

# Immediate Nonocclusal Loading of Trabecular Metal Dental Implants in a Controlled Population: Interim 2-year results.

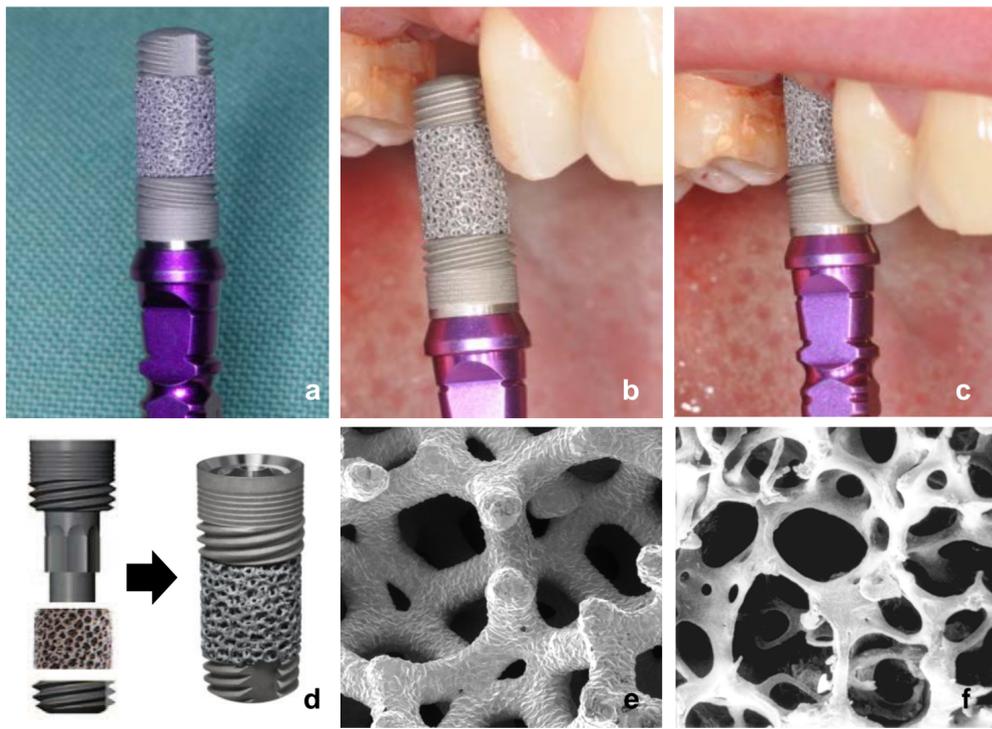
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Topic: Implant therapy outcomes, surgical aspects

## Background

Traditionally implants are kept load-free for 3-6 months to minimize the risk of implant failure. In recent years, advancements in implant designs and surgical techniques have allowed earlier restoration and shorter treatment times for selected patients without jeopardizing clinical success. Primary mechanical stability of the implant is essential for successful immediate loading without compromising secondary biologic stability by osseointegration over time. Study implants (Trabecular Metal Dental Implants, Zimmer Dental Inc., Carlsbad, CA, USA) were designed with external threads and an unthreaded porous midsection with a high coefficient of friction against bone to assist with primary stability (Fig.1). Secondary stability is by osseoincorporation, a combination of conventional osseointegration and bone ingrowth into the porous material<sup>1,2</sup>.



**Fig. 1** a-c) Examples of Trabecular Metal Dental Implants, Zimmer Dental Inc., used within this clinical study. In the study two diameters (4.7mm / 6mm) and three length (10mm / 11.5mm / 13mm) were used. The shown implants have a diameter of 4.7mm and a length of 13mm. **d**) Design of the study implant. The implant is built out of three parts: a titanium core, a Trabecular Metal shell and an apical part. **e-f**) SEM comparison of trabecular metal (e) and trabecular bone (f)

## Aim

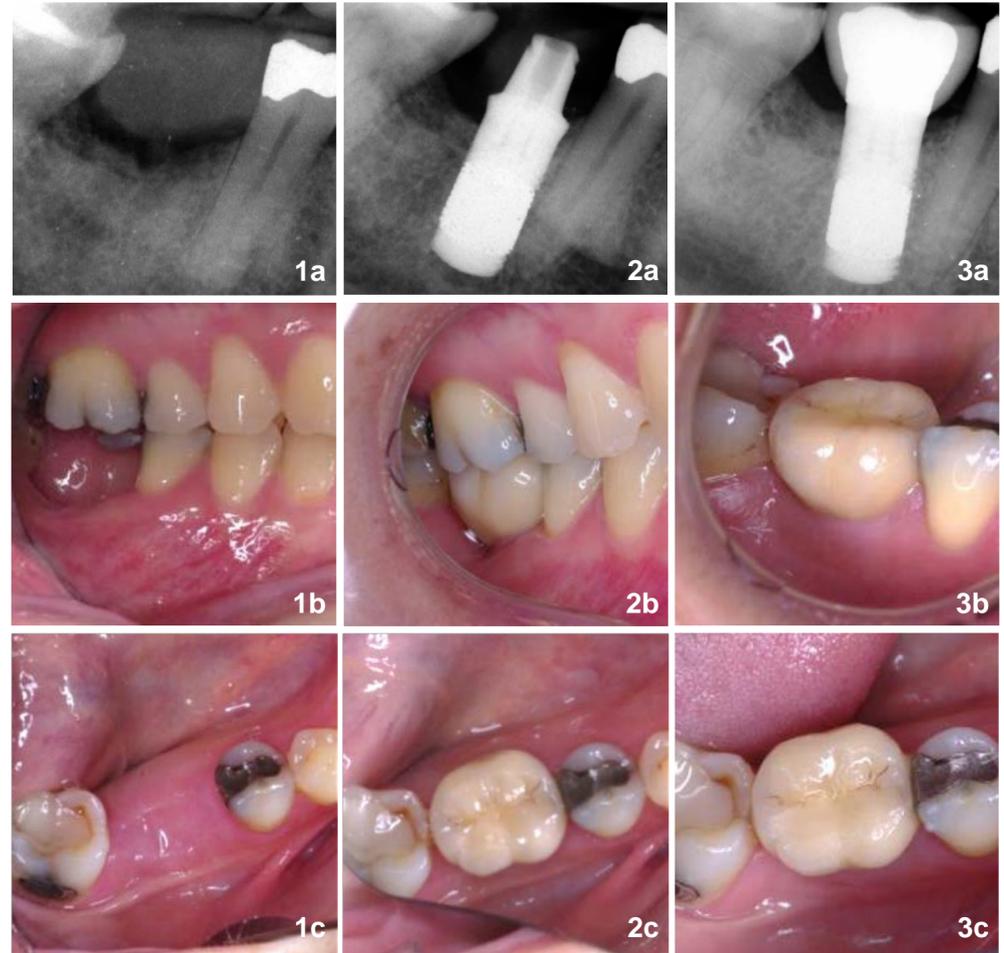
To clinically evaluate the efficacy of the study implants under immediate loading conditions, a 3-year proof-of-principle study was initiated. Interim results after the 2-year follow-up are presented.

Age at surgery (years)	Average	46
	Minimum	19
	Maximum	74
Gender	Male	11
	Female	19
Implant	Diameter (mm)	4.7 (n=24) / 6.0 (n=13)
	Length (mm)	10 (n=17) / 11.5 (n=13) / 13 (n=7)
Location	Maxilla	11
	Mandible	26
Bone Density Classification <sup>3</sup>	Type II	23
	Type III	14
Bone Width	Facial	Ø1.64mm (n=29)
	Lingual	Ø1.67mm (n=29)

**Tab. 1**) Overview of patient demographics, implant design, implant location and bone density<sup>3</sup> and bone width. All patients signed a consent form and were selected strictly according to the inclusion exclusion criteria.

## Methods and Materials

A total of 30 healthy, partially edentulous patients were enrolled and 37 implants were placed (Tab.1). To date, 22 patients with 29 implants were followed for 2 full years. Patients were uniformly treated by protocol (Fig.2). Implants that achieved 35Ncm of insertion torque were immediately provisionalized out of occlusion within 48h from surgery (Tab.2a). Between 7-14 days after implantation, implants were definitely restored in occlusion.



**Fig.2**) Radiographs (a) and clinical photos (b,c) of a study patient. Taken at pre surgery (1), immediate post surgery (2) and at two year follow-up control (3). This case shows tooth 46 (FDI) of a 50-year old patient. The combined change in bone level from provisional restoration to two-year follow-up was 0.11mm. No complications were reported.

## Results

To date, one implant failed to integrate in the study group (survival = 97.3%, n = 36/37) and all remaining implants survived. Mean crestal bone loss 2 years after provisionalization was 0.46mm (distal 0.41mm; mesial 0.5mm) (n=29) (Tab.2b).

2a	ISQ at Surgery	Final Insertion Torque	Gingiva Index <sup>4</sup> at Final Rest. <sup>+</sup>	Gingiva Index <sup>4</sup> at 2 year
	Ø77.5 (48-87)	Ø54.7 (35-132)	0.19 (n=37)	0.1 (n=29)
2b	Crestal bone loss <sup>5</sup> at 2year MESIAL	Crestal bone loss <sup>5</sup> at 2year DISTAL	Crestal Bone Loss <sup>5</sup> at 2year combined	Change of bone level 1year - 2year
	0.5mm (n=29)	0.41mm (n=29)	0.46mm (n=29)	-0.04mm (n=25)

**Tab. 2**) a) All implants showed good primary stability, as demonstrated by final insertion torque, Osstell ISQ and clinical findings. Gingiva Index<sup>4</sup> demonstrated good soft tissue preservation at final restoration and further improved for the 2 year follow up. b) Bone loss was evaluated from provisional restoration the 2-year control.<sup>5</sup>After one year, marginal bone levels were stable and showed an average gain of 0.04mm from the one-year to two-year controls.

## Conclusions

These clinical findings after two years of function indicate that immediate loading of Trabecular Metal Dental Implants was safe and effective within the controlled study conditions (Tab.2).

## References

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