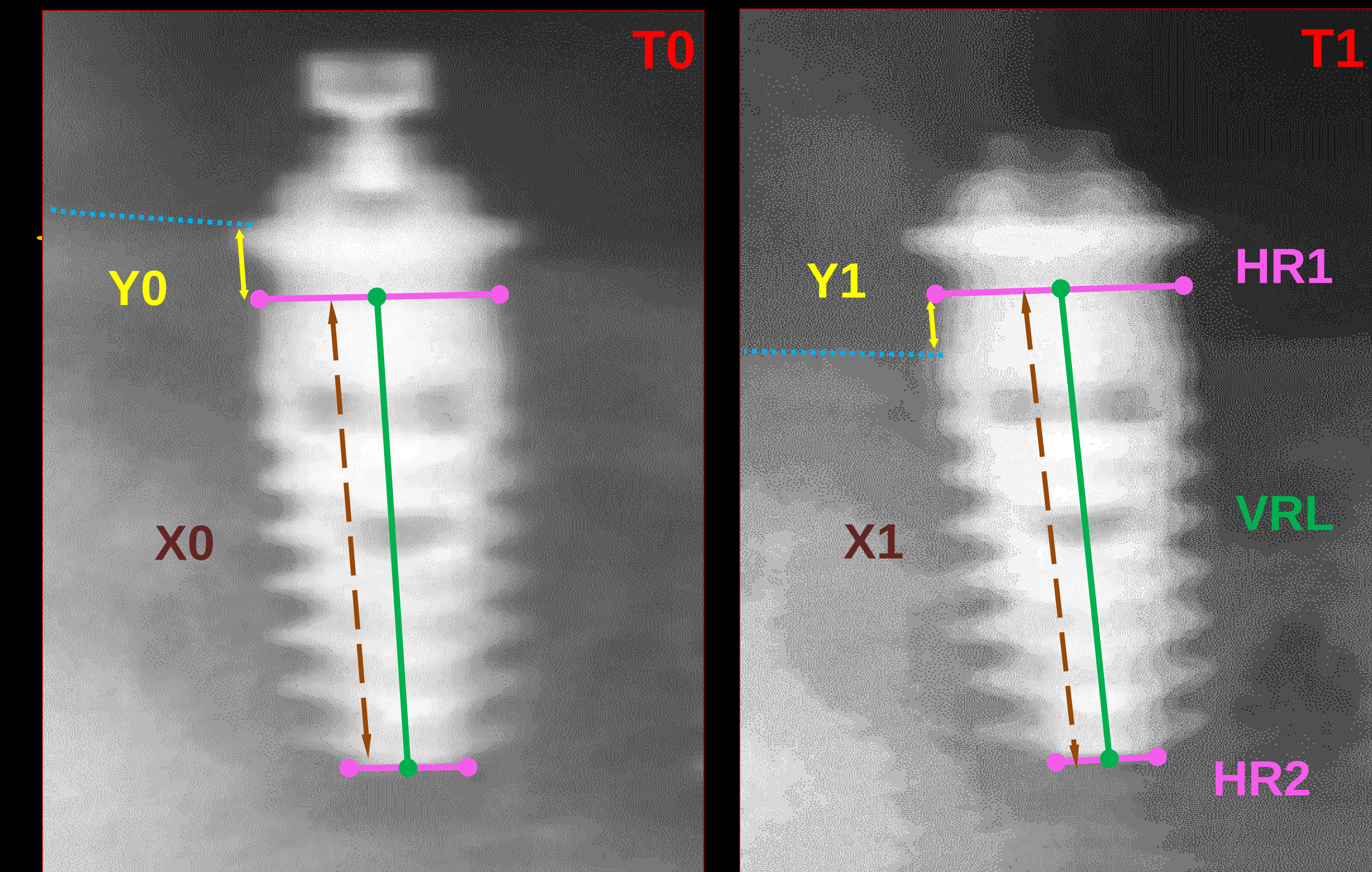
Value Calibration Formula

$$X0 (1) : Y0 (1) \\ = 11.5 (\text{Implant Length}) : Z0 (1)$$

$$\rightarrow Z0 (1) = 11.5 \times Y0 (1) / X0 (1)$$

$$Z1 - Z0 = \text{MBL change}$$

($\geq 4\text{mm}$: **Implant Failure**)



- Horizontal Reference Line 1 (**HR1**) ; Coronal Shoulder Line of implant fixture
- Horizontal Reference Line 2 (**HR2**) ; Apical Corner Line of implant fixture
- Vertical Reference Line (**VRL**) ; The Line between the center of **HR1** and **HR2**; The Line runs parallel with **X**- and **Y**-line

(References: T Ji, J Kan et al. 2012, SH Jansen VK et al. 1995; modified)

X and **Y**-values were measured using the software of measurement tool for picture files; 'Click Measure ver.2.3.0.14, ONOCHI-LAB'. **Y**-value will be zero when the implant bone contact point was at / above **HR1**. MBL change between **T0** and **T1** were calculated (**Z1-Z0**). $\geq 4 \text{ mm}$ or Implant Loss will be **Implant Failure**.

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Table- 1: Life Table Analysis

The Interval (months)	Total Implants	Implants Successes	Implant Failures	Absolute Implant Success Rate	Cumulative Implant Success Rate
0-12	120	120	0	1.000	1.000
13-24	104	104	0	1.000	1.000
25-36	72	72	0	1.000	1.000
37-48	56	54	2	0.964	0.964
49-60	28	26	2	0.929	0.895
61-72	16	16	0	1.000	0.895
73-84	16	16	0	1.000	0.895
85-96	12	12	0	1.000	0.895
Overall	120	116	4	0.967	0.895

Table- 2: Implant Failure Rate with Location

Location	Implants	Implant failures		Mean MBL change (mm)		
		No.	%	Mesial	Distal	Both
Mx A	14	1	7%	0.63	0.69	0.66
Mx P	14	0	0%	0.76	0.42	0.59
Md A	46	2	4%	0.77	0.69	0.70
Md P	46	1	2%	0.78	0.49	0.62
Total	120	4	3%	0.74	0.57	0.64

**Table- 3: Incidence of Prosthetic Complications
Interim Prosthesis**

Interim Prosthetic Complication	Prosthesis (Incidence)	Incidence Rate (%)
Misfit	0(0)	0
Base Fracture	3 (4)	10.0
Broken Denture teeth	12 (21)	40.0
Screw Loosening	1 (1)	3.3
Screw Fracture	3 (4)	10.0
Total	19 (30) / 30	63.3

**Table- 4: Incidence of Prosthetic Complications
Definitive Prosthesis**

Definitive Prosthetic Complication	Prosthesis (Incidence)	Incidence Rate (%)
Misfit	1 (1)	3.3
Base Fracture	2 (2)	6.6
Broken Denture teeth	5 (8)	16.6
Screw Loosening	0 (0)	0
Screw Fracture	5 (13)	16.6
Total	13 (29) / 30	43.3

Conclusion:

116 implants (of a total 120) remained in function with <4 mm of MBL change corresponding to the Cumulative Implant Success Rates of 89.5% and Absolute Success Rate of 96.7% after mean follow-up times of 37.8 months (range=11 - 93 months)

There were **no implant lost** during the follow-up period, however **4 implants** were identified as failure because of **MBL change $\geq$ 4 mm**. That corresponds to Implant Failure Rate of 3.3%.

The 4 implants failures occurred during the follow-up periods of 48-58 months with **Definitive Prosthesis** already been delivered.

1 of 4 failure implants had only incidence of screw loosening twice. **Relationship** between Implant Failure and Prosthetic Complications was **NOT** detected.

Patient, who had prosthetic complications, had a tendency to have multiple incidents related to the same prosthesis.